MODELING RESIDENT ATTITUDES ON THE ENVIRONMENTAL IMPACTS OF TOURISM: A CASE STUDY OF O‘AHU, HAWAI‘I

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By
Kimberly J. Lottig

Thesis Committee:
Lisa Assante, Chairperson
Pauline Sheldon
Ivan Wen
We certify that we have read this thesis and that, in our opinion, it is satisfactory in scope and quality as a thesis for the degree of Master of Science in Travel Industry Management.

THESIS COMMITTEE

[Signatures]

Chairperson
ABSTRACT

Modeling Resident Attitudes on the Environmental Impacts of Tourism: A Case Study of O'ahu, Hawai'i

This research is an exploratory analysis of sustainable tourism development and resident attitudes on O'ahu regarding the resource consumption and environmental impacts caused by tourists. A paper survey was administered to a convenience sample of residents (N=440) at local area malls and local businesses. The instrument investigated residents' perceptions of tourism's environmental impacts and how these perceptions relate to their personal benefits from tourism, community satisfaction, and views on sustainable tourism in Hawai'i. Structural equation modeling was used to explore the various relationships between residents' views of tourism and their attitudes towards sustainable tourism development.
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CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

Introduction

According to the World Tourism Organization (WTO) (2007), tourism is a booming global industry. International tourist arrivals of 842 million travelers in 2006 represented almost a 4.6 percent increase over the previous year. Fifty percent of tourists traveled for leisure in 2005. The economic impacts of tourism are increasing even faster as international tourism receipts in 2005 reached US$680 billion, representing a 9 percent increase over 2004 (WTO, 2006). As the number of people moving around the globe and the amount of money they are spending continue to grow, the tourism industry is gaining more attention as a contributor to world economic output, but also for some of the uneconomic costs of travel. While tourism is widely viewed as bringing income and employment to destinations, there is a cost that must be paid by the residents and/or the environment for these benefits (Mortz, Ray, & Jain, 2005). For sustainable tourism development to occur and for the benefits brought by tourism to be fairly distributed throughout the community, it is important that residents are included in the tourism planning process (Jamal & Getz, 1995).

Hawai‘i is a destination with a long history of tourism development, especially for the leisure market. In 2005, the state welcomed a record 7.5 million tourists who spent a total of US$11.9 billion. Of these visitors, 4.7 million came to the island of O‘ahu (DBEDT, 2006a). The entire population for the state of Hawai‘i is 1.28 million, of which 900,000 live on the island of O‘ahu (DBEDT, 2005). In light of the population, the
number of tourists visiting O'ahu is very high. According to the Department of Business, Economic Development & Tourism (DBEDT), the average daily census of visitors on the island of O'ahu is almost 60,000. The ratio of visitors to residents is 6.5:10. The majority of tourism development on the island is located near Waikiki Beach, which is an intensely-developed area that contains a large percent of the hotel rooms for the entire state. Waikiki is about a half hour drive from Honolulu Airport and is home to tall hotels and condominiums, restaurants, and upscale shopping. There is a large amount of pedestrian traffic and the green space in Waikiki is mostly irrigated and landscaped.

Because of the demand by both tourists and residents on the limited natural resources of the island, O'ahu has increasing need for energy and water inputs as well as the urbanization of much its land. While tourism also brings jobs and income, these changes in demand have created environmental and social costs that may have to be paid by local residents. Changes in demand for energy require the importation of additional fossil fuels for tourist accommodations, activities, transportation, as well as the needs of residents. The island's water supply depends on the vulnerable caprock aquifers that can be polluted by overpumping to meet high demand or by runoff from urban areas (Oki & Brasher, 2003). Also, future supplies of groundwater are cut off when the overriding land is paved and rainwater is channeled directly to the ocean. Paving also causes increased sedimentation which results in erosion and degradation of the coral reefs. In addition to the problems caused by paving, urban development changes the character of the natural environment as well as fragments habitat for native species. Environmental
damage caused by these changes can take years to mitigate or the effects may be impossible to reverse.

Residents living on O‘ahu have a vested interest in seeing tourism development become more sustainable. Residents may not even be aware that they are competing with tourists for energy, water, and other resources such as land. Residents may also be unaware of the impacts already occurring on the island because the changes have been incremental, disguising their severity. Over time, however, incremental changes can evolve into a crisis if an innate threshold (such as renewable water supply) is passed. Steps towards sustainable tourism development would benefit all stakeholders because residents would have to compete less with and benefit more from tourists.

O‘ahu is an island constrained by its resources and relies heavily on imported energy and goods to support the existing development. In order for O‘ahu to move towards sustainable tourism development, residents’ perceptions are important for assessing not just the economic, but also the environmental, social and cultural impacts of tourism. Regarding the development of sustainable tourism policy, it is very important to take these non-economic costs and who will have to pay them into consideration. Because in traditional tourism development some stakeholders benefit disproportionately, gauging residents’ perceptions to move towards sustainable tourism development can ensure that the contributions of tourism are spread more equally (Twining-Ward & Butler, 2002).

The objective of this research is to examine the perceptions of residents regarding the resource consumption and environmental impacts caused by tourists in O‘ahu. A
survey was distributed to examine residents’ perceptions of tourism’s environmental impacts and how these perceptions relate to their personal benefits from tourism, community satisfaction, and views on sustainable tourism in Hawai‘i. Structural equation modeling was used to examine the relationships between residents’ views of tourism and their attitudes towards sustainable tourism development.

**Problem Statement**

Gauging resident attitudes is essential for effective tourism planning. Understanding these attitudes is difficult because residents are a complex and heterogeneous group whose opinions of tourism are affected by many things. Perceptions of how well the government manages tourism, tourism’s environmental impacts, and community satisfaction determine how they view the sustainability of tourism on O‘ahu. The objective of this research is to increase the understanding of residents’ attitudes on government management and the environmental impacts of tourism and determine how these attitudes affect perception of community satisfaction and sustainable tourism development.

**Research Hypotheses**

The ensuing research hypotheses will be addressed throughout this study.

H1: Perceived government management of tourism will have a positive effect on overall community satisfaction.

H2: Perceived government management of tourism will have a positive effect on perception of environmental tourism impacts.
H3: Overall community satisfaction will have a positive effect on attitudes for sustainable tourism development.

H4: Perception of environmental tourism impacts will have a positive effect on overall community satisfaction.

H5: Perception of environmental tourism impacts will have a positive effect on attitudes for sustainable tourism development.

H6: Perceived government management of tourism will have a positive effect on attitudes for sustainable tourism development.

**Delimitations**

The magnitude and extent of this study are met by several constraints. The following factors should be considered while reviewing the study:

1. the results may not be representative of all residents of the Hawai‘ian Islands,
2. the sample surveyed was a convenience sample, and
3. the sample may not represent the views of residents who have no affiliation with the surveyed groups.

**Limitations**

Several procedural limitations should be considered when reviewing the results of the study:

1. Residents' ability to convey their attitudes was related to their understanding of the survey statements.
2. The qualitative nature of the questions allowed differing interpretations among residents, particularly if they were unfamiliar with a factor that could affect how they respond.

3. The model of mass tourism development in Hawai‘i is so well-established that residents are less familiar with the advantages of STD and therefore may not have fully understood the related survey statements.

4. The survey respondents were a convenience sample of mall patrons and some employees of local businesses within which residents with certain characteristics (i.e. the elderly) might be underrepresented. Similarly, because certain areas of the island are farther from malls, residents from these more remote areas might also have been underrepresented.

5. Mall patrons were approached to participate in the survey while they were at the mall, most often while dining. All participation was on a voluntary basis though it is possible that people agreed to fill out the survey but did not adequately read and process each statement before filling in a response. For these participants that were hurrying to complete the survey, the instrument would not effectively gauge their attitudes.

6. Unidentified factors remain that partially explain residents’ attitudes.

Assumptions

The following assumptions were made in justification of this study:

1. The survey instrument was inclusive of the factors influencing how residents feel about sustainable tourism on O‘ahu,
2. respondents were not prejudiced in their responses, and

3. respondents accurately depicted the opinions of residents on O'ahu tourism.

Definition of Terms

Caprock – a layer of rock over an aquifer that retards the vertical flow of water.

Community – for the purpose of this research defines the island community of O'ahu.

Ecotourism – also referred to as nature tourism, alternative tourism, or green tourism, the purposeful time spent in the natural environment of a destination used to learn about and interact with other cultures and to economically aid destination communities in environmental preservation efforts (Kahn, 2003).

Environmental – of or relating to the air, water, minerals, organisms, in the natural environment (environmental, n.d.).

Joule – the SI unit of work or energy (abbreviated J) equal to the work done by a force of newton when its point of application moves through a distance of one meter in the direction of the force: equivalent to $10^7$ ergs and one watt-second (joule, n.d.).

Megajoule – a unit of work or energy that is equivalent to one million joules abbreviated MJ (megajoule, n.d.).

Resident – one who resides in a particular place permanently or for an extended period (resident, n.d.).

Sustainable tourism development – development focused on managing the balance between environmental, social, and economic present and future costs and benefits (DBEDT, 2006b).

Tourist – a person who is traveling, esp. for pleasure (tourist, n.d.).
LITERATURE REVIEW

Tourism and the Environment

Tourism and the environment have a complicated relationship. Tourists interact with the environment and consume resources in their transportation, accommodations, and activities at a destination. For example, tourists fly to a destination on an airplane that consumes fossil fuels, use water for showering at their hotel, and perhaps visit nature preserves or other natural areas during their stay. Tourist actions such as these can impact the environment in both positive and negative ways. Tourism, in particular leisure tourism, can raise environmental awareness and make conservation politically and economically possible (Cohen, 1978). Conversely, tourism may also allow rapid and inequitable consumption of limited natural resources such as fossil fuels and fresh water.

Environmental Benefits of Tourism

Tourism can be beneficial to the environment in several ways. Gössling (2002) contends that tourists, especially higher spending ones, are attracted to clean and aesthetically pleasing landscapes indicative of a healthy environment. Tourism can facilitate conservation because their interest in and desire to see pristine environments can legitimize the preservation of these environments (Cohen, 1978). Residents, planners, and government officials who realize that tourists are attracted to destinations because of their environmental offerings may be more willing to pass legislation and commit funds to conservation. Examples of these resources in Hawai‘i include parks, mountains, coral reefs, and beautiful beaches and coastlines. In order to keep tourists
coming to see and experience the pristine environment, protection of these resources is necessary and thus can be politically and economically justified (Cohen, 1978). Tourism development must occur in a controlled and planned manner in order to protect the local resources.

Cohen (1978) argued that tourism development can also replace more environmentally destructive types of industries (such as manufacturing and mining) as heavy industrialization is not compatible with an unspoiled environment. Mining produces large amounts of hazardous waste containing high concentrations of heavy metals that can contaminate soil and groundwater (David, 2002). For example, David (2002) found that a spill of mine waste on Marinduque Island, Philippines had caused increased concentrations of lead, manganese, copper, and zinc in marine sediments.

While tourism itself can cause many detrimental environmental impacts, it is generally considered cleaner and less exploitative than heavier industrialization. However, despite the increasing local awareness of environmental resources and displacing more destructive industries, there is an even longer list of non-economic costs to the environment associated with tourists’ activities.

_Environmental Costs of Tourism_

Cohen (1978) presents a useful framework for examining the environmental costs of tourism. Environmental impacts can occur based on four features of a destination:

1. intensity of destination use and development

2. resiliency of the destination’s environment,

3. investment return schedule of a destination’s stakeholders, and
The Intensity of Destination Use and Development

The first feature, the intensity of destination use and development, is a function mainly of the type of tourists that visit the destination. This can be examined in terms of the destination life cycle (Butler, 1980). The destination, over time, passes through the different life cycle stages based on the volume and type of tourist that is visiting. Initially, exploratory and adventurous travelers 'discover' the destination but arrive in small numbers. Demands of tourists for infrastructure and impacts on the environment are small.

As time passes and more tourists hear about the destination, arrivals increase until the destination reaches a state of mass tourism (Butler, 1980). At this stage, the infrastructure such as airports, roads, and accommodations is critical to the arrival and movement of tourists. In addition, these tourists have high standards for the type of infrastructure needed (Cohen, 1978). Though the individual tourist may not cause extensive damage, the high volume of visitors multiplies the cumulative impact on the environment and demand for resources can be considerable (Christensen & Beckmann, 1998; Gössling, 2002). Finally, tourism development can enter the stagnation phase where the destination has become commoditized and tourist arrivals level off (Butler, 1980). Finally, the cycle is completed with the destination entering either the decline or the rejuvenation phase which includes destination degradation and falling arrivals or revitalization of the environment and tourism offering followed by further increases in arrivals, respectively (Butler, 1980).
Leisure travelers are often more indulgent while on vacation, resulting in an increase in resource demand relative to their home consumption patterns (Warnken, Bradley, & Guilding, 2004). Many destinations may attempt to attract fewer, higher-spending travelers in order to reduce tourist numbers while keeping tourism receipts high. Wealthy travelers demand more in terms of a clean, unspoiled environment (Gössling, Hansson, Hörstmeier, & Saggel, 2002). High-spending tourists may seem to be more attractive visitors, but they also consume more resources per person (Gössling et al., 2002). Length of stay appears to have little effect on tourists' consumption patterns as shorter trips often result in similar total consumption as longer stays (Christensen & Beckmann, 1998).

Waikiki on O'ahu is an example of such intense tourism development. Though the physical area is small, Waikiki has a large number of hotel rooms that are largely serviced by imported labor which in turn can strain roads, schools and housing (Cohen, 1978). The intense development has transformed Waikiki from peaceful beaches (as visible in pictures of the area in the 1920's) to block after block of hotel, condominium, and timeshare buildings with small pockets of intensely landscaped green space.

The Resiliency of the Destination's Environment

The ability of the destination to absorb tourists and their impacts is an important feature to determine the impacts of tourism and to plan the development of sustainable tourism. The impacts of large numbers of tourists seem to be better absorbed by cities whose infrastructure is developed and in place rather than more fragile environments such as islands (Cohen, 1978). Impacts are more severe on islands because resources
such as land are inherently constrained, thus increasing competition for those resources among tourists and residents (Cronk, 1997). Islands by their nature have a high proportion of coast, which is generally deemed one of the most advantageous environments to develop tourism and therefore are very attractive for tourism development (Erdmann, 1997).

Based on the 1972 work of Spiegel, Cohen (1978) uses German Ostsee as an example of a destination's ecosystem resiliency being overcome by intense tourism development. Ostsee was a traditional countryside transformed quickly by rapid urbanization as a result of a tourist boom (Cohen, 1978). This building of tourism infrastructure destroyed the very rural environment that attracted the tourism development to begin with.

The Investment Return Schedule of a Destination's Stakeholders

The time frame over which tourism stakeholders expect to recoup their investment is an important component of tourism development and its impacts on the environment. Moreover, the stakeholders in control of tourism development can vary by destination. Developers and private industry can elect to take an exploitative or speculative approach to development, demand a hasty return on investment, and skip town for the next development opportunity (Cohen, 1978). Obviously, such developers take no long-term interest in the viability of a destination or its future ability to attract tourists. As Wen (1998) explains, "one fundamental cause for environmental problems is that those who exploit natural resources can obtain benefits immediately without having to pay the full cost (both economic and social) of depletion, while these costs, paid either
now or in the future, are transferred to the society as a whole.” Thus, developers can cause deterioration of the very resources that the tourism industry is built upon. On the other hand, when controlled by stakeholders with a longer-term perspective (such as residents or local policy makers), tourism development can be paced to limit the exploitation of resources and thus the environmental and social costs.

As an example of a destination where tourism developers are focused on short-term returns, Cohen (1978) offers the case of the Costa Brava in Spain. Hotel developers in Costa Brava raced each other to build on the finest beaches resulting in large-scale development that erode the quality of the very beaches themselves (Cohen, 1978). Therefore, by developing Costa Brava for the short term, the destination has become less sustainable in the long term.

The Transformational Character of the Tourism Development

There are endless examples of tourism development having a transforming effect, most likely negative, on a destination. These transformations occur either when a natural attraction (such as a beach) is prepared for tourist use or after the building of a man-made attraction (Cohen, 1978). Residents are the most common victims of the resulting changes. As tourism development consumes resources and damages the environment, it can erode residents’ quality of life and erode the respective culture (Ahn, Lee, & Shafer, 2002). By urbanizing and overdeveloping, tourism development can break the bonds and decontextualize residents’ relationships with the local environment (Gössling, 2002). If not properly controlled, residents in mass tourism destinations will endure congestion, noise, neighborhood and environmental dereliction, and higher prices resulting from
competition with tourists for scarce resources (Cavus & Tanrisevdi, 2003; Liu & Var, 1986).

Singapore is an example of a destination whose character has been transformed by development (Cohen, 1978). Singapore possessed few natural attractions but still decided to pursue tourism development. According to the 1969 work of Polsky as cited by Cohen (1978), Singapore constructed several contrived attractions such as converting the island of Sentosa into South Seas Island in order to attract foreign tourists. These contrived attractions completely transformed the character and environment of the original destination.

Tourism and Energy Consumption

Tourism requires substantial energy inputs. Residents also require energy for their daily activities and limits to the availability of energy resources puts them in competition with tourists and their energy needs. High energy costs can result from such an imbalance between supply and demand. Energy supplies to both tourists and residents come mostly from the burning of fossil fuels such as petroleum and coal. Burning fossil fuels in vehicles and for electricity causes the emission of greenhouse gases into the atmosphere, leading to air pollution and global warming (Gössling, 2005).

Quantifying Tourism Energy Use

Monitoring energy use in tourism is extremely difficult because of the fragmented nature of the tourism industry and because residents and tourists are using many of the same facilities (Warnken et al., 2004). Extracting the exact amount of energy used by
tourists alone is not feasible. Energy inputs are required for the segments of transportation, accommodation, and activities for the tourism industry. However, there is a significant variance between the three aforementioned categories as transportation alone accounts for 93 percent of the energy consumed by tourists (Gössling, 2002). Table 1 is an estimate of global tourism energy consumption and carbon dioxide emissions by category and for the total global tourism industry. According to Gössling’s (2002) estimates, energy consumed by the travel industry exceeded $1.43 \times 10^{19}$ joules! The large energy inputs and emissions outputs show that in terms of energy, tourism is an unsustainable industry (Gössling, Peeters, Ceron, Dubois, Patterson, & Richardson, 2005).

Table 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Energy use (PJ)</th>
<th>Relative percentage</th>
<th>CO2 emissions (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>13,223</td>
<td>93.9</td>
<td>1,263</td>
</tr>
<tr>
<td>Accommodation</td>
<td>508</td>
<td>3.6</td>
<td>81</td>
</tr>
<tr>
<td>Activities</td>
<td>350</td>
<td>2.5</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td>14,081</td>
<td>100.0</td>
<td>1,399</td>
</tr>
</tbody>
</table>

Note. Adapted from Gössling, 2002.

Transportation

Energy inputs for transportation are in the form of fuel for cars, airplanes and other forms of transportation. In addition to being the largest contributor, accounting for almost 94 percent of tourism-related energy consumption or $1.3 \times 10^{19}$ joules, the transportation sector includes aviation. Aviation emissions are particularly harmful
because they are released into the upper troposphere where they have a greater impact on global warming (Gössling, 2002). Of the factors affecting the energy consumption of travel, travel distance to the destination is the factor with the largest effect. The average energy expenditure for transportation is 2,475 megajoules (MJ) for domestic tourism and 8,163 MJ for international trips, but, depending on the travel choices that tourists make, this number can vary greatly (Becken, Simmons, & Frampton, 2003). While there are limitations in the ability to reduce the energy consumed during transportation, as it is a function of travel distance, the relative contribution of travel distance to energy consumption can be reduced by staying longer at a destination (Gössling et al., 2005).

Accommodation

Energy inputs for accommodation are difficult to tally because of the fragmented nature of this sector and the difficulty in separating tourist consumption from resident consumption (Warnken et al., 2004). Consumption estimates usually include electricity and gas used for heating, air conditioning, lighting, and cooking. Hotels are the most common type of accommodation and the largest consumers of energy. High energy consumption is due to energy intense amenities offered at hotels, such as pools (Becken, Frampton, & Simmons, 2001). Hotels can consume 256 MJ per bed night, excluding gas for cooking (Gössling, 2002). While accommodations consume significantly less energy than the transportation sector, there are more ways to decrease energy use or increase energy efficiency (Becken et al., 2001). Efficiency is often a function of the building style, insulation, technical standards, and provided amenities (Becken et al., 2001; Warnken et al., 2004).
In order to increase energy efficiency, many hotels have installed energy management systems that detect when guests are in their rooms. The system will turn off the air conditioner when the room is vacant or when the balcony door is open. While it may seem logical that occupancy levels of hotels would be a significant variable in consumption patterns, because of the large amount of public areas and numerous, energy-intense facilities, occupancy has little effect on usage (Warnken et al., 2004).

Activities

For many tourists, activities are an important part of their experience at a destination. For instance, amusement parks such as Disneyworld and Sea World are attractions that tourists visit as part of their activities at a destination. Museums, such as the Louvre in Paris, France and visitors centers, such as are found in national parks, are additional examples of important tourist attractions. These activities consume energy. Energy inputs for activities exhibit large variations depending on the activity chosen. Generally speaking, the nature of the activities themselves is so diverse, it is difficult to systematically tally their energy consumption (Becken et al., 2002). Activities such as helicopter rides and scuba diving use orders of magnitude more energy than activities such as museums and zoos. On average, a tourist will use 250 MJ on activities during a longer vacation (Gössling, 2002).

Tourism and Energy in Hawai‘i

The State of Hawai‘i Energy Resources Coordinator (2005) has determined that Hawai‘i imports 89 percent of its primary energy, making it the most oil-dependent state. Also, Hawai‘i residents pay the highest costs for both electricity and gasoline in the
nation (SHERC, 2005). In 2004, the state consumed $3.42 \times 10^{11}$ MJ costing customers $4.35$ billion (SHERC, 2005). Tabatchnaia-Tamirisa, Loke, Leung, and Tucker (1997) estimated that tourists visiting Hawai‘i account for approximately 40 percent of total energy use. Of that energy, 94 percent is generated by burning imported petroleum and only 4 percent comes from renewable sources (SHERC, 2005).

In order to encourage energy efficiency, the Hawai‘ian Electric Company (HECO) offers rebates to businesses for utilizing energy efficient technology. Many hotels in Waikiki utilize energy management systems to try to cut back on energy consumption and thus save money. Additionally, most Hawai‘ian hotels are located near the ocean which represents a virtually unlimited supply of cool water that can be used to cool rooms. Presently, the water is cooled by refrigeration systems that run on burning crude oil. Currently, the city of Honolulu is examining the feasibility of a project to create a system that uses the cold (deep) ocean water for downtown office building cooling systems. If the program is successful, hotels in Waikiki could take advantage of the technology. The tradewinds also represent a possible source of wind energy that could be developed to reduce fossil fuel burning. While tourist demands for energy are high, technological innovation provides potential to drastically reduce the dependence on traditional forms of energy created by burning fossil fuels.

Tourism and Water Resources

For one third of the world’s population, water is scarce. Most fresh water is consumed by agricultural activities necessary to keep up with the enormous demands for food required to feed the world’s population. Food demand continues to grow as a result
of a larger population, many of whom are wealthier and require a more varied diet. A major result of world water scarcity from overuse of water resources is the pollution and drying up of rivers, depletion of groundwater, and unfair distribution of water supplies to those who can afford to pay for it (Anonymous, 2006). This trend could widen the gap between rich and poor across the globe.

Tourists use water in many ways. Surface water such as oceans or lakes is used for recreation such as swimming, boating, and snorkeling. In order to enjoy their water recreation, tourists require that water be clean and of good quality (Yap & Kahoru, 2001). Tourists consume groundwater both directly for drinking, showering, and flushing toilets and indirectly such as irrigating golf courses, pools, and water use in restaurants (Christensen & Beckmann, 1998; Gössling, 2001). In their use of water, tourists also generate large amounts of wastewater in the form of sewage, irrigation runoff, and cleaning chemicals which must be treated at wastewater treatment plants (Christensen & Beckmann, 1998). Wastewater that is not properly treated can pollute groundwater by seeping or being injected into the ground or be carried out to the ocean via surface water drainage ways such as channels and storm sewers. Tourists' wastewater places an additional burden on water resources and wastewater infrastructure, which may already be limited in a destination. In fact, hotel guests can consume up to ten times more water than local residents (Mieczkowski, 1995).

Surface Water

Tourists and tourist facilities generate large amounts of sewage and fertilizers used to enhance landscaping or golf courses on resort properties. What is generated can
be washed out into rivers, streams, and especially the ocean. Sewage contains fecal coliform, a hazardous form of bacteria that can make humans using sewage-tainted water extremely sick (Yap & Kahoru, 2001). Sewage and fertilizers increase the amount of nutrients in water, which accelerates the growth of algae (Erdmann, 1997; Gössling, 2001). This algal growth, in addition to harvesting pieces of the reef for souvenirs can kill the fragile coral reefs. Coral reefs such as the Great Barrier Reef in Australia or the reefs of the Seychelles are an important visitor attraction. Reefs also provide an important function by dissipating wave energy before reaching the shore. If the reefs are no longer present to act as breakwaters, coastal erosion can occur (Erdmann, 1997). Figure 1 diagrams the function of coral reefs and the damage that can occur to shorelines if they no longer function as breakwaters.

Another indirect impact on water resources is produced by tourism development. Undeveloped land usually contains vegetation that acts to retard the flow of runoff preventing erosion and as a filter to absorb chemicals before they are washed into waterways. Changing the land use by building hotels and other tourist infrastructure increases sediment loads to streams and the ocean which smothers and kills coral reefs, reducing the species diversity of marine life, and degrades the clarity of ocean water for nearshore activities (DBEDT, 2006b). In addition to the beach activities of tourists, many residents use the nearshore waters for swimming, snorkeling, scuba diving, and fishing and this is an important part of their life. These activities depend on the health and vitality of the coral reefs.
There are ways to decrease the detrimental effects of wastewater. First, wastewater should be sent to a treatment plant where chemicals and pathogens are removed before discharging the cleaner water into the ocean or injecting it underground. If it is properly treated to remove chemical and biological contamination, wastewater can be reused to supplement golf course and landscaping irrigation. On the more complex end, destinations can develop a basin management system to better manage the interaction of changing land use, sedimentation, and runoff (Ruiz et al., 2004). Increasing the sustainability of land-water interactions is necessary for overall destination sustainability.

**Groundwater**

Groundwater is most often the main source of freshwater for residents and tourists. Groundwater is extracted from aquifers through pumping and is piped into residential and tourist areas. However, groundwater is also important for sustaining ecosystems in coastal areas where the groundwater is close to the surface (Gössling, 2001). As the demand for groundwater grows, pumping of the groundwater increases. If the rate of groundwater extraction exceeds the rate of groundwater recharge, the groundwater table, or the point at which the bedrock or sediment is saturated, will be lowered. Lowering the groundwater table, especially in coastal areas, can have severe consequences such as land subsidence and pumping saltwater or chemical pollution into the groundwater aquifers (Gössling, 2001).

The accommodation sector can greatly reduce its use of fresh groundwater by emphasizing water conservation. Constructing water catchments to collect rainwater,
using flow limiters on showers and faucets, installing low-flow toilets, and inspecting pipes for leaks are just a few of the ways to decrease water use and waste (Gössling, 2001). Education is also another approach. Educating employees and guests about water scarcity and therefore the need for conservation is another effective approach.

Tourism and Water in Hawai‘i

Because Hawai‘i is a group of islands, their water resources are especially sensitive to tourism-related impacts. Most of the islands are ringed by coral reefs that protect the shoreline from the power of waves. However, intense development has changed the drainage patterns on the island. For instance, in Honolulu many drainage channels are concreted, keeping water from percolating down into groundwater as it would in a stream with a sediment bottom.

Also, land-use changes have resulted in increased sedimentation and chemical and biological pollution in the ocean. Paved water channels can increase and accelerate the flushing of contaminants such as heavy metals to surface waterways and into the ocean (Oki & Brasher, 2003). In the spring of 2006, O‘ahu experienced unusually heavy and extended rains that culminated in a ruptured main sewer line and 48 million gallons of raw sewage being pumped into the Ala Wai Canal which drains directly into the ocean at Waikiki Beach (Yap, 2006). For several days, tourists and residents were unable to swim in the ocean because of the large amounts of contamination carried into the ocean by storm water runoff.

In light of these incidents, it is very important to more carefully manage O‘ahu’s water resources by protecting the fragile aquifers from pollution and overpumping as well
as properly managing wastewater and drainage from the island is necessary for residents
and tourists alike to enjoy safe drinking water and a clean ocean.

Drinking water in Hawai‘i comes entirely from groundwater aquifers replenished
by rainfall which will not be able to keep up with future demand (Landers, 2003). As of
2003, the Honolulu Board of Water Supply (BWS) produced 160 million gallons per day
from groundwater wells (Landers, 2003). Hawai‘ian tourists directly and indirectly
consume large amounts of groundwater for restaurants, pools, showers, and golf course
irrigation. To handle the wastewater produced on the island, the City and County of
Honolulu operates eight wastewater treatment plants in addition to facilities used directly
by tourist facilities (Oki & Brasher, 2003).

Groundwater aquifers on the islands are volcanic-rock aquifers overlain by
sediments, some of which form a caprock, or confining layer that prevents the upward
flow of freshwater into the ocean (Mortz et al., 2005). Near the ocean, the aquifers are
confined on the bottom by a transition zone of brackish water overlying dense, cooler
seawater. As Figure 1 shows, groundwater near the coastal areas of the island of O‘ahu
exists as a “freshwater lens” between the seawater below and the caprock above. These
freshwater lenses are the most important water source of groundwater on O‘ahu (Oki &
Brasher, 2003).
Figure 1. Schematic cross-section of a freshwater lens groundwater aquifer on O'ahu. Note. From Oki & Brasher, 2003

The population of the island and the number of visitors are growing and the amount of recharge is decreasing due to the amount of impervious or paved surfaces. Therefore, the demands on this lens are increasing beyond its ability to be renewed (Mortz et al., 2005; Oki & Brasher, 2003). As the lens gets thinner, the pumps will begin to cause saltwater intrusion, contaminating the aquifer (Oki & Brasher, 2003). Once saltwater intrudes a well, the salinity begins to increase and the quality of water declines. When the salinity reaches a certain threshold, it can no longer be used as a drinking water source.
Tourism development frequently requires large amounts of land for building accommodations, airports, roads, visitor centers, landfills, golf courses, and other structures that directly or indirectly enable delivery of the tourism product (Gössling, 2002). This land, once developed, is usually comprised of a mix of uses and structure types including resort buildings, golf courses, pools, and parking lots (Klasner & Mikami, 2003). The central areas of tourism development are the first to grow and become intensely urbanized, becoming completely transformed in the process, drawing tourist attention away from the natural environment as it is replaced by the man-made environment (Cohen, 1978).

However, tourism continues to expand outwards and in certain tourist “staging” areas such as airports. Outside of the central area, tourist development follows a “ribbon-like” pattern and is difficult for planners to control (Cohen, 1978). This pattern of development is also detrimental as it fragments parts of fragile ecosystems, especially damaging in coastal areas (Gössling, 2002). This can destroy or disturb sensitive wildlife habitat resulting in the endangerment or even extinction of many species. The conversion of natural areas to developed land reduces the amount of open, unpaved space available to residents and tourists for recreation and changes the character of the island to be more urban.

Gössling (2002) estimates that 514,950 km² (199,000 mi²) of global land could be directly attributed to leisure travel, of which 97.1 percent is related to transportation infrastructure (excluding roads), 0.3 percent for accommodations, and 2.6 percent for golf
courses. While the estimates for transportation are rather high and based on many assumptions, this is still a considerable amount of land. These calculations also exclude land indirectly used by tourists such as land to grow food, landfills, and wastewater treatment.

Land-related constraints at a destination, either natural (i.e., islands) or regulatory (i.e., zoning), limit the amount of development. If a destination’s land constraints are properly used to reign in unplanned development, they can help to protect natural resources such as beaches, beautiful landscapes, and water supply (Wong, 1996).

Tourism and Land Use in Hawai‘i

Land use in Hawai‘i has been changing drastically as plantation agriculture declines and the population grows, requiring further urban and suburban development. Much of the need for new housing on the island may be caused by the increasing employment requirements of the tourism sector. Of the land on O‘ahu, 25.7 percent, or 98,663 acres were developed in 1998 (Klasner & Mikami, 2003), an increase of over 12 percent since 1978 (Oki & Brasher, 2003). This creates drastic changes in ground cover, as it is a shift from vegetation to impervious surfaces, drastically changing the groundwater recharge rates and patterns. Figure 3 shows land use on O‘ahu as of 2002.

Waikiki is a prime example of the replacement of natural attractions with contrived and man-made structures and a highly commercial version of Hawai‘ian culture (Cohen, 1978). Waikiki is a dense development of hotels, restaurants, bars, and retail establishments where most tourists stay on the island. While there has been a recent push to increase the amount of open space in Waikiki, development was generally unplanned.
an uncoordinated, resulting in little architectural blending with either the environment or other buildings.

Figure 2. Land use on O‘ahu as of 2002 depicting urban, agricultural, and conservation land. Note. From Oki & Brasher, 2003.

*Sustainable Tourism Development*

Sustainable tourism can keep a destination from entering the decline stage of the destination life cycle. The concept of sustainable tourism was developed in the 1980’s from the concept of sustainable development (DBEDT, 2006b). Sustainable tourism development (STD) balances the costs and benefits of tourism by incorporating the needs of all stakeholders to develop tourism that is economically viable without harming the
environment or altering the culture or society of the residents (DBEDT, 2006b). STD maintains or improves the quality of the tourism product by promoting the destination’s cultural and environmental assets through an interdisciplinary process involving stakeholders (DBEDT, 2006b; Twining-Ward & Butler, 2002). The process pursued to achieve STD should be adapted to each destination (Twining-Ward & Butler, 2002). While the overall goal of any industry is to generate a profit, sustainable tourism balances this goal with the needs of other stakeholders including environmental protection and preserving cultural traditions (Ahn et al., 2002; Hjalager, 1996). STD planning is based on the impacts to the economy, environment, and culture; the dynamics of wealth generation; and the relative power and interactions between stakeholders (Bramwell, 2006). Successful and sustainable tourism depends on meeting the needs of all stakeholders rather than the personal benefit of the most powerful (Dyer, Gursoy, Sharma, & Carter, 2007). Sustainable tourism development is the most effective framework for mitigating the negative impacts caused by large numbers of tourist, making it a way to improve tourism on O‘ahu (Choi & Sirakaya, 2005). However, Choi and Sirakaya (2005) point out that more ways to evaluate new sustainability frameworks are necessary. When tourism planning is protective of the environment, a positive feedback cycle of improvement of product and place can be entered (Batra & Kaur, 1996).

Tourism Suppliers

Tourism suppliers with a long-term interest in the destination will want to protect the resources on which tourism is built in order to sustain revenues (Bramwell, 2006).
Since it is the natural environment that attracts many tourists, it is in the industry's interest to protect this resource for future use. Also, tourism suppliers such as hotel chains rely heavily on the reputation of their brand name. It is their interest to act responsibly toward (rather than exploit) the environment so that the company is viewed by customers, in this case tourists, as a good corporate citizen (Warnken et al., 2004). Certification programs are one way to cue tourists about how their choices impact the environment (Dodds & Joppe, 2005). The certifications not only represent the end supplier; the entire supply-chain can be certified. Suppliers can also develop corporate social responsibility (CSR) codes as a form of self-regulation when government regulation is not protective enough of the environment and host culture to sustain the vitality of a destination (Levis, 2006).

*Government and Tourism Planners*

Government and tourism planners try to control and pace tourism development to maximize benefits and minimize detrimental impacts (Cohen, 1978; Batra & Kaur, 1996). It is their duty to ensure that tourism development proceeds according to a master plan that is ideally in a sustainable manner. Because properly managed tourism can provide benefits to all public and private stakeholders, it is the responsibility of government to protect stakeholders from development that does not serve their interests (Jamal & Getz, 1995). General protective measures, regulations to control development, and financial restraints are used to guard against detrimental impacts (Cohen, 1978; Hjalager, 1996). General protective measures protect and conserve resources such as biodiversity, land, and culture. This also includes the creation of parks and natural areas and can be funded
by tourism receipts. Regulations to control development include restricting tourism development, tourist arrivals, zoning, and ordinances which require building to blend with the environment (Cohen, 1978). Financial incentives include taxes and pricing, incentives, and penalties for non-compliance or to restore the environment (Hjalager, 1996).

According to Jamal and Getz (1995), “local authorities have the delicate task of juggling private sector interests with local resident needs and wants, in order to maintain the economic health of the community and ensure that development is sustainable”. Tourism planning rules can be designed by planners to encourage environmental improvement by emphasizing its importance as part of the tourism product for the destination (Batra & Kaur, 1996). It is also important that development is ‘harmonious’ with the overall plan for the destination (Batra & Kaur, 1996). Governments also provide and maintain the infrastructure necessary for the industry such as roads, airports, parks, and visitor centers (Jamal & Getz, 1995). This maintenance can be extremely costly. If government does not plan effectively, residents (through property taxes), rather than tourists or suppliers (through accommodations tax) will bear this burden (Wong, 1996). Therefore, government management effects how both tourists and residents perceive the destination.

Residents

Residents can benefit from tourism’s economic impacts when tourists spend money in the local economy or their spending indirectly creates employment opportunities for residents (Wong, 1996). Tourism also requires the development and
maintenance of infrastructure and facilities that residents enjoy (Wong, 1996). Residents in well-developed destinations such as Hawai‘i can become dependent on tourism for their economic well-being and standard of living. Residents can also benefit from cultural exchange with tourists with whom they interact.

Lack of tourism planning can also limit the amount of tourist spending that directly benefits residents. For instance, large tourism suppliers based in other countries, though they do pay wages to local workers, also export a large share of the revenues to their corporate headquarters creating economic leakage from the destination. Additionally, the jobs created by the tourism industry may be low-skill, low-status work with low pay.

Residents are especially vulnerable to the negative impacts of tourism because they rely on the same resources as the tourism industry and interact continuously with tourists (Wong, 1996). If the benefits of tourism are not seen by residents to outweigh the costs, the sharing of resources with tourists can cause resentment and irritation among residents that can be directed at the visitors also decreasing the satisfaction of residents with their community (Ko & Stewart, 2002; Doxey, 1975; Faulkner & Tideswell, 1997). Tourists sense these negative feelings and tourist satisfaction levels can decline (Ko & Stewart, 2002). However, residents also depend on the economic benefits of tourism and therefore downplay the negative impacts as a coping mechanism which is a function of the community satisfaction (Dyer et al., 2007; Cavus & Tanrisevdi, 2003; Faulkner & Tideswell, 1997). Generally, residents whose economic well-being is most dependent on tourism will be more supportive of the industry (Harrill, 2004).
Cavus & Tanrisevdi (2003) determined that residents’ negative impressions of tourism were mainly related to the development process controlled by planners. To prevent residents from resenting tourists and to maximize the benefits that tourism can bring, it is very important that the community’s needs be taken into account during tourism planning (Faulkner & Tideswell, 1997). The ability of residents to be active participants in tourism planning can promote positive attitudes towards tourism and tourists (Cavus & Tanrisevdi, 2003). According to Jamal and Getz (1995), this role must also be active and dynamic as perceptions and opinions change over time as the variables affected by tourism change. Continuously including residents in tourism planning will also result in an improved tourism product and higher tourist satisfaction.

**Tourists**

Tourists’ requirements for a destination may be inherently contradictory. Tourists generally want to see a pristine and unspoiled environment while at the same time setting high standards for accommodations and activities that are in direct conflict with the natural environment (Cavus & Tanrisevdi, 2003). Tourists benefit from sustainable tourism in two ways. First, sustainable tourism can enable increased interactions with the local residents giving tourists a chance to learn about the host culture. Second, sustainable tourism preserves environmental resources for use and enjoyment by both tourists and residents.

Ecotourism has been growing rapidly in the last few years (Kahn, 2003). Ecotourists represent a different tourist whose objective of environmental friendly natural experiences is more in line with the goals of sustainable tourism than traditional mass
tourists. According to Kahn (2003), ecotourists are wealthy tourists from developed countries who seek vacation experiences in natural environments. This rapidly growing market segment is willing to pay a premium for environmentally conscious suppliers to deliver experiences that offer participatory learning about conservation, preservation, and local culture (Kahn, 2003). However, there is still great debate in the literature as to whether ecotourists' pursuit of pristine natural experiences actually degrades, rather than preserves, the environment (Kahn, 2003).

The Role of Policy and Planning

For tourism to be completely sustainable, resource stores would not be depleted over time (Collins, 1999). In reality, however, tourism sustainability is an ideal that stakeholders should strive for, even if it is never truly attained. As tourist numbers continue to rise, tourism and its impacts will grow. Consequently, it is important for destinations to plan to minimize the detrimental effects (Hjalager, 1996). In order to minimize negative impacts, planners need to understand what impacts are created by tourism (Gössling et al., 2005). An approach to monitoring environmental impacts of tourism (environmental accounting) is auditing energy, water and waste (Warnken et al., 2004). Planners can use tourists' consumption patterns to estimate both direct and indirect environmental costs for cost-benefit analysis, to determine the total effects for each sector of tourism and for the industry as a whole, and identify areas that are especially sensitive in terms of resource use or degradation (Warnken et al., 2004). However, it is difficult to isolate the impacts and consumption due to tourism from the impacts and consumption of the residents.
Valuation of resources is another important tool for monitoring and controlling environmental impacts. In actuality, the costs associated with exploitation and pollution are consistently undervalued. Proper valuation of the tourist resources requires detailed information on resource supplies, but it enables pricing. When appropriate, through price control, conservation is enabled (Wen, 1998).

Even with planned development that considers all stakeholders’ interests, tourism development has limits (Cohen, 1978). These limits need to be quantified to determine critical thresholds, or carrying capacity, for the destination (Butler, 1980; Gössling et al., 2005). Calculating the carrying capacity of a destination allows planners to quantify a pre-determined limit based on the resources available (physical carrying capacity) and the resident tolerance for visitors and tourism development (psychological carrying capacity) (Christensen & Beckmann, 1998). Carrying capacities can vary greatly between destinations. As previously stated, cities have a larger capacity to absorb the impacts of tourism than do coastlines and islands.

Once environmental baselines are established, the inevitability of change can be controlled using the limits of acceptable change (LAC) framework (Ahn et al., 2002). Using this framework as a planning tool, changes are monitored so that they stay within a pre-defined and acceptable range that was agreed upon by the various tourism stakeholders and not determined by a single group. Thus, cooperation of stakeholders in their mutual efforts to protect the environment is necessary to increase the sustainability of tourism development (Christensen & Beckmann, 1998). As described by Ahn et al. (2002), the LAC planning systems consists of nine iterative steps for identifying issues,
determining indicators that will be used to assess these issues, establishing baseline conditions, defining management actions, and implementing management initiatives.

Sustainable Tourism Development in Hawai‘i

Hawai‘i, Waikiki in particular, is famous as a scenic destination with well-developed tourism infrastructure and facilities (Tabatchnaia-Tamirisa et al., 1997). Over the last century, the economy of Hawai‘i has become dependent on tourism to provide employment to many of the state’s residents in jobs working directly or indirectly with the industry (DBEDT, 2006b). Therefore, the residents of Hawai‘i are economically dependent upon the success of the tourism product offered by the tourism suppliers. However, residents should be able to enjoy the economic success of the tourism industry without having to shoulder the consequences. In order to move towards more sustainable tourism on O‘ahu, the economic, environmental, and cultural/social goals must be considered in future planning (DBEDT, 2006b).

Overall, residents use the island’s infrastructure more than tourists, though tourist use per day per person exceeds the demands of residents per capita (Sheldon, Knox, & Lowry, 2005). Increasing numbers of tourists continue to put pressure on the island’s resources (Tabatchnaia-Tamirisa et al., 1997). Residents’ perceptions of the island’s energy, water, and land assets as well as congestion are important to helping planners achieve sustainability goals by balancing demand for these resources among stakeholders. Important tourism stakeholders in the Hawai‘ian Islands include residents, tourists and government planners as well as special interest groups such as tourism industry professionals, university educators, environmental groups, and native
Hawai‘ians (DBEDT, 2006b). The Sustainable Tourism Study Group representing several stakeholder groups was able to achieve a consensus despite the diverse needs of the groups (DBEDT, 2006b).

In regards to the environment, the group envisioned that “sustainable tourism will operate in harmony with our ecosystems, enhancing natural beauty and protecting the islands’ natural resources (DBEDT, 2006b; 72). To do this, a partnership between the public and private sectors would be formed in addition to requesting state funding for environmental issues (DBEDT, 2006b). The group’s infrastructure assessment study consultant proposed finding alternative sources of water and energy as well as conservation and improved coordination between state and county transportation authorities (DBEDT, 2006b). In order to manage the sustainable tourism initiatives, the group recommended using the conceptual model for sustainable tourism monitoring proposed by Twining-Ward and Butler (2002). This model calls for the development of indicators that will be part of an environmental monitoring program to track environmental changes over time (DBEDT, 2006b). The indicators were designed to ensure that long-term respect for the land is a higher priority than residents’ or tourists’ short-term interests (Sheldon et al., 2005).
Resident Attitude Surveys

Residents develop attitudes towards tourism by weighing the predicted costs over the expected benefits (i.e. a cost-benefit analysis) (Cavus & Tanrisevdi, 2003). If costs such as environmental degradation, cultural strain, or crowding outweigh benefits such as job creation and tourist spending, attitudes towards tourism will be negative. If the reverse is true, attitudes towards tourism will be positive.

Resident attitude surveys incorporate questions to gauge residents' opinions on the types of tourism and tourists they would like, how they think tourism will impact their community (Ahn et al., 2002). Surveys also include demographic data to examine...
differences of opinion within the resident population (Ahn et al., 2002). Several factors can affect residents’ attitudes towards tourism.

The economic benefits of tourism are well-known. Tourism creates jobs and tourists bring money which they spend in the local economy. Many residents feel positively towards tourism because of the economic benefits it brings to a community (Walpole & Goodwin, 2001; Yoon et al., 2001). Residents who value the creation of jobs will have a more favorable attitude towards tourism (Lindberg & Johnson, 1997).

However, resident attitudes towards environmental and cultural changes in their community because of tourism are often negative (Walpole & Goodwin, 2001; Yoon et al., 2001). Residents also perceived that tourism caused congestion, noise and crowding (Yoon et al., 2001). Using resident attitude surveys, Liu & Var (1986) were able to determine residents’ priorities in regarding tourism impacts:

1. high standard of living
2. environmental protection
3. economic benefits
4. social costs, and
5. cultural benefits.

This research can help tourism planners understand how residents think about tourism development and give them insight into what these residents consider most important.

Over time, a number of resident attitude surveys unique to the destination in which they were developed have been administered. Due to variances in survey content, cross-destination comparisons were not possible. Lankford and Howard (1994)
developed the Tourism Impact Attitude Scale (TIAS) to create a standardized instrument for examining resident attitudes towards the impacts of tourism. The instrument could be administered in different destinations and at different times to facilitate a comparative analysis between destinations and over time. Statements appearing on the TIAS were based on a thorough literature review. The TIAS presents a series of Likert-type statements regarding their perceptions on the impacts that tourism causes to the environment, society, and the economy. The survey also asks questions about the respondents' demographic profile in an effort to examine how demographic characteristics affect residents' views on tourism. Finally, the instrument was validated by the researchers and has been validated in the literature (Lankford & Howard, 1994).

Resident attitude surveys themselves can alter the way that residents view tourism planning because the surveys themselves are an indicator that residents' opinions are important to planners. Residents who perceive that they have influence over the process of tourism development in destination are more likely to have positive feelings towards tourism (Lindberg & Johnson, 1997).

Finally, residents in mature destinations, such as Hawai‘i, have had prolonged exposure to tourists and both their positive and negative impacts (Ko & Stewart, 2002). Residents in Hawai‘i are very aware of both the positive and negative the contributions of the industry (Liu & Var, 1986). Over time, residents develop systems for coping with inconveniences and environmental damage (Rothman, 1978 as cited in Cavus & Tanrisevdi, 2003 and Liu & Var, 1986). When tourism is firmly entrenched and supports a large proportion of the economy, residents most opposed have the opportunity to avoid
the industry through selective migration, leaving a population more accepting of tourism and its impacts and more dependent on tourism for their economic well-being (Faulkner & Tideswell, 1997; Liu & Var, 1986).

**Resident Attitudes in Hawai‘i**

A recent report on resident sentiments was published by the Hawai‘i Tourism Authority (HTA, 2006) and revealed that overall, residents view tourism’s impacts as positive. Seventy-six percent of respondents from O‘ahu feel that tourism has brought more benefits than problems, similar to 2002 results of 77 percent (HTA, 2006; HTA, 2003). However, 79 percent of island respondents somewhat or strongly agree that the economy is too dependent on tourism (down from 85 percent in 2002) and 77 percent feel that the island is run for tourists at local residents’ expense, up drastically from 48 percent in 2002 (HTA, 2006; HTA, 2003). Sixty-four percent of respondents also feel that air and water pollution caused by tourism are a problem, up from 31 percent from a similar question in 2002 (HTA, 2006). Forty-one percent of respondents feel that the quality of air and water have worsened as a result of tourism (HTA, 2006). To address this issue, 82 percent of respondents feel that some of the tax money collected from tourism should be used for environmental preservation (HTA, 2006). Only 43 percent of respondents want to encourage more visitor activity in wilderness areas, down from 53 percent in 2002 (HTA, 2006; HTA, 2003).

Reducing the inconvenience to local residents caused by tourists can foster a better relationship between visitors and the host culture. One of the important factors for tourists in choosing a destination is the attitude of residents towards tourists, which
ranked behind natural beauty, climate, infrastructure, and lodging (Liu & Var, 1986). It becomes necessary to explore the relationship between residents’ perceptions and sustainable tourism development in order to create a positive attitude among residents towards tourism as well as to neutralize the negative impacts of tourists. For sustainable tourism planning to be effective, residents' opinions and concerns with regards to the economic, social and cultural elements of tourism must be addressed by tourism planning practices (Ko & Stuart, 2002; Yoon, Gursoy, & Chen, 2001).

In order to assess the environmental impacts of tourism, one must first extract the impacts caused by residents. For this reason, an objective assessment of tourism's impacts is impractical if not impossible (Briassoulis, 1991 as cited in Christensen & Beckmann, 1998). However, because of the long period of tourism development in Hawai‘i, tourism growth has had huge impacts on island’s environment, culture, and economy (Cohen, 1978). Therefore, another method of examining tourism’s impacts must be used.

Leisure travel accounts for 52 percent of world travel. Since Hawai‘i is primarily a leisure destination and there are many destinations that are more competitive in either pristine beaches or price, Hawai‘i must have a competitive and desirable tourism product to continue to attract visitors. In order for this to occur, the infrastructure and environment already in place must be improved and protected. One way to accomplish this is to use residents as a barometer for acceptable change.

Several resident attitude surveys in Hawai‘i have been conducted by local papers and academicians (Liu, Sheldon, & Var 1987). Because tourism employs so many of
O'ahu's residents both directly (hotels, airlines, retail, etc.) and indirectly (utilities, waste disposal, marketing, etc.), there needs to be a better understanding of opinions of residents who have a dual role as stakeholder: living with the industry as well as working within the industry. These highly involved stakeholders may be willing to tolerate greater levels of negative impacts because they are also receiving a larger share of the environmental impacts (Faulkner & Tideswell, 1997). Sheldon et al. (2005) identified two critical factors necessary for implementing sustainable tourism: preserving the assets which attract visitors to a destination and collaborative planning that involves key stakeholders. In the case of O'ahu, environmental and Native Hawai'ian groups have opposed new tourism development. For effective planning to occur, residents with greater, though possibly conflicting, stakes in tourism planning must be included (Yoon et al., 2001).

Chapter Summary

The purpose of this research was to explore the relevant literature related to sustainable tourism development and the environmental impacts of tourism in general and specific to the island of O'ahu in Hawai'i. Tourism effects the environment, society, and economy of a destination. Its impacts can be both good and bad, requiring that the costs and benefits of tourism be understood in order to enable sound planning decisions. Sustainable tourism development occurs when the needs of present tourism development do not conflict with the destination's future tourism offering. Sustainable tourism development requires that the environmental, social, and economic costs and benefits are understood and are distributed as equally as possible to all stakeholders, including
residents. Residents are often economically dependent on tourism but pay the price through environmental and social impacts that change their way of life and threaten the competitiveness of the destination in the future.

O'ahu is a mature tourism destination that has seen many environmental, social, and cultural impacts from tourism. Tourists can compete with residents for limited resources, particularly on an island such as O‘ahu. Energy and water demands, along with demands for developable land can cause direct conflicts between tourists and residents if not properly managed. Tourism’s energy inputs, particularly for transportation, put a strain on local supply and also contribute to air pollution. Water demands require ever-increasing pumping from natural aquifers that can cause saltwater or chemicals to intrude the water source, rendering it useless. Land use changes alter the character of the land, reduce and fragment wildlife habitat, and change drainage and recharge patterns.

Balancing the needs of residents and tourists and finding more sustainable ways to fulfill the demands of both is necessary to maintain O‘ahu’s competitive advantage as a tourism destination. Residents of O‘ahu depend on tourism for their livelihoods and perceive that tourism’s benefits outweigh its costs. However, in order to continue this perception in the future, resources need to be managed more sustainably and residents’ satisfaction with this management continually gauged. This research attempts to determine residents’ attitudes towards tourism’s environmental impacts through the use of a survey and the testing of a perceptual model created based on the hypothesized impacts.
CHAPTER II

RESEARCH METHODOLOGY

Research Design

The objective of this research is to increase the understanding of residents’ attitudes on the environmental impacts of tourism and sustainable tourism development for the island of O‘ahu. Publications regarding the environmental impacts of tourism, sustainable tourism development, resident attitude surveys and SEM have been reviewed from the appropriate literature. In order to address the objective, the relevant literature has been used to develop the framework for this research design.

Sample Selection

Zikmund (2003) defines the target population as the complete group of population elements that is significant to the research. The purpose of this research is to explore O‘ahu residents’ attitudes towards tourism’s environmental impacts. Therefore, the target population of this research is the residents of Hawai‘i.

However, because it is not practical to administer the survey to the population of the state, it is appropriate to limit the administration of the survey to a sampling frame. Zikmund (2003) defines a sampling frame as a “list of elements from which a sample may be drawn. It is not feasible to compile a list for the sampling frame without excluding some members of the population (Zikmund, 2003). Sampling frame error is introduced when “certain sample elements are excluded or when the entire population is

44
not accurately represented in the sampling frame” (Zikmund, 2003). Since it is not feasible to administer the instrument to the entire population of Hawai‘i, it is reasonable to use a convenience sample. According to Tabachnick and Fidell (2001), a minimum sample size of 200 is required for advanced multivariate statistical techniques such as structural equation modeling (SEM).

For this research, the sampling frame consisted of a convenience sample of Hawai‘i residents. Paper surveys were administered at local area malls to state residents and to some smaller, accessible resident groups. A total of 440 surveys were completed and collected.

Instrument Development

The Tourism Impact Attitude Scale (TIAS) was used as a general template for developing the survey instrument for this study. Statements for the instrument were distilled from environmental and community concerns identified during the literature review. The survey instrument was developed and tested through a small-scale pilot study. Pilot surveys were administered to residents at an O‘ahu mall. Thirty-seven completed pilot surveys were collected. Factor analysis was used to determine the optimal mix of questions for the final survey instrument. According to Green and Salkind (2005), factor analysis is “a technique used to identify factors that statistically explain the variation and covariation among measures” (p. 312). The results of the factor analysis of the pilot study eliminated ineffective questions and allowed confusing questions to be simplified. The factor analysis of the pilot survey was also used to group
the statements into the following categories: environmental impacts, government management, sustainable tourism, and community satisfaction.

The validated survey consisted of 14 questions to assess the demographic profile of participants (Appendix 1). The participants were then asked to state their level of agreement or disagreement (on a 5-point Likert scale) with a series of 18 statements.

**Data Collection**

Following pilot-test validation of the instrument, the paper survey was administered to mall patrons at three O'ahu malls as well as some smaller resident groups from accessible local businesses that agreed to participate. Mall patrons were approached, usually while eating or resting at the mall food court because of its central location. The purpose of the survey was explained and the patrons were asked if they would like to participate. Participants who were willing to participate were asked whether or not they were state residents over the age of 18. Those who responded positively to these questions were then asked to complete the survey. After handing out the survey to willing participants, the researcher would approach a nearby table in the same manner. The researcher would stay in the vicinity and monitor the participants to see if they had any questions. The researcher would move throughout the area and, once most of the patrons in a section were approached, would collect the surveys administered and move on to a new section. Surveys were administered from March 24 through March 28, 2007. A total of 507 surveys were collected which was enough to exceed Kline’s (2005) realistic criteria of 10:1 for cases to free parameters. However, 67 of the surveys
had to be rejected because they were incomplete. Of the surveys collected, 440, or 86.8 percent, were usable.

Analysis of Data

The software packages Statistical Package for Social Science (SPSS) 15.0 and EQS 6.1 were used for analysis of data collected by the survey. The statistical tools that were used in this research include descriptive statistics, confirmatory factor analysis and structural equation modeling. Survey responses were encoded into SPSS for analysis of descriptive statistics.

Descriptive Statistics

Descriptive statistics include methods that involve the collection, presentation, and characterization of a set of data in order to properly describe the various features of that set of data (Green & Salkind, 2005). Descriptive statistics are data that are summarized and presented in a simple form (such as tabular, graphical, or numerical) that is easy for readers to understand. Descriptive statistics allow derivation of the mean, median, and standard deviation from interval data. Descriptive statistics were used to analyze, summarize, and present the descriptive information in the data set created for this research.

Structural Equation Modeling

According to Hoyle (1995), structural equation modeling (SEM) is a "comprehensive statistical approach to testing hypotheses about relations among
observed and latent variables” (p. 1). SEM is used to test the validity of relationships between different parameters of a given model.

SEM is similar to correlation, multiple regression, and ANOVA in that all are based on linear statistical models that statistically test causality (Hoyle, 1995). Also, these methods are all only valid if certain assumptions are met, in the case of SEM these include the independence of observations and multivariate normality (Hoyle, 1995). SEM differs from these methods in that it requires formal model specification that enables it to estimate and test the relations between latent variables (Hoyle, 1995). However, a limitation to SEM not shared with the other models is the ambiguity associated with model fit as described in the Evaluation of Fit section (Hoyle, 1995).

SEM consists of several steps including model specification, estimation, evaluation of model fit, model modification and interpretation (Hoyle, 1995).

Model Specification

Hoyle defines specification as “the exercise of formally stating a model” (p. 2). In other words, a series of parameters or relationships between variables are expressed in words or with a diagram to create the model. Parameters are assumed to be constants that represent the relationship between two variables (Hoyle, 1995). There are two types of parameters. Fixed parameters are generally equal to zero and are not estimated from the data (Hoyle, 1995). Free parameters are estimated from the data and are hypothesized to not equal zero (Hoyle, 1995).

Variables for structural equation modeling can be either observed (measured directly by the data) or latent. Latent variables are unobserved but are implied by the
relationships noted between multiple factors (Hoyle, 1995). The latent variables are stipulated in the measurement model which, along with the structural model, comprises the general structural equation model (Hoyle, 1995). The structural model represents the relationships between the observed and latent variables (Hoyle, 1995). The combination of the measurement and structural models creates a “comprehensive statistical model that can be used to evaluate relations among variables that are free of measurement error” (Hoyle, 1995, p. 3).

Between observed and latent variables there exist three different types of relationships: association, direct effect, and indirect effect (Hoyle, 1995). An association is a nondirectional relationship within the model. A direct effect is a directional relationship between an independent and a dependent variable. An indirect effect is a directional relationship between an independent and a dependent variable through one or more intervening variables (Hoyle, 1995). The sum of the direct indirect effects of an independent variable on a dependent variable comprises the total effect between the variables (Hoyle, 1995).

Identification is an important consideration in model specification. As defined by Hoyle (1995), identification represents the correspondence between the information to be estimated (free parameters) and the information from which it is to be estimated) the observed variances and covariances” (p. 4). In other words, identification is how well the data that was collected matches the model that was created. A model that is just identified has zero degrees of freedom and only one operation performed on the observed data can fit the model (Hoyle, 1995). A model that is overidentified can have as many
degrees of freedom as the variances and covariances less the number of free parameters (Hoyle, 1995). In other words, there is more than one way to calculate from the data a value for one or more free parameters but the observed data still fit the specified model. Finally, a model that is underidentified has no unique value that can be calculated from the observed data (Hoyle, 1995). In other words, the data do not fit the model if the model is underidentified. In order to be considered specified, a model must be either just identified or over identified (Hoyle, 1995).

Estimation

Once a model has been specified, the model must be calibrated to observed data. Calculations can be performed to test the relationship between variables. In order to perform these calculations, the observed data should be used to create estimates for the free parameters (Hoyle, 1995). Iterative methods are used to estimate free parameters that ‘imply’ a covariance matrix from the observed data (Hoyle, 1995). An implied covariance matrix is the result of the structural equation calculated using the values of fixed parameters and the estimates of the free parameters (Hoyle, 1995). Start values (tentative estimates of free parameters) must be plugged into the structural equation which allow initial calculations and thus begin the iterative process of estimation (Hoyle, 1995). Following each iteration, the differences between the implied covariance matrix and the observed matrix are used to calculate the residual matrix (Hoyle, 1995). The smaller the residual matrix, the better the model estimation, thus iteration continues until the residual matrix is minimized (Hoyle, 1995). This point represents model convergence.
Evaluation of Fit

Once a model has been specified and estimated (the residual matrix minimized), the fit of the model to the data must be evaluated. There are several indexes used to evaluate the fit of a model. The chi-square goodness-of-fit test is the most common and is obtained directly from the value of the fitting function (Hoyle, 1995). The smaller the value of the chi-square, the better the model fit to the observed data. A chi-square value of zero represents a perfect fit (Hoyle, 1995).

Due to a growing dissatisfaction with the chi-square test among researchers, a number of other goodness-of-fit indexes have been developed (Hoyle, 1995). These include the normed fit, nonnormed fit, and independence models, which are not statistical and cannot be used to determine statistically model goodness-of-fit (Hoyle, 1995). However, they are useful in order to measure the model’s general ability to fit the observed data (Hoyle, 1995).

Model Modification

Also known as respecification, model modification is the tweaking of the model to better match the observed data (Hoyle, 1995). This includes changing one or more free parameters to fixed or vice versa. If, following estimation, the fit of the model to the observed data was poor, the model can be modified and reestimated to more adequately reflect the data (Hoyle, 1995).

Interpretation

Once the model’s fit is deemed acceptable, the calculated estimates for each parameter must be examined for fit and interpreted. Parameter estimates can be
evaluated either unstandardized or standardized. Unstandardized parameter estimates are values produced by the model that can only be interpreted in reference to the scales of the variables (Hoyle, 1995). Standardized parameter estimates are normalized unstandardized parameter estimates that allow parameters throughout the model to be compared and thus are more functional (Hoyle, 1995).

Proposed Model

A structural model allows researchers to explicitly incorporate measurement error into their models to assess its influence on the model fit. Also, developing and testing models allows researchers to study interdependent relationships among multiple variables simultaneously; thus, it provides a more veridical view of the reality of the phenomena of interest. This model presents factors that lead residents’ personal benefit for tourism development to residents’ attitudes toward sustainable tourism development. Therefore, SEM is the suitable statistical tool in this research. In order to use structural equation modeling effectively, Hair et al. (1998) suggested seven stages in structural equation modeling. These seven stages are:

(1) developing a theoretically based model, (2) constructing a path diagram of causal relationships, (3) converting the path diagram into a set of structural and measurement models, (4) choosing the input matrix type and estimating the proposed models, (5) assessing the identification of the structural model, (6) evaluating goodness-of-fit criteria, and (7) interpreting and modifying the model, if theoretically justified (Hair et al., 1998, p. 592).
In short, data analysis occurred in two phases as follows: (1) Confirmatory Factor Analysis (CFA), and (2) full structural equation model analysis. Also, in the process, two types of validity i.e. convergent and discriminant were analyzed. These two types of validity constitute construct validity. Construct validity refers to the extent to which an operationalization measures the factor it is supposed to measure (Bagozzi, Yi, & Phillips, 1991). Convergent validity has been defined as the extent to which the measures of a variable act as if they were measure the underlying theoretical construct because they share a variance. Discriminant validity refers to the degree to which measures of two constructs (factors) are empirically distinct (Bagozzi et al., 1991; Davis, 1989). In order to make sure good quality of research design, it is necessary to assess those validities above. Therefore, the tests of those validities were analyzed.

A graphical representation of the proposed structural equation model may be seen in Figure 4. This model is based on the theoretical model developed by Perdue, Long, and Allen (1990) and adapted and used by Ko & Stewart (2002). The six hypotheses discussed in chapter one were used to create the relationships represented as H1 through H6:

H1: Perceived government management of tourism will have a positive effect on overall community satisfaction.

H2: Perceived government management of tourism will have a positive effect on perception of environmental tourism impacts.

H3: Overall community satisfaction will have a positive effect on attitudes for sustainable tourism development.
H4: Perception of environmental tourism impacts will have a positive effect on overall community satisfaction.

H5: Perception of environmental tourism impacts will have a positive effect on attitudes for sustainable tourism development.

H6: Perceived government management of tourism will have a positive effect on attitudes for sustainable tourism development.

The value of the relationship (positive or negative) is also indicated.

SEM will be used to assess the existence and direction of each of the six hypothesized relationships.

Figure 4. Relationships between residents’ perceptions of tourism impacts and attitudes for sustainable development. Note. Adapted from Ko & Stewart, 2002.
Chapter Summary

To examine the relationships between residents' perceptions of the factors presented in Chapter 1 (environmental impacts of tourism, overall community satisfaction, government management of tourism, and sustainable tourism development), a survey was developed to be administered to a convenience sample of Hawai‘i residents gauge their attitudes towards tourism on O‘ahu. Before it was administered on a large scale, the survey instrument was developed and validated through a small-scale pilot study. The revised survey was administered to residents from local malls and businesses. Four hundred and forty surveys completed by residents were collected and analyzed using descriptive statistics and structural equation modeling. Structural equation modeling was chosen for data analysis because of its ability to examine and validate the proposed model.
CHAPTER III

RESULTS, DISCUSSION, & CONCLUSIONS

Results

Demographic Profile of Survey Respondents

Respondents were asked to identify their gender, age, and primary ethnicity. The majority of the survey respondents are male (51 percent) as represented in Table 2a. This is slightly higher than a study conducted by the state government (49.6 percent) as shown in Table 2b (DBEDT, 2006c). The average age of the respondents is 40 years. The primary ethnicities most identified by respondents included Filipino (108), Japanese (101), Caucasian (80), and Native Hawai’ian (43). Of the respondents who answered the question (423), Asians made up 57.2 percent, Caucasians 18.9 percent, and Native Hawai’ian/Pacific Islanders representing 16.3 percent. Many respondents chose more than one ethnicity and therefore, no ethnicity could be counted. Also, a large number of respondents (30) chose ‘other’ as their ethnicity. These proportions compare favorably to the most recent State of Hawai’i population characteristics provided on the DBEDT website (2006c): Asians made up 57.5 percent, Caucasians made up 23.5 percent, and Native Hawai’ian/Pacific Islander made up 22.1 percent (Table 2b).

Respondents were also asked about their level of education, personal income, whether they or another household member worked in the tourism industry, and the length of their commute. Forty-three percent of respondents had achieved at least a
bachelor's degree. The largest proportion (35.9 percent) reported earning between $20,001 and $45,000 per year. Over a quarter (25.7 percent) of respondents held jobs in the tourism industry. Residents who worked in the tourism industry full- or part-time accounted for 21.3% (113). Of those employed by the tourism industry, most were employed in hotels (45), restaurants (28), or retail (14). When asked about members of their household, 17.1% of respondents (91) reported that household members worked in the industry full- or part-time. The majority of respondents (80.5 percent) reported driving to work or school. Of the reported commute times, most (67.9 percent) are under 30 minutes.

Finally, respondents were asked which Hawai‘ian island on which they reside as well as their length of residence in the State and on the island of O‘ahu. The vast majority (91.4 percent) of respondents live on O‘ahu, with Hawai‘i, Maui, and Kaua‘i being the only other islands represented. The average length of residence in the state is 29.54 years and the average length of residence on O‘ahu is 26.51 years. In both cases, the most respondents reported living in the state and on O‘ahu for between 21 and 40 years.

**Descriptive Statistics**

For this study, there were 440 participants and 13 observed variables. Low factor loadings determined by confirmatory factor analysis revealed five of the initial 18 variables to be ineffective in that they did not fit the proposed model. Due to the low correlations between five of the statements on the original survey (Appendix I), the final
<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Male                               | 224 | 50.9%
| Female                             | 214 | 48.6%
| Missing                            | 2   | 0.5%
| **Age**                            |     |      |
| 18-25                              | 64  | 14.5%
| 26-40                              | 171 | 38.9%
| 41-55                              | 148 | 33.6%
| 55 and over                        | 53  | 12.0%
| Missing                            | 4   | 0.9%
| **Ethnicity**                      |     |      |
| Filipino                           | 108 | 24.5%
| Japanese                           | 101 | 23.0%
| Caucasian                          | 80  | 18.2%
| Native Hawaiian                    | 43  | 9.8%
| Chinese                            | 33  | 7.5%
| Pacific Islander                   | 26  | 5.9%
| African American                   | 2   | 0.5%
| Other                              | 30  | 6.8%
| Missing                            | 17  | 3.9%
| **Level of Education**             |     |      |
| High School                        | 153 | 34.8%
| GED                                | 14  | 3.2%
| Associates Degree                  | 82  | 18.6%
| Bachelors Degree                   | 129 | 29.3%
| Masters Degree                     | 49  | 11.1%
| Doctoral Degree                    | 8   | 1.8%
| Missing                            | 5   | 1.1%
| **Individual Income**              |     |      |
| $0-$20,000                         | 64  | 14.5%
| $20,001-$45,000                    | 158 | 35.9%
| $45,001-$70,000                    | 111 | 25.2%
| Over $70,000                       | 89  | 20.2%
| Missing                            | 18  | 4.1%
<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tourism Employment</strong></td>
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<td></td>
</tr>
<tr>
<td>Respondent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>78</td>
<td>14.7%</td>
</tr>
<tr>
<td>Part-time</td>
<td>35</td>
<td>6.6%</td>
</tr>
<tr>
<td>Other industry</td>
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<tr>
<td>Missing</td>
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</tr>
<tr>
<td><strong>Household member</strong></td>
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<td></td>
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<tr>
<td>Full-time</td>
<td>56</td>
<td>10.5%</td>
</tr>
<tr>
<td>Part-time</td>
<td>35</td>
<td>6.6%</td>
</tr>
<tr>
<td>Other industry</td>
<td>339</td>
<td>63.8%</td>
</tr>
<tr>
<td>Missing</td>
<td>10</td>
<td>1.9%</td>
</tr>
<tr>
<td><strong>Commute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>79</td>
<td>18.0%</td>
</tr>
<tr>
<td>Yes*</td>
<td>354</td>
<td>80.5%</td>
</tr>
<tr>
<td>0-15 minutes</td>
<td>127</td>
<td>34.9%</td>
</tr>
<tr>
<td>15-30 minutes</td>
<td>120</td>
<td>33.0%</td>
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<tr>
<td>30-60 minutes</td>
<td>99</td>
<td>27.2%</td>
</tr>
<tr>
<td>Over 60 minutes</td>
<td>18</td>
<td>4.9%</td>
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<tr>
<td>Missing</td>
<td>7</td>
<td>1.6%</td>
</tr>
<tr>
<td><strong>Island of residence</strong></td>
<td></td>
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<tr>
<td>O'ahu</td>
<td>402</td>
<td>91.4%</td>
</tr>
<tr>
<td>Hawai'i</td>
<td>27</td>
<td>6.1%</td>
</tr>
<tr>
<td>Kaua'i</td>
<td>7</td>
<td>1.6%</td>
</tr>
<tr>
<td>Maui</td>
<td>4</td>
<td>0.9%</td>
</tr>
<tr>
<td><strong>Length of residence in state</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10 years</td>
<td>76</td>
<td>17.3%</td>
</tr>
<tr>
<td>11-20 years</td>
<td>63</td>
<td>14.3%</td>
</tr>
<tr>
<td>21-40 years</td>
<td>185</td>
<td>43.0%</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>112</td>
<td>25.5%</td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
<td>0.9%</td>
</tr>
<tr>
<td><strong>Length of residence on O'ahu</strong></td>
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<td></td>
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<tr>
<td>0-10 years</td>
<td>109</td>
<td>24.8%</td>
</tr>
<tr>
<td>11-20 years</td>
<td>63</td>
<td>14.3%</td>
</tr>
<tr>
<td>21-40 years</td>
<td>174</td>
<td>39.5%</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>93</td>
<td>21.1%</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

*Note: some respondents reported a commute time though they do not drive because they ride the bus or use another form of transportation
Table 2b
Demographic profile of survey respondents (continued)

<table>
<thead>
<tr>
<th></th>
<th>%</th>
<th>DBEDT*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>50.9%</td>
<td>49.6%</td>
</tr>
<tr>
<td>Female</td>
<td>48.6%</td>
<td>50.4%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>57.2%</td>
<td>57.5%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>18.9%</td>
<td>23.5%</td>
</tr>
<tr>
<td>Native Hawai‘ian/Pacific Islander</td>
<td>16.3%</td>
<td>22.1%</td>
</tr>
</tbody>
</table>

*Source: DBEDT, 2006c

The model included only thirteen variables. The CFA model identified four factors: perception of government management of tourism (GM), overall community satisfaction (CS), perception of environmental tourism impacts (TI), and attitudes towards sustainable tourism (AS). Table 3 displays the descriptive statistics of the 13 variables. Based on a five point Likert type scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree), the composite variable scores revealed that the three survey statements the respondents most strongly agreed with were: (a) GM3 “The quality of public services has improved on O‘ahu due to tourism” (M = 3.239), (b) TI3 “Tourists generate more wastewater than residents” (M = 3.177), and (c) TI4 “Tourism development threatens drinking water supply” (M = 3.176). The three survey statements respondents most strongly disagreed with were: (a) CS1 “Tourism causes more land to be developed” (M = 2.506), (b) CS3 “I enjoy interactions with tourists” (M = 2.757), and (c) GM1 “The state government does a good job balancing residents' and tourists' needs.”
(M = 2.886). The data were evaluated for the assumptions of SEM: normality, linearity, multicollinearity and singularity, and adequacy of covariances.

Generally speaking, the results derived within larger samples have less sampling error than within smaller samples (Kline, 2005). Kline (2005) explained that "more complex models — those with more parameters — require larger samples than more parsimonious models in order for estimates to be comparably stable". Although there are no absolute standards in the literature about the relationship between sample size and path model complexity, Kline suggests a desirable goal is to have the ratio of the number of cases to the number of free parameters to be 20:1 or 10:1 as a more realistic target ratio. There are 32 free parameters in this model. The ratio of cases to observed

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Missing</th>
</tr>
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<tbody>
<tr>
<td>GM1</td>
<td>439</td>
<td>2.886</td>
<td>0.963</td>
<td>1</td>
</tr>
<tr>
<td>GM2</td>
<td>437</td>
<td>2.929</td>
<td>0.968</td>
<td>3</td>
</tr>
<tr>
<td>GM3</td>
<td>439</td>
<td>3.239</td>
<td>0.984</td>
<td>1</td>
</tr>
<tr>
<td>CS1</td>
<td>433</td>
<td>2.506</td>
<td>1.108</td>
<td>7</td>
</tr>
<tr>
<td>CS2</td>
<td>424</td>
<td>3.021</td>
<td>1.135</td>
<td>16</td>
</tr>
<tr>
<td>CS3</td>
<td>437</td>
<td>2.757</td>
<td>1.168</td>
<td>3</td>
</tr>
<tr>
<td>CS4</td>
<td>424</td>
<td>2.976</td>
<td>1.208</td>
<td>16</td>
</tr>
<tr>
<td>TI1</td>
<td>437</td>
<td>2.915</td>
<td>1.084</td>
<td>3</td>
</tr>
<tr>
<td>TI2</td>
<td>439</td>
<td>3.123</td>
<td>1.087</td>
<td>1</td>
</tr>
<tr>
<td>TI3</td>
<td>440</td>
<td>3.177</td>
<td>1.035</td>
<td>0</td>
</tr>
<tr>
<td>TI4</td>
<td>438</td>
<td>3.176</td>
<td>1.060</td>
<td>2</td>
</tr>
<tr>
<td>AS1</td>
<td>420</td>
<td>2.941</td>
<td>1.017</td>
<td>20</td>
</tr>
<tr>
<td>AS2</td>
<td>420</td>
<td>3.217</td>
<td>0.934</td>
<td>20</td>
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</table>
variable was high (13.75:1) which met the realistic target suggested by Kline (2005). Therefore, the sample size of 440 is adequate for this study.

Respondents occasionally left some survey statements blank. To determine whether they were purposefully avoiding certain statements, missing value analysis (MVA) was performed using SPSS and EQS. EQS MVA determined that the data were missing at random (MAR); \( p = 0.293 \), indicating that respondents were not avoiding particular statements. SPSS MVA was performed to replace missing values with calculated expected values.

SPSS and EQS were used to assess the normality of the variables by creating histograms. All 13 observed variables were not normally distributed. EQS was also used to determine multivariate normality. Mardia's coefficient and a normalized estimate of the coefficient were calculated using multivariate kurtosis. In order to meet the assumption of multivariate normal distribution, both Mardia's coefficient and normalized estimate should be as low as possible. There is no exact cutoff number for those two indicators. However, if those numbers are less than 3.96, the data can be justified as multivariate normal distributed. The Mardia's coefficient of 42.81 and the normalized estimate of 22.74 both indicate that the measured variables were not normally distributed. Since the data were not normally distributed, a scaling factor developed by Satorra and Bentler (1994) was used to correct the statistics by dividing the chi-square determined under normal theory by a constant determined by the model's residual matrix, the multivariate kurtosis, and the model degrees of freedom (West, Finch, & Curran, 1995).
The scaled chi-square statistic provides a good estimate of chi-square for sample sizes greater than 200.

Linearity was assessed by examining randomly selected pairs of scatterplots from SPSS GRAPHS. All observed pairs were linearly related. Thus, the assumption of linearity was not violated. SPSS Frequencies was used to identify and eliminate univariate outliers. No multivariate outliers were detected using Malahanobis distance (using SPSS Regression) and cases with the largest contributions to Mardia’s coefficient (using EQS). SEM analysis was performed on 440 surveys. The matrix determinant was determined by EQS to be 0.90265D-02. Since this exceeded 0, there was no singularity.

**Preliminary Data Analysis**

Confirmatory factor analysis (CFA) was used to identify the factors underlying survey items. The CFA model identified four factors: perception of government management of tourism (GM), overall community satisfaction (CS), perception of environmental tourism impacts (TI), and attitudes towards sustainable tourism (AS). The correlations between the four factors ranged from -0.026 to 0.720 (Table 4). The correlations between the variables and the four factors ranged from 0.440 to 0.937 (Table 5). Statement abbreviations are included in Appendix I. Variance (R²) among the factors ranged from 0.0319 to 0.455.
Table 4
Model covariance of factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>GM</th>
<th>CS</th>
<th>TI</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>0.587</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>0.130</td>
<td>0.565</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TI</td>
<td>0.118</td>
<td>0.393</td>
<td>0.613</td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td>0.305</td>
<td>-0.014</td>
<td>0.042</td>
<td>0.544</td>
</tr>
</tbody>
</table>

Table 5
Factor loading of variables

<table>
<thead>
<tr>
<th>Factor</th>
<th>GM</th>
<th>CS</th>
<th>TI</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM1</td>
<td>0.795</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM2</td>
<td>0.865</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM3</td>
<td>0.565</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td></td>
<td>0.677</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS2</td>
<td></td>
<td>0.724</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS3</td>
<td></td>
<td>0.863</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS4</td>
<td></td>
<td>0.765</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TI1</td>
<td></td>
<td></td>
<td>0.721</td>
<td></td>
</tr>
<tr>
<td>TI2</td>
<td></td>
<td></td>
<td>0.892</td>
<td></td>
</tr>
<tr>
<td>TI3</td>
<td></td>
<td></td>
<td>0.937</td>
<td></td>
</tr>
<tr>
<td>TI4</td>
<td></td>
<td></td>
<td>0.672</td>
<td></td>
</tr>
<tr>
<td>AS1</td>
<td></td>
<td></td>
<td></td>
<td>0.729</td>
</tr>
<tr>
<td>AS2</td>
<td></td>
<td></td>
<td></td>
<td>0.440</td>
</tr>
</tbody>
</table>

Reliability, Convergent Validity, and Discriminant Validity

Scale reliability is the proportion of variance attributable to the true score of the latent variables (DeVillis, 2003). Cronbach’s alpha was used to determine the reliabilities of multi-item factors. The alphas of the factors ranged from 0.485 to 0.830 (Table 6). The reliability level for one of the factors (attitudes towards sustainable
tourism development) did not meet the critical value of 0.7 as suggested by Nunnally & Bernstein (1994), but the overall model alpha of 0.83 indicates that the model is reliable.

Table 6
Reliability, convergent validity, and discriminant validity

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cronbach's alpha</th>
<th>Convergent validity</th>
<th>Discriminant validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>0.777</td>
<td>0.565 to 0.865</td>
<td>0.196 to 0.539</td>
</tr>
<tr>
<td>CS</td>
<td>0.841</td>
<td>0.565 to 0.863</td>
<td>-0.026 to 0.667</td>
</tr>
<tr>
<td>TI</td>
<td>0.876</td>
<td>0.672 to 0.937</td>
<td>0.072 to 0.667</td>
</tr>
<tr>
<td>AS</td>
<td>0.485</td>
<td>0.440 to 0.729</td>
<td>-0.026 to 0.539</td>
</tr>
<tr>
<td>Model</td>
<td>0.830</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

CFA was used to examine convergent and discriminant validity (Table 6). CFA results included covariance estimates between factors, variable loadings on factors, and measurement error for each variable. The convergent validity ranges (from 0.440 to 0.937) indicated that the variables used to measure the factors all had high standardized loadings on their respective factors, suggesting convergent validity. Discriminant validity means that the estimated correlations of variables on other factors are not excessively high (<0.85) (Kline, 2005). The discriminant validity values, with the exception of the factor for attitudes towards sustainable tourism, all demonstrated lower loadings than their original variables.

Data Analysis

SEM was used to examine the hypothesized relationships between the factors (factors) in the model. EQS was used to test the hypothesized relationships by imposing the structure of direct and indirect effects on the data. Initially, the model fit was tested
using the overall fit and regression paths to determine whether the observed variables were generated by the corresponding latent factors. Following this, the hypothesized model (Figure 4) was analyzed. Finally, the model was modified from the hypothesized model based on the results of the previous analysis so that the model could be improved in order to represent a better fit of the data and to more adequately describe the relationships between the factors. The Lagrange Multiplier (LM) and Wald tests were used to identify parameters that did not fit the model.

Measurement Model Results

The measurement specified four factors – government management of tourism, overall community satisfaction, perception of environmental tourism impacts, and attitudes for sustainable development. Each factor loaded on the remaining three factors. In the model, each variable was constrained to load only on the factor that it measured, residuals for variables were fixed to be uncorrelated, equality constraints on factor loadings were not imposed, and factor covariances were free to be estimated.

Given the complexity of SEM, a single fit index is insufficient to determine the validity of a model. Therefore, to examine the fit of the model to the observed data, several fit indices were used. Comparative fit indices such as the comparative fit index (CFI), Bollen’s fit index (IFI), and the root mean square error of approximation (RMSEA) examine the fit of the overall model by comparing the fits of individual nested models that represent subsets of the larger model (Tabachnick & Fidell, 2001). In general, higher index numbers indicate a better model fit with the exception of the RMSEA. For the RMSEA, lower values indicated a better model with a cutoff of 0.06.
(Tabachnick & Fidell, 2001). The McDonald's fit index (MFI) is an absolute fit index that does not rely on comparing nested models to evaluate fit. Higher MFI values indicate a better model fit. The model represented a good fit to the data (Table 7).

Corresponding factors accounted for the large variance ($R^2$) in the variables, ranging from 0.440 to 0.937.

<table>
<thead>
<tr>
<th>Model goodness of fit indices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>Satorra-Bentler scaled chi-square (59, N=440)</td>
</tr>
<tr>
<td>Probability value</td>
</tr>
<tr>
<td>Bentler-Bonett normed fit index</td>
</tr>
<tr>
<td>Bentler-Bonett non-normed fit index</td>
</tr>
<tr>
<td>Comparative fit index (CFI)</td>
</tr>
<tr>
<td>Bollen's fit index (IFI)</td>
</tr>
<tr>
<td>McDonald's fit index (MFI)</td>
</tr>
<tr>
<td>Root mean-square error of approximation</td>
</tr>
<tr>
<td>90% confidence interval</td>
</tr>
</tbody>
</table>

Factor correlations among factors are presented in Table 8. The strongest correlations ($r = 0.667$ and $r = 0.539$) were noted between CS and TI and GM and AT, respectively.
Structural Model Results

To examine the goodness of fit of the hypothesized model, the measurement model was re-specified by imposing the structure in the full SEM model. Table 6 summarized the results of the proposed structural parameters (Figure 6) and the model correlation matrix appears in Appendix 3. The fit indices (Table 7) of the hypothesized model indicated that the model fit the observed variables well. The Wald test asks which, if any, estimated parameters could be deleted or, which should be fixed. According to the results of the Wald test, all free parameters were reasonable and statistically significant. Therefore, there is no estimated parameter which could be deleted or fixed. The LM test asks if the model is improved if one or more of the parameters in the model that are currently fixed are estimated. In other words, which parameters should be added to the model to improve the fit. The results of the LM test suggested that no such parameter should be added to the model to improve the fit. Additional examination of the individual model parameters ensured that the model fit the data well, no evidence of improper solutions was found, measurement parameters were all statistically significant, confirmatory factor loadings were sufficiently large, and measurement errors were relatively small.

The data analysis generated 3 equations as a result of decomposing model variables. The proposed structural equations were supported by the results of the data analysis. The equations were as follows:

- \( CS = 0.648(TI) + 0.099(GM) + 0.738(D2) \)
- \( TI = 0.196(GM) + 0.981(D3) \), and
- \[ AS = -0.230(CS) + 0.115(TI) + 0.567(GM) + 0.825(D4), \]

where \( CS \) is community satisfaction, \( GM \) is government management of tourism, \( TI \) is environmental tourism impacts, and \( AS \) is attitudes towards sustainability.

Figure 6 presented the results that lend support to five of the six hypotheses. Only hypothesis 3 was rejected. The model predicts approximately a third of the attitudes on sustainable tourism \( (R^2 = 0.319) \). Therefore, despite accepting five of the six hypotheses, the overall predictability of the model means that other key factors also influence attitudes towards sustainable development.

\[ \begin{array}{c}
0.10^* \quad \text{H1 +} \\
\text{Perceived Government Management of Tourism}
\end{array} \rightarrow \quad \begin{array}{c}
\text{Overall Community Satisfaction} \\
\text{H3 -} \\
-0.23^*
\end{array} \rightarrow \quad \begin{array}{c}
\text{Attitudes for Sustainable Tourism Development} \\
\text{H6 + 0.57*}
\end{array} \]

\[ \begin{array}{c}
\text{H2 + 0.20*} \\
\text{Perception of Environmental Tourism Impacts}
\end{array} \rightarrow \quad \begin{array}{c}
\text{H4 + 0.65*} \\
\text{H5 + 0.12*}
\end{array} \rightarrow \quad \begin{array}{c}
\text{H6 + 0.57*}
\end{array} \]

Figure 5: Final SEM Model Output

Discussion

This study developed and tested a model for understanding residents' perceptions of tourism on O'ahu. The model was developed by integrating Ko & Stewart's model for resident attitudes (2002) with several important factors related to how residents perceive the environmental impacts of tourism on the island of O'ahu drawn from the literature.
namely government management of tourism, overall community satisfaction, environmental tourism impacts, and attitudes towards sustainable development.

Overview of Significant Findings

The hypotheses in this study came from a review of the literature on the environmental impacts of tourism in general and specific to Hawai‘i. It is clear that the impacts of tourism on the environment, particularly on the resources of land, water, and energy, play an important part in how residents form their opinions on tourism. Liu and Var (1986) found that residents rank environmental protection above economic and cultural benefits and social costs when considering future tourism development. Because government is an important force in managing tourism development, residents’ perceptions of government management of tourism were also important. Ko & Stewart (2002) identified overall community satisfaction as an important factor in determining residents’ attitudes towards tourism. Finally, researchers such as Choi & Sirakaya (2005) and Twining-Ward & Butler (2002) explored attitudes towards sustainable development. The relationships between these factors were tested using the theoretical model. Five of the six proposed hypotheses were supported by the results of the analysis. For the purposes of review, these results are discussed in detail.

Hypothesis 1: Government management and overall community satisfaction

Hypothesis 1 predicted that perceived government management of tourism will have a positive effect on overall community satisfaction. The results of the study indicated support for this hypothesis with a coefficient of 0.10. Residents who perceive that government effectively manages tourism on O‘ahu will have higher overall
community satisfaction. Residents who perceive that government does not effectively manage tourism will have lower overall community satisfaction. This affirms Batra & Kaur’s (1996) statement that development needs to be ‘harmonious’ with the overall destination’s plans. It also indicates the relationship identified by Wong (1996) that government planning is essential so that residents do not bear the burden of tourism’s detrimental impacts but also get to enjoy additional infrastructure maintained by the government. The relationship identified by Ko & Stewart (2002) and Faulkner & Tideswell (1997) that residents can become irritated if they do not see tourism develop in a controlled manner and for the benefit of residents was also supported by the findings of the study.

The State of Hawai’i, through its tourism agency, the HTA, has developed a Hawai’i Tourism Strategic Plan (HTSP). The HTSP was designed specifically to manage tourism in the state while benefiting all stakeholders, including residents (HTA, 2005). One of the principal considerations in creating the strategic plan was the decline in residents’ satisfaction with tourism as determined by data collected through the HTA resident attitude surveys (HTA, 2005). One of the primary goals of the HTSP is to facilitate collaboration between stakeholders, which the HTA sees as essential to successful tourism industry development. The natural result of taking residents’ concerns into consideration is that tourism development will occur harmoniously with stakeholders’ objectives and attitudes towards tourism, thus improving community satisfaction.

Hypothesis 2: Government management and environmental impacts
Hypothesis 2 predicted that perceived government management of tourism will have a positive effect on perception of environmental tourism impacts. The results of the study indicated support for this hypothesis with a coefficient of 0.20. Residents who perceive that government effectively manages tourism will feel more positively towards the environmental impacts of tourism. The results indicate that residents agree with Cohen’s (1978) and Hjalager’s (1996) assertions that government can control and limit the environmental impacts of tourism development. The study findings also supported the claim by Cavus & Tanrisevdi (2003) that residents’ negative impressions of tourism, in this case towards the environmental impacts, are a function of the development process controlled by planners.

The goal from the HTSP that encourages collaboration between stakeholders should help to address the relationship between government management and tourism’s environmental impacts (HTA, 2005). An HTSP objective is collaboration between the state’s main tourism groups (HTA, the private sector, and community groups/residents) and environmental agencies, primarily the Department of Land and Natural Resources (DLNR) but also other volunteer, county, state, and federal groups such as the Sierra Club, Department of Environmental Services (ENV), the Office of Environmental Quality Control (OEQC), and the Fish and Wildlife Service (FWS). This collaboration, in combination with the knowledge of residents’ attitudes on specific impacts on the environment from tourists, can enable the more efficient use of resources to balance the needs of tourists and residents. For example, if residents are particularly concerned about fishstocks being depleted due to competition and overuse by tourists and local fisherman,
coordination with the FWS can enable these concerns to be translated directly into tourism and FWS policies.

Hypothesis 3: Community satisfaction and attitudes towards sustainable tourism development

Hypothesis 3 predicted that overall community satisfaction will have a positive effect on attitudes for STD. The results of the study did not indicate support for this hypothesis and this hypothesis was rejected. Residents’ overall community satisfaction has a negative relationship (coefficient of -0.23) with their attitudes towards STD. This contradicts the expected relationship that residents with higher overall community satisfaction will have more positive attitudes towards sustainable tourism development. As Cavus & Tanrisevdi (2003) found, residents who feel that they have a voice in tourism planning are more positive towards tourism. Since resident participation is necessary for sustainable tourism, it would make sense that they would also feel more positively towards sustainable tourism (Dyer et al., 2007; Ko & Stewart, 2002).

As attitudes towards tourism in Hawai‘i have been declining (HTA, 2005), it becomes even more critical that the state move towards further sustainable tourism development aligned with the needs of residents. By the HTA requiring resident participation in the carrying out of the goals of the HTSP, residents’ concerns about tourism can be taken into consideration. Goodwill of the residents towards the tourism industry is necessary to sustain the industry in the long term, as it allows tourism suppliers to create new tourism products that residents approve of while simultaneously increasing tourist satisfaction as they interact with more content residents.
Hypothesis 4: Environmental impacts and community satisfaction

Hypothesis 4 predicted that perception of environmental tourism impacts will have a positive effect on overall community satisfaction. The results of the study indicated strong support for this hypothesis (coefficient of 0.65). This relationship was the strongest in the model. Residents who perceive the environmental impacts of tourism more positively will have higher overall community satisfaction. The reverse is also true where residents who perceive the environmental impacts of tourism more negatively will have lower overall community satisfaction. This relationship is well documented in the literature (Cavus & Tanrisevdi, 2003; Cohen, 1978; Doxey, 1975; Dyer et al., 2007; Faulkner & Tideswell, 1997; Ko & Stewart, 2002). These authors have all recognized the relationship between these two factors.

The HTSP has great potential to impact this important relationship. The HTSP encourages collaboration between the HTA, the private sector, and residents and environmental agencies which will illuminate the environmental issues that could most greatly impact residents’ community satisfaction. While collaboration with entities such as the DLNR, Sierra Club, ENV, OEQC, and FWS is a good first step, the Board of Water Supply (BWS), Environmental Protection Agency (EPA), the Army Corps of Engineers (ACE) and the United States Geologic Survey (USGS) could also enrich the dialogue with their particular areas of expertise.
Hypothesis 5: Environmental impacts and attitudes towards sustainable tourism development

Hypothesis 5 predicted that perception of environmental tourism impacts will have a positive effect on attitudes for STD. The results of the study indicated support for this hypothesis (coefficient of 0.12). Residents who perceive the environmental impacts of tourism more positively will have more positive attitudes towards STD. A possible reason for the weak relationship could be explained in a similar way to hypothesis 3: residents lack understanding of STD and therefore do not understand that it can help to control the negative environmental impacts of tourism.

The goal of the HTSP is to guide stakeholders in working together to make the tourism industry in Hawai‘i more beneficial to its stakeholders and more competitive with other destinations. Fundamentally, the HTSP is designed to sustain the success of the tourism industry (HTA, 2005). The importance that residents place on their environment as determined by Liu & Var (1986) makes environmental sustainability a critical part of the future success of the Hawai‘i tourism industry. Environmental degradation reduces residents’ acceptance of tourism as a major industry and also tourists’ perception of O‘ahu as a beautiful natural destination.

Hypothesis 6: Government management and attitudes towards sustainable tourism development

Hypothesis 6 predicted that perceived government management of tourism will have a positive effect on attitudes for STD. The results of the study indicated strong support for this hypothesis (coefficient of 0.57). Residents who feel that the government
effectively controls tourism development have more positive attitudes towards STD. Conversely, residents who feel that government does not effectively control tourism development have more negative attitudes toward STD. This corresponds with the work of Twining-Ward & Butler (2002) and DBEDT (2006b) that residents who are part of the planning process and believe that government can be effective in limiting tourism development will believe in the goal of STD. The HTSP is Hawai‘i’s roadmap to effectively manage tourism development (via the HTA but in concert with other stakeholders and agencies) to encourage a more controlled, unified, and sustainable tourism product on O‘ahu and for the State of Hawai‘i.

Conclusions

This thesis proposed a comprehensive model that partially explained residents’ attitudes towards tourism on O‘ahu. As the survey statements determined, many respondents feel that tourists help to increase their quality of life through public services that mutually benefit tourists and residents. However, the survey statements determined that respondents also feel that tourism competes for natural resources (drinking water) and adds a disproportionate burden to public services (wastewater disposal). Despite the recent efforts of the state, many respondents also felt that the State needs to better balance needs of residents with the needs of tourists and the tourism industry. Perhaps, as the HTSP is implemented, it will address these important issues. The model was developed by integrating relationships developed in the literature of government management of tourism, overall community satisfaction, environmental tourism impacts, and attitudes towards sustainable development. The purpose of the study was to explore
residents’ perceptions towards these concepts because residents’ attitudes are a key component of making tourism planning more sustainable on the island. While much has already been accomplished with the extensive work of the DBEDT Sustainable Tourism Study Group (DBEDT, 2006b), a deeper understanding of how residents view aspects of tourism will foster understanding of this key stakeholder group. If it is clear how residents’ attitudes on tourism are formed, future tourism development can be managed. Such management can be done through collaboration with the tourism suppliers or by increasing the importance of the environmental impact assessment for development approvals. The effect of this type of tourism management enlightened by the needs of residents will allow tourism development that benefits residents while minimizing or eliminating negative impacts, particularly the negative environmental impacts.

Five of the six hypotheses on relationships between factors identified by the literature were accepted. As predicted by the literature, the study results indicate that a very strong relationship exists between residents’ overall community satisfaction and their perceptions of the environmental impacts of tourism. Planners can make practical use of this information by understanding that controlling tourism’s detrimental environmental impacts will have a directly positive relationship with residents’ satisfaction with their communities. The HTSP is the State’s effort to increase collaboration between tourism planners such as the HTA and other important public sector agencies such as DLNR and citizen groups such as the Sierra Club (HTA, 2005). Government agencies are currently run quite independently in Hawai‘i, however, the position of Tourism Liaison has recently been created to facilitate dialogue between all of
the agencies involved directly or indirectly with the tourism industry so that better
communication is possible. Residents’ perceptions of the connectedness between
O’ahu’s tourism development and environmental impacts and residents’ prioritization of
environmental impacts for their community satisfaction can lead to increased
collaborative policymaking between these agencies. Also, the allocation of government
funds can be more effective if the relationship between community satisfaction and
environmental impacts is better defined. By acknowledging that the environment is
important to how residents feel about their community, more funds can be allocated to
take advantage of this relationship such as cleaning up pollution, treating wastewater and
sewage, and creating and maintaining natural areas for residents and tourists to enjoy.

The HTSP was an effort of the HTA with input from other stakeholder groups
such as the private sector and community groups. Collaborative efforts like this increase
the ability of government to manage tourism to benefit all stakeholders. Their
cooperation for moving O’ahu towards becoming a more sustainable tourism destination
will likewise ensure that this destination continues to attract visitors and create economic
benefits for suppliers and residents alike. The HTA and other tourism groups should also
continue to educate the residents about not only the positive consequences of tourism, but
also the negative so that the need for more sustainable tourism practices is recognized by
all of the stakeholders. This collaboration should continue to solicit the perceptions of
residents and other stakeholders to make sure that their priority needs are always being
considered.
In summary, residents appreciate the importance of tourism to their economy and enjoy the interactions with tourists. However, residents also recognize that these benefits come with a cost to the environment, which ultimately diminishes their satisfaction with the community. Using policies to effectively manage tourism so that these benefits do not come at the cost of environmental degradation can create a more educated destination that opts for what is best for stakeholders in the long term. Another benefit of managing the environmental impacts of tourism is that tourists will continue to be attracted to the stunning scenery and outdoor activities that O‘ahu provides. An important part of the basis for these policies is the understanding of how residents’ attitudes towards tourism are formed and translating it into tourism development policies that make a difference in the sustainability of O‘ahu tourism. The model presented in this research is another step to understand the relationship of the factors affecting residents’ attitudes.

Limitations

There were several limitations from this study. The limitations include the survey questions, nature of the sample, the procedures for data collection, and the ability of the proposed model to explain resident attitudes.

The survey was designed to explore residents perceptions of different factors related to tourism on O‘ahu. However, the residents’ ability to convey their attitudes was related to their understanding of the survey statements. For example, individual residents could have defined the word “community” in the survey statements differently. The qualitative nature of the questions allowed differing interpretations among residents that could affect how they respond. The residents of Hawai‘i are very used to the existing
model of mass tourism development that has been present for decades. They are less familiar with the characteristics and advantages of sustainable tourism development and therefore may not have fully understood the survey statements regarding this factor.

The survey respondents consisted of a convenience sample of mall patrons and some employees of local businesses. Because this was a convenience sample, residents with certain characteristics (i.e. the elderly) might have been underrepresented. Certain areas of the island are not served by a local mall so residents from these areas might also have been underrepresented. Also, the location where the individual surveys were collected was not recorded so exploring the differences in attitudes between malls and geographic regions within O'ahu is not possible.

Mall patrons were asked to complete a survey while they were at the mall, most often while they were dining. While surveys were only distributed to willing participants, it is possible that people agreed to fill out the survey and did not take time in considering their responses or did not adequately read and process each statement before filling in a response. Therefore, error could be introduced in that the instrument was not effectively gauging attitudes for participants that were in a hurry to finish the survey.

Finally, the overall $R^2$ of the model of 0.312 means that only 31.2 percent of residents' attitudes could be explained by the model. This means that there are unidentified factors remaining that could partially explain residents' attitudes. These latent factors were not identified and tested by the statements on the survey instrument.

However, despite the limitations, this research has proven useful in understanding how residents develop their attitudes towards sustainable tourism development. This
research extends the work of Choi & Sirakaya (2005) in exploring resident attitudes towards sustainable tourism development. Since residents are one of the most critical stakeholders for sustainable tourism, it is important to understand the attitudes of this group.

Recommendations for Future Research

An interesting follow-up for the data collected for this research would be a regression analysis between the demographic variables and the respondents' attitudes towards tourism. Also, a deeper look into residents concerns over how particular environmental concerns affect residents community satisfaction would be helpful to guide future collaborations in conjunction with the Hawai‘i Tourism Strategic Plan. For example, it would be helpful to explore what aspects of water resources are most concerning to residents such as groundwater well contamination. If this was identified as an issue of high concern for residents, more resources could be allocated to managing well protection as well as tourist education regarding groundwater in the islands and optimal use. As another example, if residents are found to have a great concern over the amount of open space on the island, the State and municipalities can work on zoning laws that better protect these open spaces for the use of residents and tourists. Exploring the details of these relationships can do much to align the tourism industry’s and government’s goals with those of residents.

While this model was useful in explaining some of residents’ attitudes towards tourism on O'ahu, more research needs to be done to complete the picture. Future research endeavors should refine the survey statements to be clearer to residents and also
to incorporate missing factors. First, regression analysis on the data would be helpful in identifying trends in how residents responded to the survey statements based on their demographic characteristics. Also, identifying the latent factors that explain the remaining 68.8 percent of residents’ attitudes would be useful. A more comprehensive conceptual model could be evaluated to better identify the relationships between residents’ perceptions of the factors. A more comprehensive model could be used to compare how residents’ attitudes towards the factors are changing over time on O‘ahu to measure the effectiveness of government in managing tourism development. In addition to identifying other factors, the relationship between the environmental impacts of tourism and overall community satisfaction can be more clearly defined by investigating how energy, water, and land resources determine residents’ perceptions of environmental impacts. The model could also be applied in other destinations, particularly other island destinations, for a cross-destination analysis of resident attitudes. This information will help government planners to better understand the attitudes of residents towards tourism on O‘ahu so that future development can be managed to consider the importance of the environment to resident satisfaction and how they form their attitudes towards tourism to make O‘ahu a more welcoming place.
CHAPTER IV

ARTICLE I: CONCEPTUALIZATION OF RESIDENT ATTITUDES TOWARDS TOURISM: A CASE STUDY OF O'AHU

Abstract

This research explores the relationships between sustainable tourism development and resident attitudes on O'ahu regarding the resource consumption and environmental impacts caused by tourists. An extensive review of the literature revealed that four factors worked together to help form residents attitudes towards tourism development. These factors were identified as: the environmental impacts of tourism, government management of tourism development, overall resident community satisfaction and attitudes towards sustainable tourism development. These four factors were used as the basis to form a model hypothesizing the nature of the relationship between the factors.

Introduction

According to the World Tourism Organization (WTO) (2007), tourism is a booming global industry. International tourist arrivals of 842 million travelers in 2006 represented almost a 4.6 percent increase over the previous year. Fifty percent of tourists traveled for leisure in 2005. The economic impacts of tourism are increasing even faster as international tourism receipts in 2005 reached US$680 billion, representing a 9 percent increase over 2004 (WTO, 2006). As the number of people moving around the globe and the amount of money they are spending continue to grow, the tourism industry is gaining more attention as a contributor to world economic output, but also for some of the
uneconomic costs of travel. While tourism is widely viewed as bringing income and employment to destinations, there is a cost that must be paid by the residents and/or the environment for these benefits (Mortz, Ray, & Jain, 2005). For sustainable tourism development to occur and for the benefits brought by tourism to be fairly distributed throughout the community, it is important that residents are included in the tourism planning process (Jamal & Getz, 1995).

Hawai‘i is a destination with a long history of tourism development, especially for the leisure market. In 2005, the state welcomed a record 7.5 million tourists who spent a total of US$11.9 billion. Of these visitors, 4.7 million came to the island of O‘ahu (DBEDT, 2006a). The population of the State of Hawai‘i is 1.28 million, of which 900,000 live on the island of O‘ahu (DBEDT, 2005). In light of the population, the number of tourists visiting O‘ahu is very high. According to DBEDT, the average daily census of visitors on the island of O‘ahu is almost 60,000. The ratio of visitors to residents is 6.5:10. The majority of tourism development on the island is located near Waikiki Beach, which is an intensely-developed area that contains a large percent of the hotel rooms for the entire state. Waikiki is about a half hour drive from Honolulu Airport and is home to tall hotels and condominiums, restaurants, and upscale shopping. There is a large amount of pedestrian traffic and the green space in Waikiki is mostly irrigated and landscaped.

Because of the demand by both tourists and residents on the limited natural resources of the island, O‘ahu has increasing need for energy and water inputs as well as the urbanization of much its land. While tourism also brings jobs and income, these
changes in demand have created environmental and social costs that may have to be paid by local residents. Changes in demand for energy require the importation of additional fossil fuels for tourist accommodations, activities, transportation, as well as the needs of residents. The island’s water supply depends on the vulnerable caprock aquifers that can be polluted by overpumping to meet high demand or by runoff from urban areas (Oki & Brasher, 2003). Also, future supplies of groundwater are cut off when the overriding land is paved and rainwater is channeled directly to the ocean. Paving also causes increased sedimentation which results in erosion and degradation of the coral reefs. In addition to the problems caused by paving, urban development changes the character of the natural environment as well as fragments habitat for native species. Environmental damage caused by these changes can take years to mitigate or the effects may be impossible to reverse.

Residents living on O'ahu have a vested interest in seeing tourism development become more sustainable. Residents may not even be aware that they are competing with tourists for energy, water, and other resources such as land. Residents may also be unaware of the impacts already occurring on the island because the changes have been incremental, disguising their severity. Over time, however, incremental changes can evolve into a crisis if an innate threshold (such as renewable water supply) is passed. Steps towards sustainable tourism development would benefit all stakeholders because residents would have to compete less with and benefit more from tourists.

O'ahu is an island constrained by its resources and relies heavily on imported energy and goods to support the existing development. In order for O'ahu to move
towards sustainable tourism development, residents’ perceptions are important for assessing not just the economic, but also the environmental, social and cultural impacts of tourism. Regarding the development of sustainable tourism policy, it is very important to take these non-economic costs and who will have to pay them into consideration. Because in traditional tourism development some stakeholders benefit disproportionately, gauging residents’ perceptions to move towards sustainable tourism development can ensure that the contributions of tourism are spread more equally (Twining-Ward & Butler, 2002).

The objective of this research is to examine the perceptions of residents regarding the resource consumption and environmental impacts caused by tourists in O‘ahu. A survey was distributed to examine residents’ perceptions of tourism’s environmental impacts and how these perceptions relate to their personal benefits from tourism, community satisfaction, and views on sustainable tourism in Hawai‘i. Structural equation modeling was used to examine the relationships between residents’ views of tourism and their attitudes towards sustainable tourism development.

**Problem Statement**

Gauging resident attitudes is essential for effective tourism planning. Understanding these attitudes is difficult because residents are a complex and heterogeneous group whose opinions of tourism are affected by many things. Perceptions of how well the government manages tourism, tourism’s environmental impacts, and community satisfaction determine how they view the sustainability of tourism on O‘ahu. The objective of this research is to increase the understanding of
residents’ attitudes on government management and the environmental impacts of tourism and determine how these attitudes affect perception of community satisfaction and sustainable tourism development.

Research Hypotheses

The ensuing research hypotheses will be addressed throughout this study.

H1: Perceived government management of tourism will have a positive effect on overall community satisfaction.

H2: Perceived government management of tourism will have a positive effect on perception of environmental tourism impacts.

H3: Overall community satisfaction will have a positive effect on attitudes for sustainable tourism development.

H4: Perception of environmental tourism impacts will have a positive effect on overall community satisfaction.

H5: Perception of environmental tourism impacts will have a positive effect on attitudes for sustainable tourism development.

H6: Perceived government management of tourism will have a positive effect on attitudes for sustainable tourism development.

Literature Review

Tourism and the Environment

Tourism and the environment have a complicated relationship. Tourists interact with the environment and consume resources in their transportation, accommodations,
and activities at a destination. For example, tourists fly to a destination on an airplane that consumes fossil fuels, use water for showering at their hotel, and perhaps visit nature preserves or other natural areas during their stay. Tourist actions such as these can impact the environment in both positive and negative ways. Tourism, in particular leisure tourism, can raise environmental awareness and make conservation politically and economically possible (Cohen, 1978). Conversely, tourism may also allow rapid and inequitable consumption of limited natural resources such as fossil fuels and fresh water.

Environmental Benefits of Tourism

Tourism can be beneficial to the environment in several ways. Gössling (2002) contends that tourists, especially higher spending ones, are attracted to clean and aesthetically pleasing landscapes indicative of a healthy environment. Tourism can facilitate conservation because their interest in and desire to see pristine environments can legitimize the preservation of these environments (Cohen, 1978). Residents, planners, and government officials who realize that tourists are attracted to destinations because of their environmental offerings may be more willing to pass legislation and commit funds to conservation. Examples of these resources in Hawai‘i include parks, mountains, coral reefs, and beautiful beaches and coastlines. In order to keep tourists coming to see and experience the pristine environment, protection of these resources is necessary and thus can be politically and economically justified (Cohen, 1978). Tourism development must occur in a controlled and planned manner in order to protect the local resources.
Cohen (1978) argued that tourism development can also replace more environmentally destructive types of industries (such as manufacturing and mining) as heavy industrialization is not compatible with an unspoiled environment. Mining produces large amounts of hazardous waste containing high concentrations of heavy metals that can contaminate soil and groundwater (David, 2002). For example, David (2002) found that a spill of mine waste on Marinduque Island, Philippines had caused increased concentrations of lead, manganese, copper, and zinc in marine sediments.

While tourism itself can cause many detrimental environmental impacts, it is generally considered cleaner and less exploitative than heavier industrialization. However, despite the increasing local awareness of environmental resources and displacing more destructive industries, there is an even longer list of non-economic costs to the environment associated with tourists' activities.

**Environmental Costs of Tourism**

Cohen (1978) presents a useful framework for examining the environmental costs of tourism. Environmental impacts can occur based on four features of a destination:

1. intensity of destination use and development
2. resiliency of the destination's environment,
3. investment return schedule of a destination's stakeholders, and
4. transformational character of the tourism development.
The Intensity of Destination Use and Development

The first feature, the intensity of destination use and development, is a function mainly of the type of tourists that visit the destination. This can be examined in terms of the destination life cycle (Butler, 1980). The destination, over time, passes through the different life cycle stages based on the volume and type of tourist that is visiting. Initially, exploratory and adventurous travelers ‘discover’ the destination but arrive in small numbers. Demands of tourists for infrastructure and impacts on the environment are small.

As time passes and more tourists hear about the destination, arrivals increase until the destination reaches a state of mass tourism (Butler, 1980). At this stage, the infrastructure such as airports, roads, and accommodations is critical to the arrival and movement of tourists. In addition, these tourists have high standards for the type of infrastructure needed (Cohen, 1978). Though the individual tourist may not cause extensive damage, the high volume of visitors multiplies the cumulative impact on the environment and demand for resources can be considerable (Christensen & Beckmann, 1998; Gössling, 2002). Finally, tourism development can enter the stagnation phase where the destination has become commoditized and tourist arrivals level off (Butler, 1980). Finally, the cycle is completed with the destination entering either the decline or the rejuvenation phase which includes destination degradation and falling arrivals or revitalization of the environment and tourism offering followed by further increases in arrivals, respectively (Butler, 1980).
Leisure travelers are often more indulgent while on vacation, resulting in an increase in resource demand relative to their home consumption patterns (Warnken, Bradley, & Guilding, 2004). Many destinations may attempt to attract fewer, higher-spending travelers in order to reduce tourist numbers while keeping tourism receipts high. Wealthy travelers demand more in terms of a clean, unspoiled environment (Gössling, Hansson, Hörstmeier, & Saggel, 2002). High-spending tourists may seem to be more attractive visitors, but they also consume more resources per person (Gössling et al., 2002). Length of stay appears to have little effect on tourists’ consumption patterns as shorter trips often result in similar total consumption as longer stays (Christensen & Beckmann, 1998).

Waikiki on O‘ahu is an example of such intense tourism development. Though the physical area is small, Waikiki has a large number of hotel rooms that are largely serviced by imported labor which in turn can strain roads, schools and housing (Cohen, 1978). The intense development has transformed Waikiki from peaceful beaches (as visible in pictures of the area in the 1920’s) to block after block of hotel, condominium, and timeshare buildings with small pockets of intensely landscaped green space.

The Resiliency of the Destination’s Environment

The ability of the destination to absorb tourists and their impacts is an important feature to determine the impacts of tourism and to plan the development of sustainable tourism. The impacts of large numbers of tourists seem to be better absorbed by cities whose infrastructure is developed and in place rather than more fragile environments such as islands (Cohen, 1978). Impacts are more severe on islands because resources
such as land are inherently constrained, thus increasing competition for those resources among tourists and residents (Cronk, 1997). Islands by their nature have a high proportion of coast, which is generally deemed one of the most advantageous environments to develop tourism and therefore are very attractive for tourism development (Erdmann, 1997).

Based on the 1972 work of Spiegel, Cohen (1978) uses German Ostsee as an example of a destination's ecosystem resiliency being overcome by intense tourism development. Ostsee was a traditional countryside transformed quickly by rapid urbanization as a result of a tourist boom (Cohen, 1978). This building of tourism infrastructure destroyed the very rural environment that attracted the tourism development to begin with.

_The Investment Return Schedule of a Destination's Stakeholders_

The time frame over which tourism stakeholders expect to recoup their investment is an important component of tourism development and its impacts on the environment. Moreover, the stakeholders in control of tourism development can vary by destination. Developers and private industry can elect to take an exploitative or speculative approach to development, demand a hasty return on investment, and skip town for the next development opportunity (Cohen, 1978). Obviously, such developers take no long-term interest in the viability of a destination or its future ability to attract tourists. As Wen (1998) explains, “one fundamental cause for environmental problems is that those who exploit natural resources can obtain benefits immediately without having to pay the full cost (both economic and social) of depletion, while these costs, paid either
now or in the future, are transferred to the society as a whole.” Thus, developers can cause deterioration of the very resources that the tourism industry is built upon. On the other hand, when controlled by stakeholders with a longer-term perspective (such as residents or local policy makers), tourism development can be paced to limit the exploitation of resources and thus the environmental and social costs.

As an example of a destination where tourism developers are focused on short-term returns, Cohen (1978) offers the case of the Costa Brava in Spain. Hotel developers in Costa Brava raced each other to build on the finest beaches resulting in large-scale development that erode the quality of the very beaches themselves (Cohen, 1978). Therefore, by developing Costa Brava for the short term, the destination has become less sustainable in the long term.

The Transformational Character of the Tourism Development

There are endless examples of tourism development having a transforming effect, most likely negative, on a destination. These transformations occur either when a natural attraction (such as a beach) is prepared for tourist use or after the building of a man-made attraction (Cohen, 1978). Residents are the most common victims of the resulting changes. As tourism development consumes resources and damages the environment, it can erode residents’ quality of life and erode the respective culture (Ahn, Lee, & Shafer, 2002). By urbanizing and overdeveloping, tourism development can break the bonds and decontextualize residents’ relationships with the local environment (Gössling, 2002). If not properly controlled, residents in mass tourism destinations will endure congestion, noise, neighborhood and environmental dereliction, and higher prices resulting from
competition with tourists for scarce resources (Cavus & Tanrisevdi, 2003; Liu & Var, 1986).

Singapore is an example of a destination whose character has been transformed by development (Cohen, 1978). Singapore possessed few natural attractions but still decided to pursue tourism development. According to the 1969 work of Polsky as cited by Cohen (1978), Singapore constructed several contrived attractions such as converting the island of Sentosa into South Seas Island in order to attract foreign tourists. These contrived attractions completely transformed the character and environment of the original destination.

Tourism and Energy Consumption

Tourism requires substantial energy inputs. Residents also require energy for their daily activities and limits to the availability of energy resources puts them in competition with tourists and their energy needs. High energy costs can result from such an imbalance between supply and demand. Energy supplies to both tourists and residents come mostly from the burning of fossil fuels such as petroleum and coal. Burning fossil fuels in vehicles and for electricity causes the emission of greenhouse gases into the atmosphere, leading to air pollution and global warming (Gössling, 2005).

Quantifying Tourism Energy Use

Monitoring energy use in tourism is extremely difficult because of the fragmented nature of the tourism industry and because residents and tourists are using many of the same facilities (Warnken et al., 2004). Extracting the exact amount of energy used by
tourists alone is not feasible. Energy inputs are required for the segments of transportation, accommodation, and activities for the tourism industry. However, there is a significant variance between the three aforementioned categories as transportation alone accounts for 93 percent of the energy consumed by tourists (Gössling, 2002). Table 1 is an estimate of global tourism energy consumption and carbon dioxide emissions by category and for the total global tourism industry. According to Gössling’s (2002) estimates, energy consumed by the travel industry exceeded $1.43 \times 10^{19}$ joules! The large energy inputs and emissions outputs show that in terms of energy, tourism is an unsustainable industry (Gössling, Peeters, Ceron, Dubois, Patterson, & Richardson, 2005).

<table>
<thead>
<tr>
<th>Category</th>
<th>Energy use (PJ)</th>
<th>Relative percentage</th>
<th>CO2 emissions (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>13,223</td>
<td>93.9</td>
<td>1,263</td>
</tr>
<tr>
<td>Accommodation</td>
<td>508</td>
<td>3.6</td>
<td>81</td>
</tr>
<tr>
<td>Activities</td>
<td>350</td>
<td>2.5</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td>14,081</td>
<td>100.0</td>
<td>1,399</td>
</tr>
</tbody>
</table>

Note. Adapted from Gössling, 2002.

Transportation

Energy inputs for transportation are in the form of fuel for cars, airplanes and other forms of transportation. In addition to being the largest contributor, accounting for almost 94 percent of tourism-related energy consumption or $1.3 \times 10^{19}$ joules, the
transportation sector includes aviation. Aviation emissions are particularly harmful because they are released into the upper troposphere where they have a greater impact on global warming (Gössling, 2002). Of the factors affecting the energy consumption of travel, travel distance to the destination is the factor with the largest effect. The average energy expenditure for transportation is 2,475 megajoules (MJ) for domestic tourism and 8,163 MJ for international trips, but, depending on the travel choices that tourists make, this number can vary greatly (Becken, Simmons, & Frampton, 2003). While there are limitations in the ability to reduce the energy consumed during transportation, as it is a function of travel distance, the relative contribution of travel distance to energy consumption can be reduced by staying longer at a destination (Gössling et al., 2005).

Accommodation

Energy inputs for accommodation are difficult to tally because of the fragmented nature of this sector and the difficulty in separating tourist consumption from resident consumption (Warnken et al., 2004). Consumption estimates usually include electricity and gas used for heating, air conditioning, lighting, and cooking. Hotels are the most common type of accommodation and the largest consumers of energy. High energy consumption is due to energy intense amenities offered at hotels, such as pools (Becken, Frampton, & Simmons, 2001). Hotels can consume 256 MJ per bed night, excluding gas for cooking (Gössling, 2002). While accommodations consume significantly less energy than the transportation sector, there are more ways to decrease energy use or increase energy efficiency (Becken et al., 2001). Efficiency is often a function of the building
In order to increase energy efficiency, many hotels have installed energy management systems that detect when guests are in their rooms. The system will turn off the air conditioner when the room is vacant or when the balcony door is open. While it may seem logical that occupancy levels of hotels would be a significant variable in consumption patterns, because of the large amount of public areas and numerous, energy-intense facilities, occupancy has little effect on usage (Warnken et al., 2004).

Activities

For many tourists, activities are an important part of their experience at a destination. For instance, amusement parks such as Disneyworld and Sea World are attractions that tourists visit as part of their activities at a destination. Museums, such as the Louvre in Paris, France and visitors centers, such as are found in national parks, are additional examples of important tourist attractions. These activities consume energy. Energy inputs for activities exhibit large variations depending on the activity chosen. Generally speaking, the nature of the activities themselves is so diverse, it is difficult to systematically tally their energy consumption (Becken & Simmons, 2002). Activities such as helicopter rides and scuba diving use orders of magnitude more energy than activities such as museums and zoos. On average, a tourist will use 250 MJ on activities during a longer vacation (Gössling, 2002).
Tourism and Energy in Hawai'i

The State of Hawai'i Energy Resources Coordinator (2005) has determined that Hawai'i imports 89 percent of its primary energy, making it the most oil-dependent state. Also, Hawai'i residents pay the highest costs for both electricity and gasoline in the nation (SHERC, 2005). In 2004, the state consumed $4.35 billion (SHERC, 2005). Tabatchnaia-Tamirisa, Loke, Leung, and Tucker (1997) estimated that tourists visiting Hawai'i account for approximately 40 percent of total energy use. Of that energy, 94 percent is generated by burning imported petroleum and only 4 percent comes from renewable sources (SHERC, 2005).

In order to encourage energy efficiency, the Hawai'ian Electric Company (HECO) offers rebates to businesses for utilizing energy efficient technology. Many hotels in Waikiki utilize energy management systems to try to cut back on energy consumption and thus save money. Additionally, most Hawai'ian hotels are located near the ocean which represents a virtually unlimited supply of cool water that can be used to cool rooms. Presently, the water is cooled by refrigeration systems that run on burning crude oil. Currently, the city of Honolulu is examining the feasibility of a project to create a system that uses the cold (deep) ocean water for downtown office building cooling systems. If the program is successful, hotels in Waikiki could take advantage of the technology. The tradewinds also represent a possible source of wind energy that could be developed to reduce fossil fuel burning. While tourist demands for energy are high, technological innovation provides potential to drastically reduce the dependence on traditional forms of energy created by burning fossil fuels.
For one third of the world’s population, water is scarce. Most fresh water is consumed by agricultural activities necessary to keep up with the enormous demands for food required to feed the world’s population. Food demand continues to grow as a result of a larger population, many of whom are wealthier and require a more varied diet. A major result of world water scarcity from overuse of water resources is the pollution and drying up of rivers, depletion of groundwater, and unfair distribution of water supplies to those who can afford to pay for it (Anonymous, 2006). This trend could widen the gap between rich and poor across the globe.

Tourists use water in many ways. Surface water such as oceans or lakes is used for recreation such as swimming, boating, and snorkeling. In order to enjoy their water recreation, tourists require that water be clean and of good quality (Yap & Kahoru, 2001). Tourists consume groundwater both directly for drinking, showering, and flushing toilets and indirectly such as irrigating golf courses, pools, and water use in restaurants (Christensen & Beckmann, 1998; Gössling, 2001). In their use of water, tourists also generate large amounts of wastewater in the form of sewage, irrigation runoff, and cleaning chemicals which must be treated at wastewater treatment plants (Christensen & Beckmann, 1998). Wastewater that is not properly treated can pollute groundwater by seeping or being injected into the ground or be carried out to the ocean via surface water drainage ways such as channels and storm sewers. Tourists’ wastewater places an additional burden on water resources and wastewater infrastructure, which may already
be limited in a destination. In fact, hotel guests can consume up to ten times more water than local residents (Mieczkowski, 1995).

Surface Water

Tourists and tourist facilities generate large amounts of sewage and fertilizers used to enhance landscaping or golf courses on resort properties. What is generated can be washed out into rivers, streams, and especially the ocean. Sewage contains fecal coliform, a hazardous form of bacteria that can make humans using sewage-tainted water extremely sick (Yap & Kahoru, 2001). Sewage and fertilizers increase the amount of nutrients in water, which accelerates the growth of algae (Erdmann, 1997; Gössling, 2001). This algal growth, in addition to harvesting pieces of the reef for souvenirs can kill the fragile coral reefs. Coral reefs such as the Great Barrier Reef in Australia or the reefs of the Seychelles are an important visitor attraction. Reefs also provide an important function by dissipating wave energy before reaching the shore. If the reefs are no longer present to act as breakwaters, coastal erosion can occur (Erdmann, 1997).

Figure 1 diagrams the function of coral reefs and the damage that can occur to shorelines if they no longer function as breakwaters.

Another indirect impact on water resources is produced by tourism development. Undeveloped land usually contains vegetation that acts to retard the flow of runoff preventing erosion and as a filter to absorb chemicals before they are washed into waterways. Changing the land use by building hotels and other tourist infrastructure increases sediment loads to streams and the ocean which smothers and kills coral reefs, reducing the species diversity of marine life, and degrades the clarity of ocean water for
nearshore activities (DBEDT, 2006b). In addition to the beach activities of tourists, many residents use the nearshore waters for swimming, snorkeling, scuba diving, and fishing and this is an important part of their life. These activities depend on the health and vitality of the coral reefs.

There are ways to decrease the detrimental effects of wastewater. First, wastewater should be sent to a treatment plant where chemicals and pathogens are removed before discharging the cleaner water into the ocean or injecting it underground. If it is properly treated to remove chemical and biological contamination, wastewater can be resused to supplement golf course and landscaping irrigation. On the more complex end, destinations can develop a basin management system to better manage the interaction of changing land use, sedimentation, and runoff (Ruiz et al., 2004).

Increasing the sustainability of land-water interactions is necessary for overall destination sustainability.

Groundwater

Groundwater is most often the main source of freshwater for residents and tourists. Groundwater is extracted from aquifers through pumping and is piped into residential and tourist areas. However, groundwater is also important for sustaining ecosystems in coastal areas where the groundwater is close to the surface (Gössling, 2001). As the demand for groundwater grows, pumping of the groundwater increases. If the rate of groundwater extraction exceeds the rate of groundwater recharge, the groundwater table, or the point at which the bedrock or sediment is saturated, will be lowered. Lowering the groundwater table, especially in coastal areas, can have severe
consequences such as land subsidence and pumping saltwater or chemical pollution into the groundwater aquifers (Gössling, 2001).

The accommodation sector can greatly reduce its use of fresh groundwater by emphasizing water conservation. Constructing water catchments to collect rainwater, using flow limiters on showers and faucets, installing low-flow toilets, and inspecting pipes for leaks are just a few of the ways to decrease water use and waste (Gössling, 2001). Education is also another approach. Educating employees and guests about water scarcity and therefore the need for conservation is another effective approach.

Tourism and Water in Hawai‘i

Because Hawai‘i is a group of islands, their water resources are especially sensitive to tourism-related impacts. Most of the islands are ringed by coral reefs that protect the shoreline from the power of waves. However, intense development has changed the drainage patterns on the island. For instance, in Honolulu many drainage channels are concreted, keeping water from percolating down into groundwater as it would in a stream with a sediment bottom.

Also, land-use changes have resulted in increased sedimentation and chemical and biological pollution in the ocean. Paved water channels can increase and accelerate the flushing of contaminants such as heavy metals to surface waterways and into the ocean (Oki & Brasher, 2003). In the spring of 2006, O‘ahu experienced unusually heavy and extended rains that culminated in a ruptured main sewer line and 48 million gallons of raw sewage being pumped into the Ala Wai Canal which drains directly into the ocean at Waikiki Beach (Yap, 2006). For several days, tourists and residents were unable to swim
in the ocean because of the large amounts of contamination carried into the ocean by storm water runoff.

In light of these incidents, it is very important to more carefully manage O‘ahu’s water resources by protecting the fragile aquifers from pollution and overpumping as well as properly managing wastewater and drainage from the island is necessary for residents and tourists alike to enjoy safe drinking water and a clean ocean.

Drinking water in Hawai‘i comes entirely from groundwater aquifers replenished by rainfall which will not be able to keep up with future demand (Landers, 2003). As of 2003, the Honolulu Board of Water Supply (BWS) produced 160 million gallons per day from groundwater wells (Landers, 2003). Hawai‘ian tourists directly and indirectly consume large amounts of groundwater for restaurants, pools, showers, and golf course irrigation. To handle the wastewater produced on the island, the City and County of Honolulu operates eight wastewater treatment plants in addition to facilities used directly by tourist facilities (Oki & Brasher, 2003).

Groundwater aquifers on the islands are volcanic-rock aquifers overlain by sediments, some of which form a caprock, or confining layer that prevents the upward flow of freshwater into the ocean (Mortz et al., 2005). Near the ocean, the aquifers are confined on the bottom by a transition zone of brackish water overlying dense, cooler seawater. As Figure 1 shows, groundwater near the coastal areas of the island of O‘ahu exists as a “freshwater lens” between the seawater below and the caprock above. These freshwater lenses are the most important water source of groundwater on O‘ahu (Oki & Brasher, 2003).
Figure 1. Schematic cross-section of a freshwater lens groundwater aquifer on O‘ahu. Note. From Oki & Brasher, 2003

The population of the island and the number of visitors are growing and the amount of recharge is decreasing due to the amount of impervious or paved surfaces. Therefore, the demands on this lens are increasing beyond its ability to be renewed (Mortz et al., 2005; Oki & Brasher, 2003). As the lens gets thinner, the pumps will begin to cause saltwater intrusion, contaminating the aquifer (Oki & Brasher, 2003). Once saltwater intrudes a well, the salinity begins to increase and the quality of water declines. When the salinity reaches a certain threshold, it can no longer be used as a drinking water source.
Tourism and Land Use

Tourism development frequently requires large amounts of land for building accommodations, airports, roads, visitor centers, landfills, golf courses, and other structures that directly or indirectly enable delivery of the tourism product (Gössling, 2002). This land, once developed, is usually comprised of a mix of uses and structure types including resort buildings, golf courses, pools, and parking lots (Klasner & Mikami, 2003). The central areas of tourism development are the first to grow and become intensely urbanized, becoming completely transformed in the process, drawing tourist attention away from the natural environment as it is replaced by the man-made environment (Cohen, 1978).

However, tourism continues to expand outwards and in certain tourist “staging” areas such as airports. Outside of the central area, tourist development follows a “ribbon-like” pattern and is difficult for planners to control (Cohen, 1978). This pattern of development is also detrimental as it fragments parts of fragile ecosystems, especially damaging in coastal areas (Gössling, 2002). This can destroy or disturb sensitive wildlife habitat resulting in the endangerment or even extinction or of many species. The conversion of natural areas to developed land reduces the amount of open, unpaved space available to residents and tourists for recreation and changes the character of the island to be more urban.

Gössling (2002) estimates that 514,950 km² (199,000 mi²) of global land could be directly attributed to leisure travel, of which 97.1 percent is related to transportation infrastructure (excluding roads), 0.3 percent for accommodations, and 2.6 percent for golf
courses. While the estimates for transportation are rather high and based on many assumptions, this is still a considerable amount of land. These calculations also exclude land indirectly used by tourists such as land to grow food, landfills, and wastewater treatment.

Land-related constraints at a destination, either natural (i.e., islands) or regulatory (i.e., zoning), limit the amount of development. If a destination’s land constraints are properly used to reign in unplanned development, they can help to protect natural resources such as beaches, beautiful landscapes, and water supply (Wong, 1996).

Tourism and Land Use in Hawai‘i

Land use in Hawai‘i has been changing drastically as plantation agriculture declines and the population grows, requiring further urban and suburban development. Much of the need for new housing on the island may be caused by the increasing employment requirements of the tourism sector. Of the land on O‘ahu, 25.7 percent, or 98,663 acres were developed in 1998 (Klasner & Mikami, 2003), an increase of over 12 percent since 1978 (Oki & Brasher, 2003). This creates drastic changes in ground cover, as it is a shift from vegetation to impervious surfaces, drastically changing the groundwater recharge rates and patterns. Figure 3 shows land use on O‘ahu as of 2002.

Waikiki is a prime example of the replacement of natural attractions with contrived and man-made structures and a highly commercial version of Hawai‘ian culture (Cohen, 1978). Waikiki is a dense development of hotels, restaurants, bars, and retail establishments where most tourists stay on the island. While there has been a recent push to increase the amount of open space in Waikiki, development was generally unplanned
an uncoordinated, resulting in little architectural blending with either the environment or other buildings.

Figure 2. Land use on O‘ahu as of 2002 depicting urban, agricultural, and conservation land. Note. From Oki & Brasher, 2003.

Sustainable Tourism Development

Sustainable tourism can keep a destination from entering the decline stage of the destination life cycle. The concept of sustainable tourism was developed in the 1980’s from the concept of sustainable development (DBEDT, 2006b). Sustainable tourism development (STD) balances the costs and benefits of tourism by incorporating the needs of all stakeholders to develop tourism that is economically viable without harming the
environment or altering the culture or society of the residents (DBEDT, 2006b). STD maintains or improves the quality of the tourism product by promoting the destination’s cultural and environmental assets through an interdisciplinary process involving stakeholders (DBEDT, 2006b; Twining-Ward & Butler, 2002). The process pursued to achieve STD should be adapted to each destination (Twining-Ward & Butler, 2002).

While the overall goal of any industry is to generate a profit, sustainable tourism balances this goal with the needs of other stakeholders including environmental protection and preserving cultural traditions (Ahn et al., 2002; Hjalager, 1996). STD planning is based on the impacts to the economy, environment, and culture; the dynamics of wealth generation; and the relative power and interactions between stakeholders (Bramwell, 2006). Successful and sustainable tourism depends on meeting the needs of all stakeholders rather than the personal benefit of the most powerful (Dyer, Gursoy, Sharma, & Carter, 2007). Sustainable tourism development is the most effective framework for mitigating the negative impacts caused by large numbers of tourist, making it a way to improve tourism on O‘ahu (Choi & Sirakaya, 2005). However, Choi and Sirakaya (2005) point out that more ways to evaluate new sustainability frameworks are necessary. When tourism planning is protective of the environment, a positive feedback cycle of improvement of product and place can be entered (Batra & Kaur, 1996).

**Tourism Suppliers**

Tourism suppliers with a long-term interest in the destination will want to protect the resources on which tourism is built in order to sustain revenues (Bramwell, 2006).
Since it is the natural environment that attracts many tourists, it is in the industry's interest to protect this resource for future use. Also, tourism suppliers such as hotel chains rely heavily on the reputation of their brand name. It is their interest to act responsibly toward (rather than exploit) the environment so that the company is viewed by customers, in this case tourists, as a good corporate citizen (Warnken et al., 2004). Certification programs are one way to cue tourists about how their choices impact the environment (Dodds & Joppe, 2005). The certifications not only represent the end supplier; the entire supply-chain can be certified. Suppliers can also develop corporate social responsibility (CSR) codes as a form of self-regulation when government regulation is not protective enough of the environment and host culture to sustain the vitality of a destination (Levis, 2006).

**Government and Tourism Planners**

Government and tourism planners try to control and pace tourism development to maximize benefits and minimize detrimental impacts (Cohen, 1978; Batra & Kaur, 1996). It is their duty to ensure that tourism development proceeds according to a master plan that is ideally in a sustainable manner. Because properly managed tourism can provide benefits to all public and private stakeholders, it is the responsibility of government to protect stakeholders from development that does not serve their interests (Jamal & Getz, 1995). General protective measures, regulations to control development, and financial restraints are used to guard against detrimental impacts (Cohen, 1978; Hjalager, 1996). General protective measures protect and conserve resources such as biodiversity, land, and culture. This also includes the creation of parks and natural areas and can be funded
by tourism receipts. Regulations to control development include restricting tourism development, tourist arrivals, zoning, and ordinances which require building to blend with the environment (Cohen, 1978). Financial incentives include taxes and pricing, incentives, and penalties for non-compliance or to restore the environment (Hjalager, 1996).

According to Jamal and Getz (1995), “local authorities have the delicate task of juggling private sector interests with local resident needs and wants, in order to maintain the economic health of the community and ensure that development is sustainable”. Tourism planning rules can be designed by planners to encourage environmental improvement by emphasizing its importance as part of the tourism product for the destination (Batra & Kaur, 1996). It is also important that development is ‘harmonious’ with the overall plan for the destination (Batra & Kaur, 1996). Governments also provide and maintain the infrastructure necessary for the industry such as roads, airports, parks, and visitor centers (Jamal & Getz, 1995). This maintenance can be extremely costly. If government does not plan effectively, residents (through property taxes), rather than tourists or suppliers (through accommodations tax) will bear this burden (Wong, 1996). Therefore, government management effects how both tourists and residents perceive the destination.

Residents

Residents can benefit from tourism’s economic impacts when tourists spend money in the local economy or their spending indirectly creates employment opportunities for residents (Wong, 1996). Tourism also requires the development and
maintenance of infrastructure and facilities that residents enjoy (Wong, 1996). Residents in well-developed destinations such as Hawai‘i can become dependent on tourism for their economic well-being and standard of living. Residents can also benefit from cultural exchange with tourists with whom they interact.

Lack of tourism planning can also limit the amount of tourist spending that directly benefits residents. For instance, large tourism suppliers based in other countries, though they do pay wages to local workers, also export a large share of the revenues to their corporate headquarters creating economic leakage from the destination. Additionally, the jobs created by the tourism industry may be low-skill, low-status work with low pay.

Residents are especially vulnerable to the negative impacts of tourism because they rely on the same resources as the tourism industry and interact continuously with tourists (Wong, 1996). If the benefits of tourism are not seen by residents to outweigh the costs, the sharing of resources with tourists can cause resentment and irritation among residents that can be directed at the visitors also decreasing the satisfaction of residents with their community (Ko & Stewart, 2002; Doxey, 1975; Faulkner & Tideswell, 1997). Tourists sense these negative feelings and tourist satisfaction levels can decline (Ko & Stewart, 2002). However, residents also depend on the economic benefits of tourism and therefore downplay the negative impacts as a coping mechanism which is a function of the community satisfaction (Dyer et al., 2007; Cavus & Tanrisevdi, 2003; Faulkner & Tideswell, 1997). Generally, residents whose economic well-being is most dependent on tourism will be more supportive of the industry (Harrill, 2004).
Cavus & Tanrisevdi (2003) determined that residents’ negative impressions of tourism were mainly related to the development process controlled by planners. To prevent residents from resenting tourists and to maximize the benefits that tourism can bring, it is very important that the community’s needs be taken into account during tourism planning (Faulkner & Tideswell, 1997). The ability of residents to be active participants in tourism planning can promote positive attitudes towards tourism and tourists (Cavus & Tanrisevdi, 2003). According to Jamal and Getz (1995), this role must also be active and dynamic as perceptions and opinions change over time as the variables affected by tourism change. Continuously including residents in tourism planning will also result in an improved tourism product and higher tourist satisfaction.

Tourists

Tourists’ requirements for a destination may be inherently contradictory. Tourists generally want to see a pristine and unspoiled environment while at the same time setting high standards for accommodations and activities that are in direct conflict with the natural environment (Cavus & Tanrisevdi, 2003). Tourists benefit from sustainable tourism in two ways. First, sustainable tourism can enable increased interactions with the local residents giving tourists a chance to learn about the host culture. Second, sustainable tourism preserves environmental resources for use and enjoyment by both tourists and residents.

Ecotourism has been growing rapidly in the last few years (Kahn, 2003). Ecotourists represent a different tourist whose objective of environmentally friendly natural experiences is more in line with the goals of sustainable tourism than traditional mass
tourists. According to Kahn (2003), ecotourists are wealthy tourists from developed countries who seek vacation experiences in natural environments. This rapidly growing market segment is willing to pay a premium for environmentally conscious suppliers to deliver experiences that offer participatory learning about conservation, preservation, and local culture (Kahn, 2003). However, there is still great debate in the literature as to whether ecotourists’ pursuit of pristine natural experiences actually degrades, rather than preserves, the environment (Kahn, 2003).

The Role of Policy and Planning

For tourism to be completely sustainable, resource stores would not be depleted over time (Collins, 1999). In reality, however, tourism sustainability is an ideal that stakeholders should strive for, even if it is never truly attained. As tourist numbers continue to rise, tourism and its impacts will grow. Consequently, it is important for destinations to plan to minimize the detrimental effects (Hjalager, 1996). In order to minimize negative impacts, planners need to understand what impacts are created by tourism (Gössling et al., 2005). An approach to monitoring environmental impacts of tourism (environmental accounting) is auditing energy, water and waste (Warnken et al., 2004). Planners can use tourists’ consumption patterns to estimate both direct and indirect environmental costs for cost-benefit analysis, to determine the total effects for each sector of tourism and for the industry as a whole, and identify areas that are especially sensitive in terms of resource use or degradation (Warnken et al., 2004). However, it is difficult to isolate the impacts and consumption due to tourism from the impacts and consumption of the residents.
Valuation of resources is another important tool for monitoring and controlling environmental impacts. In actuality, the costs associated with exploitation and pollution are consistently undervalued. Proper valuation of the tourist resources requires detailed information on resource supplies, but it enables pricing. When appropriate, through price control, conservation is enabled (Wen, 1998).

Even with planned development that considers all stakeholders’ interests, tourism development has limits (Cohen, 1978). These limits need to be quantified to determine critical thresholds, or carrying capacity, for the destination (Butler, 1980; Gössling et al., 2005). Calculating the carrying capacity of a destination allows planners to quantify a pre-determined limit based on the resources available (physical carrying capacity) and the resident tolerance for visitors and tourism development (psychological carrying capacity) (Christensen & Beckmann, 1998). Carrying capacities can vary greatly between destinations. As previously stated, cities have a larger capacity to absorb the impacts of tourism than do coastlines and islands.

Once environmental baselines are established, the inevitability of change can be controlled using the limits of acceptable change (LAC) framework (Ahn et al., 2002). Using this framework as a planning tool, changes are monitored so that they stay within a pre-defined and acceptable range that was agreed upon by the various tourism stakeholders and not determined by a single group. Thus, cooperation of stakeholders in their mutual efforts to protect the environment is necessary to increase the sustainability of tourism development (Christensen & Beckmann, 1998). As described by Ahn et al. (2002), the LAC planning systems consists of nine iterative steps for identifying issues,
determining indicators that will be used to assess these issues, establishing baseline conditions, defining management actions, and implementing management initiatives.

**Sustainable Tourism Development in Hawai‘i**

Hawai‘i, Waikiki in particular, is famous as a scenic destination with well-developed tourism infrastructure and facilities (Tabatchnaia-Tamirisa et al., 1997). Over the last century, the economy of Hawai‘i has become dependent on tourism to provide employment to many of the state’s residents in jobs working directly or indirectly with the industry (DBEDT, 2006b). Therefore, the residents of Hawai‘i are economically dependent upon the success of the tourism product offered by the tourism suppliers. However, residents should be able to enjoy the economic success of the tourism industry without having to shoulder the consequences. In order to move towards more sustainable tourism on O‘ahu, the economic, environmental, and cultural/social goals must be considered in future planning (DBEDT, 2006b).

Overall, residents use the island’s infrastructure more than tourists, though tourist use per day per person exceeds the demands of residents per capita (Sheldon, Knox, & Lowry, 2005). Increasing numbers of tourists continue to put pressure on the island’s resources (Tabatchnaia-Tamirisa et al., 1997). Residents’ perceptions of the island’s energy, water, and land assets as well as congestion are important to helping planners achieve sustainability goals by balancing demand for these resources among stakeholders. Important tourism stakeholders in the Hawai‘ian Islands include residents, tourists and government planners as well as special interest groups such as tourism industry professionals, university educators, environmental groups, and native
Hawai‘ians (DBEDT, 2006b). The Sustainable Tourism Study Group representing several stakeholder groups was able to achieve a consensus despite the diverse needs of the groups (DBEDT, 2006b).

In regards to the environment, the group envisioned that “sustainable tourism will operate in harmony with our ecosystems, enhancing natural beauty and protecting the islands’ natural resources (DBEDT, 2006b; 72). To do this, a partnership between the public and private sectors would be formed in addition to requesting state funding for environmental issues (DBEDT, 2006b). The group’s infrastructure assessment study consultant proposed finding alternative sources of water and energy as well as conservation and improved coordination between state and county transportation authorities (DBEDT, 2006b). In order to manage the sustainable tourism initiatives, the group recommended using the conceptual model for sustainable tourism monitoring proposed by Twining-Ward and Butler (2002). This model calls for the development of indicators that will be part of an environmental monitoring program to track environmental changes over time (DBEDT, 2006b). The indicators were designed to ensure that long-term respect for the land is a higher priority than residents’ or tourists’ short-term interests (Sheldon et al., 2005).
Resident Attitude Surveys

Residents develop attitudes towards tourism by evaluating the costs and benefits (i.e. a cost-benefit analysis) (Cavus & Tanrisevdi, 2003). When costs such as environmental degradation, cultural strain, or crowding outweigh benefits such as job creation and tourist spending, attitudes towards tourism decline. If the reverse is true, attitudes towards tourism will become more positive.

Resident attitude surveys gauge residents’ opinions the impact of tourism on their community (Ahn et al., 2002). Demographic data included on the surveys examine differences within the resident population (Ahn et al., 2002). Several factors influence residents’ attitudes towards tourism.
The job-creation and tourist spending are economic benefits of tourism. Residents who value economic impacts will have a more favorable attitude towards tourism (Lindberg & Johnson, 1997; Walpole & Goodwin, 2001; Yoon et al., 2001). However, resident often have negative attitudes towards environmental and cultural changes in their community due to tourism (Walpole & Goodwin, 2001; Yoon et al., 2001). Liu & Var (1986) determined residents’ priorities in regarding tourism impacts using resident attitude surveys:

1. high standard of living
2. environmental protection
3. economic benefits
4. social costs, and
5. cultural benefits.

Findings from resident attitude surveys, like the priorities found by Liu & Var, show planners how residents think about tourism development and which benefits and costs are most important to residents.

Over time, a number of resident attitude surveys unique to the destination in which they were developed have been administered. Due to variances in survey content, cross-destination comparisons were not possible. Lankford and Howard (1994) developed the Tourism Impact Attitude Scale (TIAS) to create a standardized instrument for examining resident attitudes towards the impacts of tourism. The instrument could be administered in different destinations and at different times to facilitate a comparative analysis between destinations and over time. Statements appearing on the TIAS were
based on a thorough literature review. The TIAS presents a series of Likert-type statements regarding their perceptions on the impacts that tourism causes to the environment, society, and the economy. The survey also asks questions about the respondents' demographic profile in an effort to examine how demographic characteristics affect residents' views on tourism. Finally, the instrument was validated by the researchers and has been validated in the literature (Lankford & Howard, 1994).

Resident attitude surveys themselves can alter the way that residents view tourism planning because the surveys themselves are an indicator that residents' opinions are important to planners. Residents who perceive that they have influence over the process of tourism development in destination are more likely to have positive feelings towards tourism (Lindberg & Johnson, 1997).

Finally, residents in mature destinations, such as Hawai‘i, have had prolonged exposure to tourists and both their positive and negative impacts (Ko & Stewart, 2002). Residents in Hawai‘i are very aware of both the positive and negative the contributions of the industry (Liu & Var, 1986). Over time, residents develop systems for coping with inconveniences and environmental damage (Rothman, 1978 as cited in Cavus & Tanrisevdi, 2003 and Liu & Var, 1986). When tourism is firmly entrenched and supports a large proportion of the economy, residents most opposed have the opportunity to avoid the industry through selective migration, leaving a population more accepting of tourism and its impacts and more dependent on tourism for their economic well-being (Faulkner & Tideswell, 1997; Liu & Var, 1986).
A recent report on resident sentiments was published by HTA (2006) and revealed that overall, residents view tourism's impacts as positive. Seventy-six percent of respondents from O'ahu feel that tourism has brought more benefits than problems, similar to 2002 results of 77 percent (HTA, 2006; HTA, 2003). However, 79 percent of island respondents somewhat or strongly agree that the economy is too dependent on tourism (down from 85 percent in 2002) and 77 percent feel that the island is run for tourists at local residents' expense, up drastically from 48 percent in 2002 (HTA, 2006; HTA, 2003). Sixty-four percent of respondents also feel that air and water pollution caused by tourism are a problem, up from 31 percent from a similar question in 2002 (HTA, 2006). Forty-one percent of respondents feel that the quality of air and water have worsened as a result of tourism (HTA, 2006). To address this issue, 82 percent of respondents feel that some of the tax money collected from tourism should be used for environmental preservation (HTA, 2006). Only 43 percent of respondents want to encourage more visitor activity in wilderness areas, down from 53 percent in 2002 (HTA, 2006; HTA, 2003).

Reducing the inconvenience to local residents caused by tourists can foster a better relationship between visitors and the host culture. One of the important factors for tourists in choosing a destination is the attitude of residents towards tourists, which ranked behind natural beauty, climate, infrastructure, and lodging (Liu & Var, 1986). It becomes necessary to explore the relationship between residents' perceptions and sustainable tourism development in order to create a positive attitude among residents.
towards tourism as well as to neutralize the negative impacts of tourists. For sustainable tourism planning to be effective, residents' opinions and concerns with regards to the economic, social and cultural elements of tourism must be addressed by tourism planning practices (Ko & Stuart, 2002; Yoon, Gursoy, & Chen, 2001).

In order to assess the environmental impacts of tourism, one must first extract the impacts caused by residents. For this reason, an objective assessment of tourism's impacts is impractical if not impossible (Briassoulis, 1991 as cited in Christensen & Beckmann, 1998). However, because of the long period of tourism development in Hawai‘i, tourism growth has had huge impacts on island's environment, culture, and economy (Cohen, 1978). Therefore, another method of examining tourism's impacts must be used.

Leisure travel accounts for 52 percent of world travel. Since Hawai‘i is primarily a leisure destination and there are many destinations that are more competitive in either pristine beaches or price, Hawai‘i must have a competitive and desirable tourism product to continue to attract visitors. In order for this to occur, the infrastructure and environment already in place must be improved and protected. One way to accomplish this is to use residents as a barometer for acceptable change.

Several resident attitude surveys in Hawai‘i have been conducted by local papers and academicians (Liu, Sheldon, & Var 1987). Because tourism employs so many of O‘ahu’s residents both directly (hotels, airlines, retail, etc.) and indirectly (utilities, waste disposal, marketing, etc.), there needs to be a better understanding of opinions of residents who have a dual role as stakeholder: living with the industry as well as working
within the industry. These highly involved stakeholders may be willing to tolerate
greater levels of negative impacts because they are also receiving a larger share of the
environmental impacts (Faulkner & Tideswell, 1997). Sheldon et al. (2005) identified
two critical factors necessary for implementing sustainable tourism: preserving the assets
which attract visitors to a destination and collaborative planning that involves key
stakeholders. In the case of O'ahu, environmental and Native Hawai‘ian groups have
opposed new tourism development. For effective planning to occur, residents with
greater, though possibly conflicting, stakes in tourism planning must be included (Yoon
et al., 2001).

Problem Statement

Understanding resident attitudes is essential for effective tourism planning but is
complicated because opinions of tourism are affected by many things. Perceptions of
government efficacy in managing tourism and environmental impacts affect residents’
community satisfaction and their views on the sustainability of tourism on O'ahu. The
objective of this research is to increase the understanding of residents’ attitudes on
government management and the environmental impacts of tourism to determine how
these attitudes affect perception of community satisfaction and sustainable tourism
development.

Methodology

After mining the literature for factors that influence resident attitudes towards
tourism, a conceptual model was developed to explore these factors. Six hypotheses
were developed from themes in the literature related to four primary factors of environmental impacts of tourism, overall community satisfaction, government management of tourism, and sustainable tourism development. These related residents’ perceptions of government management of tourism and the environmental impacts of tourism to their overall community satisfaction and attitudes towards sustainable development. Due to the significance of tourism in the Hawai‘ian Islands a model was developed to help predict resident attitudes on O‘ahu.

**Conceptual Model Development**

Based on themes identified from the literature, four factors related towards residents’ attitudes towards tourism were distilled. These factors were residents’ perceptions of the effectiveness of government management of tourism, environmental impacts of tourism, overall community satisfaction, and attitudes towards sustainable development. The six hypotheses are as follows:

- **H1**: Perceived government management of tourism will have a positive effect on overall community satisfaction.
- **H2**: Perceived government management of tourism will have a positive effect on perception of environmental tourism impacts.
- **H3**: Overall community satisfaction will have a positive effect on attitudes for sustainable tourism development.
- **H4**: Perception of environmental tourism impacts will have a positive effect on overall community satisfaction.
H5: Perception of environmental tourism impacts will have a positive effect on attitudes for sustainable tourism development.

H6: Perceived government management of tourism will have a positive effect on attitudes for sustainable tourism development.

Hypothesis 1 predicts that the perceived effectiveness of government management of tourism will have a positive effect on overall community satisfaction (Batra & Kaur, 1996; Faulkner & Tideswell, 1997; Jamal & Getz, 1995; Ko & Stewart, 2002; Wong, 1996). When residents positively perceive government management of tourism on O'ahu, they will be more satisfied with their communities. Batra & Kaur (1996) stated that tourism development needs to be ‘harmonious’ with the government’s plans for the destination. Wong (1996) avers that government planning is essential so that residents do not bear the burden of tourism’s detrimental impacts but also get to enjoy additional infrastructure maintained by the government. Ko & Stewart (2002) and Faulkner & Tideswell (1997) recognized that residents can become irritated if they do not see tourism develop in a controlled manner and for the benefit of residents, making them less satisfied with their community.

Hypothesis 2 predicts that the perceived effectiveness of government management of tourism will have a positive effect on perception of environmental tourism impacts (Cavus & Tanrisevdi, 2003; Cohen, 1978; Hjalager, 1996). When residents perceive that government effectively manages tourism they will feel more positively/less negatively towards the environmental impacts caused by tourism. Cohen’s (1978) and Hjalager’s (1996) determined that government can control and limit the environmental impacts of
tourism development. Cavus & Tanrisevdi (2003) linked residents’ negative impressions of tourism, in this case towards the environmental impacts, with the development process controlled by planners.

Hypothesis 3 predicts that higher overall community satisfaction among residents will have a positive effect on attitudes for STD (Choi & Sirakaya, 2005; Cohen, 1978; Cronk, 1997; Ko & Stewart, 2002; Twining-Ward & Butler, 2002). Residents with higher overall community satisfaction will feel that tourism development is more sustainable on O‘ahu (Twining-Ward & Butler, 2002). Residents will also be more satisfied with their community if they perceive that the tourism product on O‘ahu is sustainable and they do not need to compete with residents for resources (Cronk, 1997). The ability of sustainable tourism to avoid and mitigate the negative impacts of tourism makes it an important factor in reducing the perceived costs of tourism to residents (Choi & Sirakaya, 2005).

Hypothesis 4 predicts that residents’ perception of environmental tourism impacts will have a positive relationship with overall community satisfaction (Cavus & Tanrisevdi, 2003; Cohen, 1978; Doxey, 1975; Dyer et al, 2007; Faulkner & Tideswell, 1997; Ko & Stewart, 2002). Residents who perceive the environmental impacts of tourism more positively/less negatively are more satisfied with their community. The reverse relationship is also true: residents who perceive the environmental impacts of tourism negatively will have lower community satisfaction. Many authors have written about this relationship (Cavus & Tanrisevdi, 2003; Cohen, 1978; Doxey, 1975; Dyer et al, 2007; Faulkner & Tideswell, 1997; Ko & Stewart, 2002).
Hypothesis 5 predicts that perception of environmental tourism impacts will have a positive relationship with attitudes towards STD (Cohen, 1978; Choi & Sirakaya, 2005). Residents who perceive the environmental impacts of tourism more positively/less negatively will have more positive attitudes towards STD on O‘ahu (Choi & Sirakaya, 2005).

Hypothesis 6 predicts that perceived effectiveness of government management of tourism will have a positive relationship with attitudes towards STD (Choi & Sirakaya, 2005; Twining-Ward & Butler, 2002; DBEDT, 2006b). If residents feel the government on O‘ahu effectively controls tourism development, they will have more positive attitudes towards STD. Conversely, residents who feel that government does not effectively control tourism development will have more negative attitudes towards STD. Twining-Ward & Butler (2002) and DBEDT (2006b) found that residents who are part of the planning process and believe that government can be effective in limiting tourism development believe in the goals of STD.

The hypothesized relationships were combined to form a conceptual model of resident attitudes. A graphical representation of the proposed model may be seen in Figure 2. This model is based on the theoretical model developed by Perdue, Long, and Allen (1990) and adapted and used by Ko & Stewart (2002). The model was adapted based on the review of the literature to gauge residents’ attitudes towards sustainable tourism development.
Implications and Conclusions

The importance of gauging residents' attitudes towards tourism is constantly cited in the existing literature. Resident attitude surveys have been extensively used to determine how residents feel about tourism development because their inclusion in the process is necessary to make tourism more sustainable and the benefits and costs of tourism distributed more equitably. When residents are unhappy with tourism development, they will direct their dissatisfaction towards tourists, making them feel unwelcome and diminishing the long-term viability of the destination (Doxey, 1975). Residents can become unhappy with tourism when they feel that the environmental costs are too high and government fails to control tourism development for residents' best interests (Ahn et al., 2002; Bramwell, 2006; Cavus & Tanrisevdi, 2003; Cohen, 1978; Dyer et al., 2007; Harill, 2004; Jamal & Getz, 1995; Twining-Ward & Butler, 2002).
This unhappiness affects their attitudes towards the community and STD (Choi & Shirakaya, 2005; Ko & Stewart, 2002; Twining-Ward & Butler, 2002).

Planners are already taking steps to make tourism on O'ahu more sustainable (DBEDT, 2006b; Sheldon et al., 2005). To aid this process, a more complete understanding of how resident attitudes are formed is necessary. Resident attitude surveys gauge residents’ perceptions of tourism impacts on the environment and their community but few studies have attempted to create a model for how residents form these attitudes. A conceptual model was developed that incorporates relevant factors from the literature on tourism’s environmental impacts, sustainable tourism, and resident attitude surveys. The four relevant factors for determining residents’ attitudes are: the environmental impacts of tourism, the effectiveness of government in managing tourism, overall community satisfaction, and attitudes towards sustainable tourism development. The conceptual model developed can help to fill the gap in the literature identified by Choi & Sirakaya (2005) for methods to evaluate sustainability frameworks such as the one developed by DBEDT (2006b). Particularly, these authors pointed out a dearth of studies on residents perceptions of sustainability and developed a survey instrument to fill this gap. The conceptual model links residents’ attitudes on four important factors of tourism development: government management, community satisfaction, negative environmental impacts, and sustainable tourism. Limitations to the model include factors relevant to residents’ perceptions but not included in the model such as their personal benefit from tourism.
Recommendations

Recommendations for future research include the development of a survey instrument to test this conceptual model on residents, particularly on O'ahu. A survey designed to test the relationships represented by the six hypotheses is necessary in order to validate the model. Validation of the model can aid the current research by establishing not only how residents feel about the four factors identified: environmental impacts, government management, community satisfaction, and attitudes towards sustainable development; but also how residents' views on these different factors are interrelated.

Tourism planners can then use this information to better understand residents' attitudes towards tourism development and where these attitudes originate. This understanding can be used to change tourism planning policies so that the goals for development of tourism on O'ahu are more in line with what is acceptable to the island's residents.

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CHAPTER V

ARTICLE II: MODELING RESIDENT ATTITUDES TOWARDS TOURISM ON O'AHU, HAWAI'I

Abstract

This research is an exploratory analysis of sustainable tourism development and resident attitudes on O'ahu based on the conceptual model developed by Lottig (2007). A paper survey was administered to a convenience sample of residents (N=440) at local area malls and businesses. The instrument investigated residents' perceptions of tourism's environmental impacts and how these perceptions relate to their personal benefits from tourism, community satisfaction, and views on sustainable tourism on O'ahu. Structural equation modeling was used to explore the various relationships between residents' views of tourism and their attitudes towards sustainable tourism development.

Introduction

Over 842 million tourists traveled internationally in 2006, with more than half traveling for pleasure (WTO, 2007; WTO 2006). Tourist spending in 2005 reached US$680 billion, 9 percent more than in 2004 (WTO, 2006). While the economic benefits of tourism are well known (i.e. job creation), the benefits of tourism are rarely equitably distributed among stakeholders in traditional tourism development. These economic benefits also come with environmental and cultural costs that are unfairly borne by some stakeholders (Mortz, Ray, & Jain, 2005). To move away from this traditional tourism
model towards sustainable tourism development benefits and costs must be justly
distributed among stakeholders. Residents are important stakeholders whose
participation is necessary to move towards sustainable tourism (Jamal & Getz, 1995).

Tourism in Hawai‘i has been an important part of the economy for several
decades. Seven and a half million tourists visited the state in 2005, 4.7 million of which
came to O‘ahu, and spent US$11.9 billion (DBEDT, 2006a). Waikiki Beach is a zone of
intense urban development that contains a high proportion of the hotel rooms for the
entire state.

Increasing demands for resources from tourists and residents on O‘ahu mean that
shortages or higher prices for energy, water, and land could occur. Imported fossil fuels
are the island’s primary energy source. Caprock aquifers vulnerable to pollution from
overpumping are the island’s groundwater source (Oki & Brasher, 2003). Paving land
compounds the problem by limiting recharge to the aquifers and sedimentation damaging
coral reefs. Urbanization also changes the character of the natural environment and
fragments native species habitat. Mitigating the impacts from development, if even
possible, can be difficult, slow, and costly.

O‘ahu residents have an interest in making tourism development more sustainable
because it would help to balance demand from residents and tourists for resources. For
more sustainable tourism development, understanding residents’ perceptions is critical to
fairly distributing the environmental, social, and economic costs and benefits of tourism
(Twining-Ward & Butler, 2002). The objective of this research is to test the model of
O‘ahu residents’ perceptions of government management of tourism, environmental
tourism impacts, community satisfaction, and sustainable tourism developed by Lottig (2007).

Literature Review

Tourism and the Environment

Tourists’ transportation, accommodation, and activities at a destination alter the environment and consume resources. While tourism has some positive environmental impacts such as raising environmental awareness (Cohen, 1978), lack of good tourism planning causes many more environmental costs. Cohen (1978) examined the environmental costs of tourism development based on the following characteristics:

1. intensity of destination use and development
2. resiliency of the destination’s environment,
3. investment return schedule of a destination’s stakeholders, and
4. transformational character of the tourism development.

The intensity of destination use and development can be related to Butler’s (1980) destination life cycle. Destinations pass through the life cycle stages based on the volume and type of tourist it attracts. A small number of exploratory and adventurous travelers ‘discover’ the destination and are followed by mass tourism as the destination becomes more popular. Destination planners and tourism companies must supply the needed tourism development and infrastructure to accommodate increasing numbers of tourists. As tourist arrivals increase, the cumulative impact of tourists on the environment and demand for resources also increase (Christensen & Beckmann, 1998;
Also important to consider is that leisure travelers are more indulgent while on vacation, increasing demands for resources per capita (Warnken, Bradley, & Guilding, 2004). Waikiki has been intensely used by tourists for decades as it contains a large proportion of the hotel rooms and visitors to the state (Sheldon, Knox, & Lowry, 2005). Waikiki was transformed from a quiet beach to a densely-developed urban area in order to support the large number of visitor arrivals.

The destination’s absorptive capacity for tourists and tourist impacts is another important feature for determining tourism impacts (Cohen, 1978). Urban infrastructure can better receive and accommodate large numbers of visitors compared to natural areas and therefore natural environments give way to development. Impacts to islands are more intense because of resource limitations, increasing competition between tourists and residents for those resources (Cronk, 1997). The natural environment of Waikiki has given way to hotel/condo development and infrastructure to accommodate the demands of large numbers of visitors.

Time horizon of tourism development investments is the third destination feature identified by Cohen (1978). Developers who demand short-term returns develop with less regard to the overall vitality of the destination and its potential to continue to attract tourists long into the future (Cohen, 1978). These speculative developers receive the economic benefits without paying the non-financial costs. Wen (1998) argues that “one fundamental cause for environmental problems is that those who exploit natural resources can obtain benefits immediately without having to pay the full cost (both economic and social) of depletion, while these costs, paid either now or in the future, are transferred to
the society as a whole.” This type of development can be controlled by government through zoning and permits and when tourism development is properly controlled by stakeholders with a longer-term perspective, resource exploitation and environmental and social costs can be reduced.

Tourism development transforms its destination, usually with a negative outcome (Cohen, 1978). The natural environment or culture that originally attracted tourists was replaced by development and commercialization. Transformational tourism development, however, also alters the relationship that residents have with the environment (Ahn, Lee, & Shafer, 2002). Residents’ relationships with the local environment become decontextualized (Gössling, 2002). Residents in mass tourism destinations face congestion, noise, neighborhood and environmental dereliction, and higher prices resulting from competition with tourists for scarce resources resulting which lower their community satisfaction (Cavus & Tanrisevdi, 2003; Liu & Var, 1986).

Tourism and Natural Resources

Tourism requires resources, particularly energy, water, and land. Residents also need these resources for their daily activities (Lottig, 2007). Tourists use energy for transportation, accommodations, and activities and this energy is supplied mostly by fossil fuels which need to be imported to O'ahu (State of Hawai‘i Energy Resources Coordinator (SHERC), 2005). It is estimated that tourists consume approximately 40 percent of total energy use for the state (Tabatchnaia-Tamirisa, Loke, Leung, and Tucker, 1997). Tourists use surface water for recreation activities such as surfing, boating, and snorkeling and groundwater directly and indirectly for drinking, showering, toilets,
restaurants, and irrigation (Christensen & Beckmann, 1998; Gössling, 2001; Lottig, 2007). Tourist water use generates wastewater which must be sent to treatment plants to remove sewage, irrigation runoff, and cleaning chemicals (Christensen & Beckmann, 1998). Misuse of water resources causes a number of issues including shortages and pollution (Lottig, 2007). Finally, tourism requires large amounts of land for development of accommodations, airports, roads, visitor centers, landfills, golf courses, and other structures. Plantation agriculture decline and population growth are changing the land use on O‘ahu, resulting in extensive urban and suburban residential development (Lottig, 2007). Almost 26 percent of the land on O‘ahu (98,663 acres) were developed as of 1998 (Klasner & Mikami, 2003), an increase of over 12 percent in 20 years (Oki & Brasher, 2003).

**Sustainable Tourism Development**

Sustainable tourism development (STD) is a long-term approach that develops economically viable tourism without harming the environment or society of the residents and making sure that costs and benefits are distributed fairly (DBEDT, 2006b). Decisions are based on the economic, environmental, and cultural impacts, how wealth is generated and distributed, and the relative power and interactions among the stakeholders (Bramwell, 2006; Twining-Ward & Butler, 2002). STD balances industry’s goal of profit with the needs of the environment and stakeholders (Bramwell, 2006). Stakeholders cooperation is necessary for sustainable tourism; otherwise only the most powerful will benefit (Dyer, Gursoy, Sharma, & Carter, 2007). To keep stakeholders satisfied with tourism development and their community, the environment and culture most be
protected (Ahn et al., 2002; Hjalager, 1996). When tourism development enhances, rather than erodes the natural environment, a more sustainable tourism product can be offered to support the destination’s economy (Batra & Kaur, 1996). A government that effectively manages tourism creates benefits for all stakeholders (Jamal & Getz, 1995). Effective management is avoiding negative impacts through a combination of general protective measures, regulations to control development, and financial restraints (Cohen, 1978; Hjalager, 1996). Improvement of the environment can be achieved by ensuring that development is harmonious with the overall plan for the destination (Batra & Kaur, 1996). Necessary tourism infrastructure such as roads, airports, parks, and visitor centers are also the responsibility of government (Jamal & Getz, 1995). Maintenance of infrastructure and facilities is expensive and residents, through property taxes, should not be the only group to bear this burden (Wong, 1996).

Residents benefit when tourists spend money in the local economy and create jobs and also from the development of infrastructure that residents also utilize (Wong, 1996). Residents in mass tourism destinations such as Hawai‘i depend on tourism for their standard of living (Liu, Sheldon, & Var, 1987). Because tourism development usually comes with a tradeoff between economic benefits and environmental or cultural costs, residents cope by downplaying the negative impacts based and emphasizing the economic gains to maintain satisfaction with their community (Dyer et al., 2007; Cavus & Tanriservdi, 2003; Faulkner & Tideswell, 1997). Residents with the most economic gain are the most supportive of the tourism industry (Harrill, 2004).
Cavus & Tanrisevdi (2003) found that the development process controlled by planners was the primary factor in residents’ negative attitudes towards tourism. When residents perceive that the costs of tourism outweigh the benefits, feelings of resentment and irritation towards tourists can develop and lower community satisfaction (Doxey, 1975; Faulkner & Tideswell, 1997; Ko & Stewart, 2002). Residents who feel that they have a voice in tourism planning are more positive towards tourism (Cavus & Tanrisevdi, 2003).

According to Choi & Sirakaya (2005), sustainable tourism is the development pathway to minimize the negative impacts of tourism. There are many ways to make tourism more sustainable but few tools for evaluating and testing a sustainable tourism framework (Choi & Sirakaya, 2005). Audits and resource valuation evaluate tourism’s costs and benefits so that they can be fairly distributed to stakeholders (Warnken et al., 2004; Wen, 1998). Limiting tourism growth (such as carrying capacity or limits of acceptable change) can also make development more sustainable (Cohen, 1978; Butler, 1980; Gössling, Peeters, Ceron, Dubois, Patterson, & Richardson, 2005; Christensen & Beckmann, 1998; Ahn et al., 2002). In these approaches, government management and stakeholder cooperation are necessary to reach a consensus for how to manage future tourism development.

In Hawai‘i, Waikiki is an established destination with well-developed tourism infrastructure and facilities (Tabatchnaia-Tamirisa et al., 1997). Hawai‘i’s economy has become dependent on tourism for employing residents directly or indirectly with the industry who want to maintain the high standard of living that tourism brings (DBEDT,
2006b). For instance, O‘ahu’s infrastructure is used by both residents and tourists, though tourists use it more intensely (Sheldon, et al., 2005). Rising tourist arrivals put increasing demand on the island’s limited resources that must also sustain residents (Tabatchnaia-Tamirisa et al., 1997). The Sustainable Tourism Study Group was formed to organize several stakeholder groups to explore tourism on O‘ahu (DBEDT, 2006b). The objective was that “sustainable tourism will operate in harmony with our ecosystems, enhancing natural beauty and protecting the islands’ natural resources” (DBEDT, 2006b; 72). The group proposed finding alternative sources of water and energy, land conservation, and improving coordination of state and county transportation authorities to improve tourism management (DBEDT, 2006b). The group recommended the conceptual model for sustainable tourism monitoring developed by Twining-Ward and Butler (2002) in Samoa be adapted to Hawai‘i to manage sustainable tourism initiatives. The model develops economic, social, and environmental indicators to be monitored over time to record tourism’s impacts (DBEDT, 2006b). The indicators developed by DBEDT (2006b) rank respect for the land as a higher priority than stakeholders’ short-term interests (Sheldon et al., 2005).
Figure 1. DBEDT general conceptual model for data-driven sustainable tourism system. Note. From DBEDT, 2006b.

Resident Attitude Surveys

Resident attitude surveys assess sentiments about the impact of tourism on their community (Ahn et al., 2002). Demographic data collected examines differences within resident population groups (Ahn et al., 2002). Residents' attitudes towards tourism are influenced by several factors. Resident attitude surveys have found that residents who value economic impacts will have favorable attitudes towards tourism but their attitudes towards environmental and cultural changes are negative (Lindberg & Johnson, 1997; Walpole & Goodwin, 2001; Yoon et al., 2001). HTA's (2006) recently report on residents' attitudes revealed that residents view tourism's impacts positively overall. Over three quarters (76 percent) of respondents feel that tourism creates more benefits than
problems. However, 79 percent feel that O‘ahu’s economy is too dependent on tourism and 77 percent feel that the island is run for tourists at the expense of residents (HTA, 2006). Sixty-four percent of respondents feel that air and water pollution from tourism are a problem and forty-one percent of respondents feel that tourism has degraded the quality of air and water on the island (HTA, 2006). Eighty-two percent of respondents feel that tax money collected from tourism should be used for environmental preservation to better manage negative environmental impacts (HTA, 2006). Fewer than half (43 percent) want increased visitor activity in wilderness areas (HTA, 2006). One can conclude from these results that while many residents support existing tourism, they are aware of the negative impacts on O‘ahu and want to restrict the continued growth of the industry. As such, their community satisfaction is related the effectiveness of government management of tourism, tourism’s environmental impacts, and their attitudes towards how sustainable tourism is on the island.

**Problem Statement**

Understanding resident attitudes is complicated because opinions of tourism are formed based on residents’ perceptions of many factors. Perceptions of government ability to control and the environmental impacts of tourism affect residents’ community satisfaction and their views on the sustainability of tourism development on O‘ahu. The objective of this research is to understand how residents’ attitudes on government management and the environmental impacts of tourism affect their community satisfaction and perceptions of sustainable tourism development.
Methodology

Research Design

The objective of this research is to increase the understanding of residents' attitudes towards government management and the environmental impacts of tourism and how these relate to overall community satisfaction and sustainable tourism development for the island of O'ahu. Using the model developed by Lottig (2007), these factors were tested by developing and administering a resident attitude survey to a sample of residents of Hawai‘i (Figure 2). The literature relevant to the environmental impacts of tourism, sustainable tourism development, and resident attitude surveys were reviewed to develop the survey instrument in order to test Lottig's (2007) model. To address the objective, the relevant literature was used to create a framework for this research design.

Figure 2. Relationships between residents' perceptions of tourism impacts and attitudes for sustainable development. Note. Adapted from Ko & Stewart, 2002.
The proposed model identified the following six hypotheses (Lottig, 2007):

H1: Perceived government management of tourism will have a positive effect on overall community satisfaction.

H2: Perceived government management of tourism will have a positive effect on perception of environmental tourism impacts.

H3: Overall community satisfaction will have a positive effect on attitudes for sustainable tourism development.

H4: Perception of environmental tourism impacts will have a positive effect on overall community satisfaction.

H5: Perception of environmental tourism impacts will have a positive effect on attitudes for sustainable tourism development.

H6: Perceived government management of tourism will have a positive effect on attitudes for sustainable tourism development.

Sample Selection

The purpose of this research is to explore O‘ahu residents’ attitudes towards tourism’s environmental impacts. The population for this research is the residents of the state of Hawai‘i. Because it is impractical to administer the survey to the population of the state, survey administration was limited to a convenience sample distributed and collected at local area malls to state residents and to some smaller resident groups to which the researcher had access. A total of 440 completed surveys were collected. This exceeds the recommendation from Tabachnick and Fidell (2001) of a minimum sample
size of 200 for advanced multivariate statistical techniques such as structural equation modeling (SEM).

**Instrument Development**

The TIAS (Lankford & Howard, 1994) and SUS-TAS (Choi & Sirakaya, 2005) were used as a basis for developing the survey instrument to test the proposed model. Statements for the instrument were extracted from factors related to resident attitudes identified during the literature review. A small-scale pilot study on mall patrons on O‘ahu was run to test the instrument. Thirty-seven completed pilot surveys were collected and used for factor analysis to determine the optimal mix of statements for the final instrument. Green and Salkind (2005) define factor analysis as “a technique used to identify factors that statistically explain the variation and covariation among measures” (p. 312). Factor analysis of the pilot study instrument eliminated ineffective questions and identified confusing or vague questions for rewriting and grouped the statements into the following categories: environmental impacts, government management of tourism, sustainable tourism, and community satisfaction.

The validated final survey consisted of 14 questions on participants’ demographic profile. The remainder of the instrument had a series of 18 statements to which participants stated their level of agreement or disagreement on a 5-point Likert scale.

**Data Collection**

The final instrument was administered in paper form to mall patrons at three O‘ahu malls as well as some residents from local businesses that agreed to participate.
Only respondents that were state residents over the age of 18 were allowed to complete the survey. A total of 507 surveys were collected from March 24 through March 28, 2007. Sixty-seven of the surveys were rejected because they were incomplete or respondents were not residents over the age of 18. Of the surveys collected, 440 (86.8 percent) were usable.

Analysis of Data

Statistical Package for Social Science (SPSS) 15.0 and EQS 6.1 software packages were used for data analysis. Survey responses were hand-coded into SPSS and imported into EQS for analysis. Descriptive statistics, confirmatory factor analysis, and structural equation modeling (SEM) were used to analyze the collected surveys. SEM was selected because of the ability of this method to explore the interconnected relationships between the factors identified within the model (Hoyle, 1995).

Results and Discussion

Demographic Profile of Survey Respondents

Respondents were asked to select their gender, age, and primary race. Survey respondents were 51 percent male (Table 2) which is slightly higher than a study conducted by the state government (49.6 percent) (DBEDT, 2006c). The average respondent is 40 years old. Respondents selected the following as their primary race: Filipino (108), Japanese (101), Caucasian (80), and Native Hawai‘ian (43). Of the 423 respondents who answered, 57.2 percent were Asian, 18.9 percent were Caucasian, and 16.3 percent were Native Hawai‘ian/Pacific Islander. These proportions are similar to
the most recent State of Hawai‘i population characteristics provided on the DBEDT website (2006c): Asians made up 57.5 percent, Caucasians made up 23.5 percent, and Native Hawai’ian/Pacific Islander made up 22.1 percent. Differences could be attributable to several respondents selecting more than one race or selecting ‘other’ as their race.

Respondents were asked about their education level, personal income, the length of their commute, and whether they or another household member worked in the tourism industry. Forty-three percent had achieved a bachelor’s or higher degree. The largest proportion (35.9 percent) reported personal annual income between $20,001 and $45,000. Most respondents (80.5 percent) reported driving to work or school with most commutes (67.9 percent) taking less than 30 minutes. Over 21 percent of respondents (113) worked in the tourism industry full- or part-time, primarily in hotels (45), restaurants (28), or retail (14). Over 17 percent of respondents (91) reported that household members worked in the industry full- or part-time.

Finally, respondents were their island or residence as well as their length of residence in the State of Hawai‘i and the island of O‘ahu. The vast majority (91.4 percent) of respondents reside on O‘ahu, with Hawai‘i, Maui, and Kaua‘i being the only other islands represented. Respondents lived in the state an average of 29.54 years and on O‘ahu an average of 26.51 years. Most respondents reported living in the state and on O‘ahu for between 21 and 40 years.
<table>
<thead>
<tr>
<th></th>
<th>N</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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</tr>
<tr>
<td>Age</td>
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<td></td>
</tr>
<tr>
<td>18-25</td>
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</tr>
<tr>
<td>26-40</td>
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<tr>
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</tr>
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<td></td>
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<tr>
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<tr>
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</tr>
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</tr>
<tr>
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<td>7.5%</td>
</tr>
<tr>
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</tr>
<tr>
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<tr>
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</tr>
<tr>
<td>Missing</td>
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<td>GED</td>
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<td>Masters Degree</td>
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<tr>
<td>Income</td>
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<td>$0-$20,000</td>
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<td>35.9%</td>
</tr>
<tr>
<td>$45,001-$70,000</td>
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</tr>
<tr>
<td>Over $70,000</td>
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<tr>
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Table 2  
Demographic profile of survey respondents (continued)

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<thead>
<tr>
<th></th>
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</thead>
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<td><strong>Tourism Employment</strong></td>
<td></td>
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</tr>
<tr>
<td>Respondent</td>
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<tr>
<td>Full-time</td>
<td>78</td>
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<td>Part-time</td>
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<td>6.6%</td>
</tr>
<tr>
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<tr>
<td><strong>Household member</strong></td>
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<tr>
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<td>10.5%</td>
</tr>
<tr>
<td>Part-time</td>
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<td>6.6%</td>
</tr>
<tr>
<td>Other industry</td>
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<td><strong>Commute</strong></td>
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</tr>
<tr>
<td>Yes*</td>
<td>354</td>
<td>80.5%</td>
</tr>
<tr>
<td>0-15 minutes</td>
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</tr>
<tr>
<td>15-30 minutes</td>
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<tr>
<td>30-60 minutes</td>
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<td>27.2%</td>
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<tr>
<td>Over 60 minutes</td>
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<td>4.9%</td>
</tr>
<tr>
<td>Missing</td>
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</tr>
<tr>
<td><strong>Island of residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O'ahu</td>
<td>402</td>
<td>91.4%</td>
</tr>
<tr>
<td>Hawai'i</td>
<td>27</td>
<td>6.1%</td>
</tr>
<tr>
<td>Kaua'i</td>
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<td>1.6%</td>
</tr>
<tr>
<td>Maui</td>
<td>4</td>
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</tr>
<tr>
<td><strong>Length of residence in state</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10 years</td>
<td>76</td>
<td>17.3%</td>
</tr>
<tr>
<td>11-20 years</td>
<td>63</td>
<td>14.3%</td>
</tr>
<tr>
<td>21-40 years</td>
<td>185</td>
<td>42.0%</td>
</tr>
<tr>
<td>Over 40 years</td>
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</tr>
<tr>
<td>Missing</td>
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<td>0.9%</td>
</tr>
<tr>
<td><strong>Length of residence on O'ahu</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10 years</td>
<td>109</td>
<td>24.8%</td>
</tr>
<tr>
<td>11-20 years</td>
<td>63</td>
<td>14.3%</td>
</tr>
<tr>
<td>21-40 years</td>
<td>174</td>
<td>39.5%</td>
</tr>
<tr>
<td>Over 40 years</td>
<td>93</td>
<td>21.1%</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

*Note: some respondents reported a commute time though they do not drive
Descriptive Statistics

The study had 440 respondents and 13 observed variables. The final model included only thirteen variables out of the original 18 survey statements (Appendix I). Five variables were eliminated because they did not fit the proposed model based on low loadings during confirmatory factor analysis. Descriptive statistics of the 13 variables are presented in Table 3. The CFA model identified four factors: perception of government management of tourism (GM), overall community satisfaction (CS), perception of environmental tourism impacts (TI), and attitudes towards sustainable tourism (AS).

Table 3 displays the descriptive statistics of the 13 variables. Based on a five point Likert type scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree), the composite variable scores revealed that the three survey statements the respondents most strongly agreed with were: (a) GM3 “The quality of public services has improved on O‘ahu due to tourism” ($M = 3.239$), (b) TI3 “Tourists generate more wastewater than residents” ($M = 3.177$), and (c) TI4 “Tourism development threatens drinking water supply” ($M = 3.176$). The three survey statements respondents most strongly disagreed with were: (a) CS1 “Tourism causes more land to be developed” ($M = 2.506$), (b) CS3 “I enjoy interactions with tourists” ($M = 2.757$), and (c) GM1 “The state government does a good job balancing residents' and tourists' needs” ($M = 2.886$). The data were evaluated fit with the assumptions of SEM: normality, linearity, multicollinearity and singularity, and adequacy of covariances.
Table 3
Sample size, mean, and standard deviation of variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM1</td>
<td>439</td>
<td>2.886</td>
<td>0.963</td>
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<td>0.2%</td>
</tr>
<tr>
<td>GM2</td>
<td>437</td>
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<td>0.968</td>
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<tr>
<td>GM3</td>
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<td>CS1</td>
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<tr>
<td>CS2</td>
<td>424</td>
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<tr>
<td>CS3</td>
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<td>CS4</td>
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<tr>
<td>TI1</td>
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</tr>
<tr>
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<tr>
<td>TI3</td>
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<td>1.035</td>
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<td>TI4</td>
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<tr>
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<tr>
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<td>3.217</td>
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</tbody>
</table>

Results derived within larger samples generally have less sampling error than smaller samples (Kline, 2005). Kline (2005) reasoned that "more complex models – those with more parameters – require larger samples than more parsimonious models in order for estimates to be comparably stable". In the absence of absolute standards in the literature about sample size and path model complexity relationships, Kline proposes that the ratio of the number of cases to the number of free parameters be 20:1 as an ideal or 10:1 as a more realistic target ratio. This model contains 32 free parameters and the ratio cases to observed variables (13.75:1) met Kline's realistic. Therefore, 440 is an adequate sample size for this study.

Respondents occasionally left some survey statements blank. To determine whether they were purposefully avoiding certain statements, missing value analysis
(MVA) was performed using SPSS and EQS. EQS MVA determined that the data were missing at random (MAR); $p = 0.293$, indicating that respondents were not avoiding particular statements. SPSS MVA was performed to replace missing values with calculated expected values.

The data were evaluated for normality. Histograms of all 13 observed variables were not normally distributed. Both the Mardia’s coefficient of 42.81 and the normalized estimate of 22.74 indicated that the variables were not normally distributed. A scaling factor developed by Satorra and Bentler (1994) was used to correct the statistics for non-normality. Linearity was confirmed by examination of randomly selected pairs of scatterplots from SPSS GRAPHS. For the selected pairs, the assumption of linearity was not violated. No multivariate outliers were detected using Malahanobis distance (using SPSS Regression) and cases with the largest contributions to Mardia’s coefficient (using EQS). The matrix determinant was determined by EQS to be $0.90265D-02$ exceeded zero, indicating no singularity.

Preliminary Data Analysis

Confirmatory factor analysis (CFA) identified four factors underlying survey items: perception of government management of tourism (GM), overall community satisfaction (CS), perception of environmental tourism impacts (TI), and attitudes towards sustainable tourism (AS). Statement abbreviations are included in Appendix I. Factor correlations ranged from -0.026 to 0.720 (Table 4). Correlations between the four factors and the 13 variables ranged from 0.440 to 0.937 (Table 5). Variance ($R^2$) among the factors ranged from 0.0319 to 0.455.
### Table 4
**Model covariance of factors**

<table>
<thead>
<tr>
<th>Factor</th>
<th>GM</th>
<th>CS</th>
<th>TI</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>0.587</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CS</td>
<td>0.130</td>
<td>0.565</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TI</td>
<td>0.118</td>
<td>0.393</td>
<td>0.613</td>
<td>-</td>
</tr>
<tr>
<td>AS</td>
<td>0.305</td>
<td>-0.014</td>
<td>0.042</td>
<td>0.544</td>
</tr>
</tbody>
</table>

### Table 5
**Factor loading of variables**

<table>
<thead>
<tr>
<th>Factor</th>
<th>GM</th>
<th>CS</th>
<th>TI</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM1</td>
<td>0.795</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM2</td>
<td>0.865</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM3</td>
<td>0.565</td>
<td>0.677</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td></td>
<td></td>
<td></td>
<td>0.721</td>
</tr>
<tr>
<td>CS2</td>
<td></td>
<td></td>
<td>0.724</td>
<td></td>
</tr>
<tr>
<td>CS3</td>
<td></td>
<td></td>
<td>0.863</td>
<td></td>
</tr>
<tr>
<td>CS4</td>
<td></td>
<td></td>
<td>0.765</td>
<td></td>
</tr>
<tr>
<td>T11</td>
<td></td>
<td></td>
<td></td>
<td>0.729</td>
</tr>
<tr>
<td>T12</td>
<td></td>
<td></td>
<td>0.892</td>
<td></td>
</tr>
<tr>
<td>T13</td>
<td></td>
<td></td>
<td>0.937</td>
<td></td>
</tr>
<tr>
<td>T14</td>
<td></td>
<td></td>
<td>0.672</td>
<td></td>
</tr>
<tr>
<td>AS1</td>
<td></td>
<td></td>
<td></td>
<td>0.729</td>
</tr>
<tr>
<td>AS2</td>
<td></td>
<td></td>
<td></td>
<td>0.440</td>
</tr>
</tbody>
</table>

### Reliability, Convergent Validity, and Discriminant Validity

Cronbach’s alpha, used to determine the reliabilities of multi-item factors, ranged from 0.485 to 0.830 (Table 6). The reliability level for attitudes towards sustainable tourism development (AS) did not meet the critical value of 0.7 suggested by Nunnally & Bernstein (1994).
Convergent and discriminant validity test results included covariance estimates between factors, variable loadings on factors, and measurement error for each variable (Table 6). The range of convergent validity values (0.440 to 0.937) had high standardized loadings on their respective factors, suggesting convergent validity. The discriminant validity excepting attitudes towards sustainable tourism (AS) demonstrated lower loadings than their original variables indicating discriminant validity.

Table 6
Reliability, convergent validity, and discriminant validity

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cronbach's alpha</th>
<th>Convergent validity</th>
<th>Discriminant validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>0.777</td>
<td>0.565 to 0.865</td>
<td>0.196 to 0.539</td>
</tr>
<tr>
<td>CS</td>
<td>0.841</td>
<td>0.565 to 0.863</td>
<td>-0.026 to 0.667</td>
</tr>
<tr>
<td>TI</td>
<td>0.876</td>
<td>0.672 to 0.937</td>
<td>0.072 to 0.667</td>
</tr>
<tr>
<td>AS</td>
<td>0.485</td>
<td>0.440 to 0.729</td>
<td>-0.026 to 0.539</td>
</tr>
<tr>
<td>Model</td>
<td>0.830</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Data Analysis

An SEM model was used to examine the hypothesized relationships between the constructs (factors) in the model using EQS. Model fit was initially tested using the overall fit and regression paths to determine whether observed variables were generated by the corresponding latent factors. The hypothesized model (Figure 2) was then analyzed. The model was modified from the hypothesized model based on the results of the analysis to find a better fit of the data to more adequately describe the relationships between the factors. The Lagrange Multiplier (LM) and Wald tests identified whether parameters fit the proposed model.

Measurement Model Results
The measurement model specified the following four factors: government management of tourism (GM), overall community satisfaction (CS), perception of environmental tourism impacts (TI), and attitudes for sustainable development (AS). Each factor loaded on the three remaining factors. For analysis, each variable was allowed to load only on the factor that it measured, residuals for variables were fixed to be uncorrelated, equality constraints on factor loadings were not imposed, and factor covariances were free to be estimated. The model fit the observed data well (Table 7). The large variance ($R^2$) in the variables, ranging from 0.440 to 0.937, were caused by corresponding factors (Table 5). The strongest factor correlations ($r = 0.667$ and $r = 0.539$) were noted between CS and TI and GM and AS, respectively (Table 8).

![Table 7](attachment:table7.png)

Table 7
Model goodness of fit indices

<table>
<thead>
<tr>
<th>Index</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satorra-Bentler scaled chi-square (59, N=440)</td>
<td>136.656</td>
</tr>
<tr>
<td>Probability value</td>
<td>$p &lt; 0.000001$</td>
</tr>
<tr>
<td>Bentler-Bonett normed fit index</td>
<td>0.937</td>
</tr>
<tr>
<td>Bentler-Bonett non-normed fit index</td>
<td>0.951</td>
</tr>
<tr>
<td>Comparative fit index (CFI)</td>
<td>0.963</td>
</tr>
<tr>
<td>Bollen's fit index (IFI)</td>
<td>0.963</td>
</tr>
<tr>
<td>McDonald's fit index (MFI)</td>
<td>0.916</td>
</tr>
<tr>
<td>Root mean-square error of approximation</td>
<td>0.055</td>
</tr>
</tbody>
</table>

90% confidence interval $0.043 - 0.067$

![Table 8](attachment:table8.png)

Table 8
Factor correlations among factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>GM</th>
<th>CS</th>
<th>TI</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>1.000</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CS</td>
<td>0.226</td>
<td>1.000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TI</td>
<td>0.196</td>
<td>0.667</td>
<td>1.000</td>
<td>-</td>
</tr>
<tr>
<td>AS</td>
<td>0.539</td>
<td>-0.026</td>
<td>0.072</td>
<td>1.000</td>
</tr>
</tbody>
</table>
Structural Model Results

To examine model goodness of fit, the measurement model was respecified with the imposed structure in the full SEM model. Figure 3 summarizes the results of the proposed structural parameters. The fit indices indicated that the model fit the observed variables well (Table 7). Wald test results found that all free parameters were reasonable and statistically significant and none that were free should be fixed. LM test results suggested that no parameter should be added to the model to improve the fit. Additional examination of the model parameters ensured goodness-of-fit and found no evidence of improper solutions, measurement parameters were all statistically significant, confirmatory factor loadings were sufficiently large, and measurement errors were relatively small.

The results support five of the six hypotheses (Figure 3). Hypothesis 3 was rejected. The ability of the model to predict attitudes on sustainable tourism is moderate ($R^2 = 0.319$) indicating that the overall predictability of the model means that key factors missing from the model also influence attitudes towards sustainable development.
This study developed and tested a model adapted from Ko & Stewart (2002) and relevant literature to better understand residents’ attitudes on O‘ahu. The important factors identified included: government management of tourism, overall community satisfaction, environmental tourism impacts, and attitudes towards sustainable development. Hypotheses for the model came from the literature on the environmental impacts of tourism in general and specific to Hawai‘i as well as residents’ perceptions of government management of tourism, community satisfaction, and attitudes towards sustainable development. The theoretical model supported five of the six proposed hypotheses.

Hypothesis 1: Government management and overall community satisfaction

Hypothesis 1 predicted that perceived government management of tourism will positively effect overall community satisfaction and was supported with a coefficient of 0.10. This confirms Batra & Kaur’s (1996) statement that tourism development needs to be ‘harmonious’ with the destination and supports the relationship identified by Wong.
(1996) that government planning is essential to residents enjoyment additional infrastructure maintained by the government without bearing the burden of tourism’s detrimental impacts. The results also affirm that residents can become irritated if they do not see tourism develop in a controlled manner and for the benefit of residents was also supported by the findings of the study (Ko & Stewart, 2002; Faulkner & Tideswell, 1997).

The State of Hawai‘i, through its tourism agency, the HTA, has developed a Hawai‘i Tourism Strategic Plan (HTSP). The HTSP was designed specifically to manage tourism in the state while benefiting all stakeholders, including residents (HTA, 2005). One of the principal considerations in creating the strategic plan was the decline in residents’ satisfaction with tourism as determined by data collected through the HTA resident attitude surveys (HTA, 2005). One of the primary goals of the HTSP is to facilitate collaboration between stakeholders, which the HTA sees as essential to successful tourism industry development. The natural result of taking residents’ concerns into consideration, is that tourism development will occur harmoniously with stakeholders’ objectives and attitudes towards tourism, thus improving community satisfaction.

Hypothesis 2: Government management and environmental impacts

Hypothesis 2 predicted that perceived government management of tourism will positively effect on perception of environmental tourism impacts, which was supported with a coefficient of 0.20. Residents who feel that government effectively manages tourism will be more positive towards the environmental impacts of tourism. The results
indicate that O‘ahu residents agree with Cohen (1978) and Hjalager (1996) in that
government control can limit the environmental impacts of tourism development. The
findings also concur with Cavus & Tanrisevdi (2003) that residents’ negative attitudes, in
this case towards the environmental impacts, are a function of the development process
controlled by tourism planners.

The goal from the HTSP that encourages collaboration between stakeholders
should help to address the relationship between government management and tourism’s
environmental impacts (HTA, 2005). An HTSP objective is collaboration between the
state’s main tourism groups (HTA, the private sector, and community groups/residents)
and environmental agencies, primarily the Department of Land and Natural Resources
(DLNR) but also other volunteer, county, state, and federal groups such as the Sierra
Club, Department of Environmental Services (ENV), the Office of Environmental
Quality Control (OEQC), and the Fish and Wildlife Service (FWS). This collaboration,
in combination with the knowledge of residents’ attitudes on specific impacts on the
environment from tourists, can enable the more efficient use of resources to balance the
needs of tourists and residents. For example, if residents are particularly concerned about
fishstocks being depleted due to competition and overuse by tourists and local fisherman,
coordination with the FWS can enable these concerns to be translated directly into
tourism and FWS policies.

Hypothesis 3: Community satisfaction and attitudes towards sustainable tourism
development
Hypothesis 3 predicted that overall community satisfaction will positively effect attitudes for STD but was rejected with an $R^2 = -0.23$. This contradicts the expected relationship identified by Cavus & Tanrisevdi (2003) that residents who feel included in tourism planning are more positive towards tourism. Resident participation is necessary for sustainable tourism which should have increased their positive feelings for the factor (Dyer et al., 2007; Ko & Stewart, 2002).

As attitudes towards tourism in Hawai‘i have been declining (HTA, 2005), it becomes even more critical that the state move towards further sustainable tourism development aligned with the needs of residents. By the HTA requiring resident participation in the carrying out of the goals of the HTSP, residents’ concerns about tourism can be taken into consideration. Goodwill of the residents towards the tourism industry is necessary to sustain the industry in the long term, as it allows tourism suppliers to create new tourism products that residents approve of while simultaneously increasing tourist satisfaction as they interact with more content residents.

Hypothesis 4: Environmental impacts and community satisfaction

Hypothesis 4 predicted that perception of environmental tourism impacts will positively effect overall community satisfaction and was supported with an $R^2 = 0.65$, the strongest relationship identified by the model. Residents who more positively perceive the environmental impacts of tourism will have higher overall community satisfaction. This relationship is well documented as many authors have recognized this relationship (Cavus & Tanrisevdi, 2003; Cohen, 1978; Doxey, 1975; Dyer et al., 2007; Faulkner & Tideswell, 1997; Ko & Stewart, 2002).
The HTSP has great potential to impact this important relationship state the relationship here instead of this important relationship. The HTSP encourages collaboration between the HTA, the private sector, and residents and environmental agencies which will illuminate the environmental issues that could most greatly impact residents' community satisfaction. While collaboration with entities such as the DLNR, Sierra Club, ENV, OEQC, and FWS is a good first step, the Board of Water Supply (BWS), Environmental Protection Agency (EPA), the Army Corps of Engineers (ACE) and the United States Geologic Survey (USGS) could also enrich the dialogue with their particular areas of expertise.

Hypothesis 5: Environmental impacts and attitudes towards sustainable tourism development

Hypothesis 5 predicted that perception of environmental tourism impacts will positively effect attitudes for STD, which was supported with an $R^2 = 0.12$. Residents who positively perceive the environmental impacts of tourism will have more positive attitudes towards STD (Choi & Sirakaya, 2005; Twining-Ward & Butler, 2002).

The goal of the HTSP is to guide stakeholders in working together to make the tourism industry in Hawai‘i more beneficial to its stakeholders and more competitive with other destinations. Fundamentally, the HTSP is designed to sustain the success of the tourism industry (HTA, 2005). The importance that residents place on their environment as determined by Liu & Var (1986) makes environmental sustainability a critical part of the future success of the Hawai‘i tourism industry. Environmental
degradation reduces residents’ acceptance of tourism as a major industry and also tourists’ perception of O‘ahu as a beautiful natural destination.

Hypothesis 6: Government management and attitudes towards sustainable tourism development

Hypothesis 6 predicted that perceived government management of tourism will positively effect attitudes for STD, which was supported with an $R^2 = 0.57$. Residents who feel that the government is effective in its control of tourism development feel more positively towards STD. This reinforces the work of Twining-Ward & Butler (2002) and DBEDT (2006b) that residents who are part of the planning process and believe that government can be effective in limiting tourism development will believe in the goal of STD. The HTSP is Hawai‘i’s roadmap to effectively manage tourism development (via the HTA but in concert with other stakeholders and agencies) to encourage a more controlled, unified, and sustainable tourism product on O‘ahu and for the State of Hawai‘i.

Conclusions

The model developed by Lottig (2007) was tested and it was proven useful in better understanding residents’ attitudes towards tourism on O‘ahu. As the survey statements determined, many respondents feel that tourists help to increase their quality of life through public services that mutually benefit tourists and residents. However, the survey statements determined that respondents also feel that tourism competes for natural resources (drinking water) and adds a disproportionate burden to public services (wastewater disposal). Despite the recent efforts of the state, many respondents also felt
that the State needs to better balance needs of residents with the needs of tourists and the tourism industry. Perhaps, as the HTSP is implemented, it will address these important issues. The model was developed by extracting relationships from the literature between government management of tourism, overall community satisfaction, environmental tourism impacts, and attitudes towards sustainable development (Lottig, 2007). These findings complement the extensive work of the DBEDT Sustainable Tourism Study Group (DBEDT, 2006b) to provide a deeper understanding of how residents form their attitudes towards tourism and their priorities for their community. Future tourism development can be managed to work with residents’ priorities through collaboration with the tourism suppliers or by increasing the requirements of developer’s environmental impact assessments to incorporate such priorities. Tourism management enlightened by the needs of residents enables tourism development that benefits residents while minimizing or eliminating negative impacts, particularly the negative environmental impacts.

Five of the six hypotheses on relationships between factors identified by the literature were accepted. As predicted by the literature, the study results indicate that a very strong relationship exists between residents’ overall community satisfaction and their perceptions of the environmental impacts of tourism. Planners can make practical use of this information by understanding that controlling tourism’s detrimental environmental impacts will have a directly positive relationship with residents’ satisfaction with their communities. The HTSP is the State’s effort to increase collaboration between tourism planners such as the HTA and other important public
sector agencies such as DLNR and citizen groups such as the Sierra Club (HTA, 2005). Government agencies are currently run quite independently in Hawai‘i, however, the position of Tourism Liaison has recently been created to facilitate dialogue between all of the agencies involved directly or indirectly with the tourism industry so that better communication is possible. Residents’ perceptions of the connectedness between O‘ahu’s tourism development and environmental impacts and residents’ prioritization of environmental impacts for their community satisfaction can lead to collaborative policy making between these agencies. Also, the allocation of government funds can be more effective if the relationship between community satisfaction and environmental impacts is better defined. By acknowledging that the environment is important to how residents feel about their community, more funds can be allocated to take advantage of this relationship such as cleaning up pollution, treating wastewater and sewage, and creating and maintaining natural areas for residents and tourists to enjoy.

The HTSP was an effort of the HTA with input from other stakeholder groups such as the private sector and community groups. Collaborative efforts like this increase the ability of government to manage tourism to benefit all stakeholders. Their cooperation for moving O‘ahu towards becoming a more sustainable tourism destination will likewise ensure that this destination continues to attract visitors and create economic benefits for suppliers and residents alike. The HTA and other tourism groups should also continue to educate the residents about not only the positive consequences of tourism, but also the negative so that the need for more sustainable tourism practices is recognized by all of the stakeholders. This collaboration should continue to solicit the perceptions of
residents and other stakeholders to make sure that their priority needs are always being considered.

In summary, residents appreciate the importance of tourism to their economy and enjoy the interactions with tourists. However, residents also recognize that these benefits come with a cost to the environment, which ultimately diminishes their satisfaction with the community. Using policies to effectively manage tourism so that these benefits do not come at the cost of environmental degradation can create a more educated destination that opts for what is best for stakeholders in the long term. Another benefit of managing the environmental impacts of tourism is that tourists will continue to be attracted to the stunning scenery and outdoor activities that O‘ahu provides. An important part of the basis for these policies is the understanding of how residents’ attitudes towards tourism are formed and translating it into tourism development policies that make a difference in the sustainability of O‘ahu tourism. The model presented in this research is clearly a starting point to understand the relationship of the factors affecting residents’ attitudes.

This study had several limitations. These include the survey questions, nature of the sample, the procedures for data collection, and the ability of the proposed model to explain resident attitudes. Though the survey was designed to explore residents’ attitudes of factors related to tourism on O‘ahu, their ability to convey their attitudes was related to their understanding of the survey statements. The qualitative nature of the questions allowed differing interpretations among residents, particularly if they were unfamiliar with a factor (such as STD), that could affect how they respond. The model of mass tourism development in Hawai‘i has been around for so long that residents are less
familiar with the advantages of STD and therefore may not have fully understood the related survey statements. The survey respondents were a convenience sample of mall patrons and some employees of local businesses within which residents with certain characteristics (i.e. the elderly) might be underrepresented. Similarly, because certain areas of the island are farther from malls, residents from these more remote areas might also have been underrepresented. Mall patrons were approached to participate in the survey while they were at the mall, most often while dining. All participation was on a voluntary basis though it is possible that people agreed to fill out the survey but did not adequately read and process each statement before filling in a response. For these participants that were hurrying to complete the survey, the instrument would not effectively gauge their attitudes. The overall $R^2$ of the model of 0.312 equates to the model explaining only 31.2 of residents’ attitudes. Unidentified factors remain that partially explain residents’ attitudes.

Recommendations for Future Research

An interesting follow-up for the data collected for this research would be a regression analysis between the demographic variables and the participants’ attitudes towards tourism. Also, a deeper look into residents concerns over how particular environmental concerns affect residents community satisfaction would be helpful to guide future collaborations in conjunction with the Hawai‘i Tourism Strategic Plan. For example, it would be helpful to explore what aspects of water resources are most concerning to residents such as groundwater well contamination. If this was identified as an issue of high concern for residents, more resources could be allocated to managing
well protection as well as tourist education regarding groundwater in the islands and optimal use. As another example, if residents are found to have a great concern over the amount of open space on the island, the State and municipalities can work on zoning laws that better protect these open spaces for the use of residents and tourists. Exploring the details of these relationships can do much to align the tourism industry’s and government’s goals with those of residents.

While this model was useful in explaining some of residents’ attitudes towards tourism on O’ahu, more research needs to be done to complete the picture. Future research endeavors should refine the survey statements to be clearer to residents and also to incorporate missing factors. First, regression analysis on the data would be helpful in identifying trends in how residents responded to the survey statements based on their demographic characteristics. Also, identifying the latent factors that explain the remaining 68.8 percent of residents’ attitudes would be useful. A more comprehensive conceptual model could be evaluated to better identify the relationships between residents’ perceptions of the factors. A more comprehensive model could be used to compare how residents’ attitudes towards the factors are changing over time on O’ahu measure the effectiveness of government in managing tourism development. In addition to identifying other factors, the relationship between the environmental impacts of tourism and overall community satisfaction can be more clearly defined by investigating how energy, water, and land resources determine residents’ perceptions of environmental impacts. The model could also be applied in other destinations, particularly other island destinations, for a cross-destination analysis of resident attitudes. This information will
help government planners to better understand the attitudes of residents towards tourism on O'ahu so that future development can be managed to consider the importance of the environment to resident satisfaction and how they form their attitudes towards tourism to make O'ahu a more welcoming place.

References


Oki, D., & Brasher, A. (2003). Environmental Setting and the Effects of Natural and Human-Related Factors on Water Quality and Aquatic Biota, O'ahu, Hawai'i. *USGS Water-Resources Investigations Report 03-4156*.


REFERENCES


Oki, D., & Brasher, A. (2003). Environmental Setting and the Effects of Natural and Human-Related Factors on Water Quality and Aquatic Biota, O'ahu, Hawai'i. USGS Water-Resources Investigations Report 03-4156.


APPENDIX I: Survey Instrument
Dear Invited Participant,

Currently, I am a Masters student in University of Hawaii’s School of Travel Industry Management. I am conducting thesis research examining resident attitudes towards tourism on O'ahu. More specifically, residents of O'ahu will be queried to determine their views on the environmental impacts of tourism and their attitudes towards sustainable tourism development. This exploratory research may allow a deeper understanding of resident attitudes towards the dominant industry on the island. More importantly, this understanding may be valuable because it can be used by tourism planners to create more sustainable forms of tourism on the island.

At this time, I would like to personally invite you to participate in an on-line survey where you will share your ideas, opinions, and comments regarding tourism on O'ahu. I recognize that this is a lengthy survey. However, your effort may result in creating a foundation for the effective evaluation of how residents feel about tourism’s negative impacts. I estimate that it will take you approximately 15 minutes to complete this survey.

You may be assured of complete confidentiality. Your response will not be associated with your name or any other identifying characteristics.

Thank you for your assistance in this very important step towards better understanding residents’ views towards the island’s largest industry. Should you have any questions regarding this study, you can contact me at (412) 216 - 0069. If you would like additional information regarding your rights as a respondent, please contact the Institutional Review Board for the Protection of Human Subjects at (808) 956-5007.

Thank you again. The survey is strictly a research effort and your ideas and opinions will assist in making the research project a success.

Best Regards,
Kimberly Lottig, Masters Student and Lisa Marie Assante, PhD and Thesis Committee Chair
Our goal is to gain a better understanding of residents' attitudes towards tourism on Oahu. Your opinion matters!

Directions:
? Please complete the participant profile section.
? Please read each statement and circle your level of agreement or disagreement. If you strongly disagree with the statement, circle 1; if you disagree, circle 2; if you are neutral or don't know, circle 3; if you agree, circle 4; if you strongly agree, circle 5.
? Please return your completed survey to the survey distributor.

PARTICIPANT PROFILE

1 Are you a permanent resident of the state of Hawa'i?  
   (i.e. do you have a Hawa'i driver's license?)  
   _______ yes _______ no

2 On which island do you permanently reside? (select only one)  
   _______ O'ahu _______ Hawai'i _______ Kaua'i  
   _______ Maui _______ Moloka'i _______ Lanai

3 Length of residence in the state of Hawa'i  
   _______ years

4 Length of residence on the island of O'ahu  
   _______ years

5 What is your gender?  
   _______ female _______ male

6 What is your age? Please write in the number.  
   _______

7 What is your PRIMARY race? Please select only one.  
   _______ Caucasian _______ Japanese _______ Filipino  
   _______ Native _______ African  
   _______ Chinese _______ Hawaiian _______ Americas  
   _______ Pacific _______ Islander other (please specify):  

8 What is your highest degree earned?  
   _______ High school diploma _______ GED  
   _______ Associates Degree _______ Bachelor's Degree  
   _______ Masters Degree _______ Doctoral Degree

9 What is your individual annual income?  
   _______ $0-$30,000 _______ $30,001-$45,000  
   _______ $45,001-$70,000 _______ Over $70,000

10a Do you work in the tourism/hospitality industry?  
   _______ full-time _______ part-time _______ no

10b If yes, please specify:  
   _______ hotel/resort _______ restaurant/bar  
   _______ airline _______ tour operator

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8 What is your highest degree earned?  

- High school diploma
- GED
- Associates Degree
- Bachelors Degree
- Masters Degree
- Doctoral Degree

9 What is your individual annual income?  

- $0-$20,000
- $20,001-$45,000
- $45,001-$70,000
- Over $70,000

10a Do you work in the tourism/hospitality industry?  

- full-time
- part-time
- no

10b If yes, please specify:  

- hotel/resort
- restaurant/bar
- airline
- tour operator
- entertainment
- cruise
- retail
- rental car
- other (please specify):

11 Do one or more members of your household other than yourself work in the tourism/hospitality industry?  

- full-time
- part-time
- no

12a Do you drive to work/school?  

- yes
- no

12b If yes, how long is your commute? Please select only one.  

- 0-15 minutes
- 16-30 minutes
- 31-60 minutes
- over 60 minutes
**SURVEY STATEMENTS**

### Tourism Environmental Impacts

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>TI1 Tourists use more energy than residents</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>TI2 Tourists use more water than residents</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>TI3 Tourists generate more wastewater than residents</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>TI4 Tourism development threatens drinking water supply</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>TI5 Air quality in Honolulu is poor because of the increased traffic due to tourism</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Government Management of Tourism

<table>
<thead>
<tr>
<th>Statement</th>
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<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM1 The state government does a good job balancing residents and tourists' needs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GM2 The state government listens to residents about their concerns with tourism</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GM3 The quality of public services has improved on O'ahu due to tourism</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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</tbody>
</table>

### Community Satisfaction

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<tr>
<th>Statement</th>
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<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1 Tourism causes more land to be developed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>CS2 Tourism is responsible for higher land prices</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>CS3 I enjoy transactions with tourists</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>CS4 Due to tourism, housing is not affordable on O'ahu</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>CS5 Natural resources can be protected on O'ahu</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>CS6 O'ahu is too crowded because of tourism</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Sustainable Tourism

<table>
<thead>
<tr>
<th>Statement</th>
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<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST1 If feel I can access the decision making process to influence future tourism development</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ST2 Long-term government planning controls tourism's negative environmental impacts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ST3 Tourists are important to the community</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ST4 Tourism development will continue to expand outside of Waikiki</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
APPENDIX II: Human Subjects Approval to Administer Survey
Protection of Human Subjects
Assurance Identification/IRB Certification/Declaration of Exemption
(Common Rule)

Policy: Research activities involving human subjects may not be conducted or supported by the Departments and Agencies adopting the Common Rule (45 CFR 46.003, June 16, 1981) unless the activities are exempt from or approved in accordance with the Common Rule. See section 101(b) of the Common Rule for exemptions. Institutions submitting applications or proposals for support must submit certification of appropriate Institutional Review Board (IRB) review and approved to the Department or Agency in accordance with the Common Rule.

1. Request Type
   [ ] ORIGINAL
   [ ] CONTINUATION
   [X] EXEMPTION

2. Type of Mechanism
   [ ] GRANT
   [ ] CONTRACT
   [X] FELLOWSHIP
   [ ] COOPERATIVE AGREEMENT

3. Name of Federal Department or Agency and, if known, Application or Proposal Identification No.

4. Title of Application or Activity
   "Resident Attitudes Towards Tourism on Oahu"

5. Name of Principal Investigator, Program Director, Fellow, or Other
   Kimberly Lotlig

6. Assurance Status of this Project (Respond to one of the following)
   [X] This Assurance, on file with Department of Health and Human Services, covers this activity. Assurance Identification No. F-3526, the expiration date September 23, 2008
   IRB Registration No. IOR0000169

   [ ] This Assurance, on file with (agency/dept)_________________________, the expiration date_________________________, covers this activity. Assurance Identification No._________________________, IRB Registration/Identification No._________________________(if applicable)

   [ ] No assurance has been filed for this institution. This institution declares that it will provide an Assurance and Certification of IRB review and approval upon request.

   [X] Exemption Status: Human subjects are involved, but this activity qualifies for exemption under Section 101(b), paragraph 2.

7. Certification of IRB Review (Respond to one of the following IF you have an Assurance on file)
   [ ] This activity has been reviewed and approved by the IRB in accordance with the Common Rule and any other governing regulations. by: [ ] Full IRB Review on (date of IRB meeting)______ or [ ] Expedited Review on (date)
   [ ] If less than one year approval, provide expiration date

   [ ] This activity contains multiple projects, some of which have not been reviewed. The IRB has granted approval on condition that all projects covered by the Common Rule will be reviewed and approved before they are initiated and that appropriate further certification will be submitted.

8. Comments

9. The official signing below certifies that the information provided above is correct and that, as required, future reviews will be performed until study closure and certification will be provided.

   11. Phone No. (with area code) (808) 656-5007
   12. Fax No. (with area code) (808) 956-6683
   13. Email: dendle@hawaii.edu
   14. Name of Official
      William H. Dendle

10. Name and Address of Institution
    University of Hawaii at Manoa
    2444 Dole Street, Bachman Hall
    Honolulu, HI 96822

15. Title
    Compliance Officer

16. Signature

17. Date
    February 1, 2007

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Sponsored by HHS

Public reporting burden for this collection of information is estimated to average less than an hour per response. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: OS Reports Clearance Officer, Room 503 200 Independence Avenue, SW., Washington, DC 20201. Do not return the completed form to this address.
APPENDIX III: Model Correlation Matrix
## Appendix 2

### Model correlation matrix for variables

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<thead>
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<th></th>
<th>T11</th>
<th>CS1</th>
<th>CS3</th>
<th>T12</th>
<th>T13</th>
<th>T14</th>
<th>GM1</th>
<th>GM2</th>
<th>GM3</th>
<th>AS1</th>
<th>AS2</th>
<th>CS2</th>
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<tbody>
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<td>0.676</td>
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<td>0.169</td>
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<td>0.190</td>
<td>0.110</td>
<td>0.047</td>
<td>0.028</td>
<td>0.624</td>
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<tr>
<td>T12</td>
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<td>GM1</td>
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<td>0.122</td>
<td>0.155</td>
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<td>AS1</td>
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<td>0.130</td>
<td>0.139</td>
<td>0.133</td>
<td>0.098</td>
<td>0.092</td>
<td>0.554</td>
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</tr>
<tr>
<td>Mean</td>
<td>2.915</td>
<td>2.506</td>
<td>2.757</td>
<td>3.123</td>
<td>3.177</td>
<td>3.176</td>
<td>2.886</td>
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<td>1.017</td>
<td>0.934</td>
<td>1.135</td>
<td>1.208</td>
</tr>
</tbody>
</table>
APPENDIX IV: Copyright Permissions for Figures
From Anne M Brasher <abrasher@usgs.gov>
Sent Tuesday, April 10, 2007 9:16 am
To Kimberly J Lottig <lottig@hawaii.edu>
Subject Re: Request for permission to use figures

Hi Kimberly,

I talked to Delwyn and you have our permission to use the figures. Just cite the report when you use them.

Good luck on your thesis!

Anne

Anne Brasher, PhD
Research Aquatic Ecologist
U.S. Geological Survey Water Science Center
121 West 200 South
Moab, Utah 84532
435-259-3866

From Library <library@dbedt.hawaii.edu>
Sent Tuesday, April 10, 2007 9:41 am
To Kimberly J Lottig <lottig@hawaii.edu>
Subject Re: Request for permission to use figures

Figure 5 is from the source cited along with the diagram. The Journal of Sustainable Tourism is available in Hamilton Library if you want to view the diagram in its original context. That is the source you should cite.

Aloha,

CBEDT Library Staff

Kimberly J Lottig <lottig@hawaii.edu>
04/10/2007 08:13 AM

Subject Request for permission to use figures

Dear Sir or Madam,

I am a masters student at UH working on my thesis. I would like permission to use one of the figures from your Planning for Sustainable Tourism Part 1: Summary Report document published April 2006. I would like to use Figure 5: General Conceptual Model for Data-Driven Sustainable Tourism System on page 76 in my thesis document. Please let me know if I can use this figure in my text. Thank you in advance for your help with this.

Best regards,
Kim Lottig
Hi Kim,

Not a problem, thanks for asking. Just put me as the source, or improve the diagram and say “adapted from Twining-Ward, 2002). Which one is it and what is your thesis on?

Best wishes,
Louise

Dr Louise Twining-Ward
Tourism Advisory Services
120 Berkeley Place
Brooklyn NY 11217
USA
Tel: +1 917 571 7020
Email: louiseetward@mac.com

On Apr 10, 2007, at 4:35 PM, trcnz wrote:

Dear Kim,

Thank you for your email. I have copied your email to Dr Twining-Ward, so that she can reply to you directly.

Best of luck with your thesis.
Kind regards
Hilary
Hilary Merwick
Tourism Resource Consultants Ltd.
Level 3, Harbour City Tower, 29 Brashon Street,
PO Box 2515
Wellington 6140, New Zealand
Ph. 64 4 4733114
Fax. 64 4 4730020
Email: hilary@trcnz.com
www.trcnz.com

On Apr 11, 2007, at 8:29 am, Kimberly J Lottig wrote:

Dear Sir or Madam,

I was wondering if Dr. Louise Twining-Ward was on your staff and, if so, if I could possibly get in touch with her regarding permission to use one of her figures from her 2002 paper for my masters thesis at the University of Hawaii. Your help would be much appreciated.

Sincerely,
Kim Lottig
From: Ko, Dong Wan <dwko@kyonggi.ac.kr>
Sent: Wednesday, May 23, 2007 1:42 am
To: Kimberly J. Lottig <lottig@hawaii.edu>
Subject: Permission to use model

Dear Kimberly,

Thanks for your email.

I know that you've got okay message from prof. Stewart, and the same is true of my case.

I wish you get a great findings and please send a copy of your work.

Sincerely,

Ko, Dong Wan

Ko, Dong Wan Ph. D. & P. E.
Associate Professor, Dept. of Tourism & Recreation,
College of Tourism Sciences, Kyonggi University,
San 84-8, In-dong, Yeongdong-gu, Suwon-si,
Gyeonggi-do, 443-705, S. Korea
Tel & Fax: +82 31 249 9509. Email: dwko@kgu.ac.kr

--- Original Message ---
From: Kimberly J. Lottig <lottig@hawaii.edu>
To: dwko@kuc.kyonggi.ac.kr, wstewart@uluc.edu
Cc:
Sent: 2007/05/23 04:55
Subject: Permission to use model

Dear Doctors Ko and Stewart,

I am a Masters student at the University of Hawaii in the School of Travel Industry Management. I am currently working on my thesis (title: MODELING RESIDENT ATTITUDES ON THE ENVIRONMENTAL IMPACTS OF TOURISM: A CASE STUDY OF O'AHU, HAWAII) and have adapted the model you published in your article "A structural equation model of residents' attitudes for tourism development" published in Tourism Management. I was writing to see if I can get your permission to publish your model and my adaptations. Please let me know if I have your approval. Thank you in advance for your help.

Sincerely,

Kimberly J. Lottig
From Bill Stewart <wstewart@uiuc.edu>
Sent Tuesday, May 22, 2007 10:56 am
To Kimberly J Lottig <lottig@hawaii.edu>
Cc: dwko@kuic.kyonggi.ac.kr
Subject: Re: Permission to use model

Hello Kimberly,

Thanks for your email and introduction of your work on resident attitudes in tourism. Yes, it is okay to publish our model with your adaptations. All I ask is that you give our work appropriate citation. Our thoughts have evolved since this model was published, and we too have adapted some ideas. When you get the chance, please send a copy of your work. I think we could learn from each other.

Regards,
Bill

At 08:00 PM 5/22/2007, you wrote:
>Dear Doctors Ko and Stewart,
> I am a Masters student at the University of Hawaii in the School of Travel
> Industry Management. I am currently working on my thesis (title: MODELING
> RESIDENT ATTITUDES ON THE ENVIRONMENTAL IMPACTS OF TOURISM: A CASE STUDY
> OF O'AHU, HAWAII) and have adapted the model you published in your
> article "A structural equation model of residents' attitudes for tourism
> development" published in Tourism Management. I was writing to see if I
> can get your permission to publish your model and my adaptations. Please
> let me know if I have your approval. Thank you in advance for your help.
> Sincerely,
> Kimberly J. Lottig