

---

Tourism and the Environment in Small Island Developing States:  
Development of a New Framework for Assessing Sustainability

---

Masters in Science, Technology, and Public Policy Thesis Submitted in  
Fulfillment of the Graduation Requirements for the

College of Liberal Arts/Public Policy Program at  
ROCHESTER INSTITUTE OF TECHNOLOGY

Rochester, New York

*By:*

**Katie L. K. Kimmel**

**January 22nd, 2007**

Submitted by:

---

Katie L.K.Kimmel

Signature

Date

Accepted by:

---

James J.Winebrake, Ph.D.

Signature

Date

---

M. Ann Howard, J.D.

Signature

Date

---

Lei Lani Stelle, Ph.D.

Signature

Date

## Table of Contents

Introduction.....	4
1.0 Background.....	5
1.1 Sustainability .....	6
1.2 Efforts to Develop Sustainability.....	11
1.3 Tourism.....	12
1.4 Tourism and the Environment .....	15
Country Snapshot: Zanzibar, Tanzania.....	18
2.0 Small Island Developing States .....	19
2.1 Energy on SIDS .....	22
2.2 Solid Wastes .....	23
2.3 Tourism Impacts and water use in SIDS .....	24
Country Snapshot: Turkey .....	26
2.4 The Bahamas.....	29
3.0 Research Methodology .....	37
3.0 The Six Frameworks.....	38
4.0 Critique of Frameworks.....	47
4.1 New Framework Development.....	51
4.2 Indicators .....	59
4.3 Optimal Framework.....	61
4.4 Application to the Bahamas.....	62
5.0 Issues with Framework .....	63
5.1 Policy Implications .....	65
5.2 Community Involvement .....	69
6.0 Conclusion .....	71
Country Snapshot: East Sussex, UK.....	71
Acknowledgements.....	75
Selected References .....	76
APPENDIX A.....	82
APPENDIX B .....	87
APPENDIX C .....	94
APPENDIX D.....	110

## List of Figures and Tables

Figure 1. Definitions of Sustainability within Tourist Destinations.....	8
Figure 2. Ranges of Sustainable Tourism Development .....	10
Figure 3. International Tourist Arrivals 1950-2020 .....	14
Figure 4 Contribution to the GDP in 1995 of various sectors of the Bahamian Economy. ....	32
Figure 5. Foreign Direct Investment and Total Debt Service, Bahamas .....	34
Figure 6. Integrated Tourism Yield Framework.....	43
Figure 7. Conceptual framework for tourism sustainability assessment .....	44
Figure 8. System indicators leading towards system orientors .....	60
Figure 9. Regional, National, and Island Decision Triangle .....	69
Table 1. Comparison of Water Resource Options.....	27
Table 2. Six Aspects that are Important When Generating Indicators .....	40
Table 3. Three Dominant Process areas as defined by ESSD (Harger and Meyer, 1996) .....	41
Table 4. Framework Evaluation Matrix .....	49
Table 5. Framework Evaluation Matrix, Highlighted Strong and Weak Aspects .....	50
Table 6. Process-oriented criteria for evaluating the approach of sustainable development programs .....	53
Table 7. Outcome-oriented criteria for evaluating sustainable rural development projects.....	54
Table 8. Top three objective indicators of each dimension.....	57
Table 9. A Journey towards sustainability for tourism enterprises .....	58
Table 10. General Indicator Categories and Subcategories.....	62

## ***Abstract***

***Title:*** Tourism and the Environment in Small Island Developing States: Development of a New Framework for Assessing Sustainability

***Author:*** Katie L.K. Kimmel

### ***Thesis Summary:***

***Purpose.*** The purpose of this thesis is to develop an analytical framework that can be used to better understand the impacts of tourism on small island developing states (SIDS). In particular, the framework will address tourism in light of sustainability goals (environmental, economic, social, and political). Because tourism is both a major economic driver for many SIDS, as well as a primary cause of environmental degradation within these states, a framework is needed that allows for systemic, value tradeoff evaluation. Currently there are multiple frameworks and plans for sustainability and development in SIDS; but few frameworks take into account how tourism can further stress resources within these nations. With the framework developed herein, analysts will have a tool for evaluating policies and programs aimed at integrating tourism within a sustainability context.

***Approach.*** The approach for this thesis was to develop a new framework to evaluate how tourism contributes to stresses of water resources, energy, environmental degradation, and wastes during sustainable development. Previous reports provide a framework for the issues at hand. Through meta-analysis, current practices and methods for evaluation will be examined. Methods that are being used worldwide will be considered as well as methods that are used and/or proposed in the Bahamas. The Bahamas serve as the main focus of this study. The findings from the meta-analysis and “snap-shots” of practices in other countries will provide information as to strengths and weaknesses of current sustainable frameworks. A new framework for sustainable development was then formulated and applied in the Bahamas.

***Conclusion.*** Many SIDS and other developing countries do not have alternatives to tourism to fund programs and needed projects. Without having apparent alternatives to tourism the governments have little other choice than to continue operations as is, even though it does not support sustainable development. Essentially, without other means of foreign investment developing countries will likely support any industry regardless if they are sustainable or not. In retrospect it is interesting to look at the attempt to make one framework work for sustainable development and be applicable to all nations. The efforts should be applied towards identifying the different social, political, economical, cultural, and environmental dynamics of each nation, then determining the path towards sustainability. It seems that a significant change, potentially a significant social change may have to take place for SIDS to become ‘Sustainable’.

## **Introduction**

The purpose of this thesis is to develop an analytical framework that can be used to better understand the impacts of tourism on small island developing states (SIDS). The developed framework was then applied to the case of the Bahamas. The outcome of the application and framework provides a better understanding and implications that can be of use for more effective policy programs. Problem areas usually lie within small island developing states with regard to issues such as salinization of coastal aquifers, increased energy needs, increased solid waste, and environmental degradation. Existing geographic, climatic, and socio-economic factors of small island developing states coupled with increases in international transport development, and a rise in living standards has increased the amount of mass tourism. Actions such as these carry a large burden for small island developing states as pressure increases on the carrying capacity of the coastal areas. For example, water is usually supplied from groundwater; this water is often pumped to meet the increasing demands of newly developed areas. This action lowers the water table, increasing the vulnerability of salt-water intrusion of the coastal aquifers.

SIDS not only experience stress on water resources but they also rely on less dependable means for energy. Often islands have large generators that supply power by burning diesel fuel. This diesel fuel is delivered by barge to islands. The cost effectiveness of this power generation seems poor. In addition to water and energy, solid waste disposal is becoming an increasing issue. Poor management techniques and increasing garbage loads are stressing the resources on SIDS. Overall the ecological and cultural assets of the areas are continuously pushing degradation limits.

Small developing islands can often be overused and mismanaged, resulting in serious degradation to the island. Tourism has continued to grow through many regions of the world, and in less developed locations resources and their quality have begun to decline. Many studies acknowledge the need for sustainable tourism development, mainly touching on eco-tourism and minimal impact development. What seems to be missing is that tourism stresses resources and many tourism practices are not eco-friendly. In addition, a framework that includes tourism in sustainable development is lacking.

## **1.0 Background**

Throughout the world, countries must confront the issue of sustainable development. Sustainable development requires one to use resources efficiently and effectively so that future use is not compromised by today's actions. Communities should utilize their own resources so that they can survive without bringing in outside resources; this is the best long-term approach. A problem exists in that there are many countries/communities throughout the world that cannot provide enough resources for themselves to maintain their current living conditions. This can be due to poor management techniques and also to over consumption. Evidence of this is usually seen first in small islands.

Many studies have acknowledged that sustainable tourism development is needed in order to make the standard of living better for the local communities. What is of concern is that most of these evaluations discuss the development of eco-tourism or low impact development. Ideally all tourism would be based around those concepts, but in reality many locations are developed quickly for financial concerns is priority. These

issues/concerns are elaborated upon in a further section.

## **1.1 Sustainability**

The term sustainability has been used in multiple disciplines with varying definitions. The World Commission on Environment and Development (WCED) developed the most familiar concept of sustainability. The WCED termed sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Apart from this general concept of the term ‘sustainable’ or ‘sustainability’ the actual definition really has two components. The components are the meaning of development and the conditions that are necessary for sustainability (Tosun, 1998). Development in this context does not simply refer to the concept of economic growth; rather it means development in terms of change. “Development is not just about increased wealth. It means change; changes in behavior, aspirations, and in the way which one understands the world around one” (Dudley, 1993). Sustainable development is a concept that is used in long-term planning, most often in regards to conserving environmental resources. It is also implied that today’s society will use resources wisely so that the level of welfare is balanced for future generations. Sustainable development does not only refer to countries with a low level of development, it encompasses all countries.

The idea of sustainable development became the idea of a solution to a multitude of problems. The most common concept of sustainability is with the environment. However, other uses can also be sustainable such as economics, health, employment, etc. Due to this broad range of use it is important for those using the term sustainable to

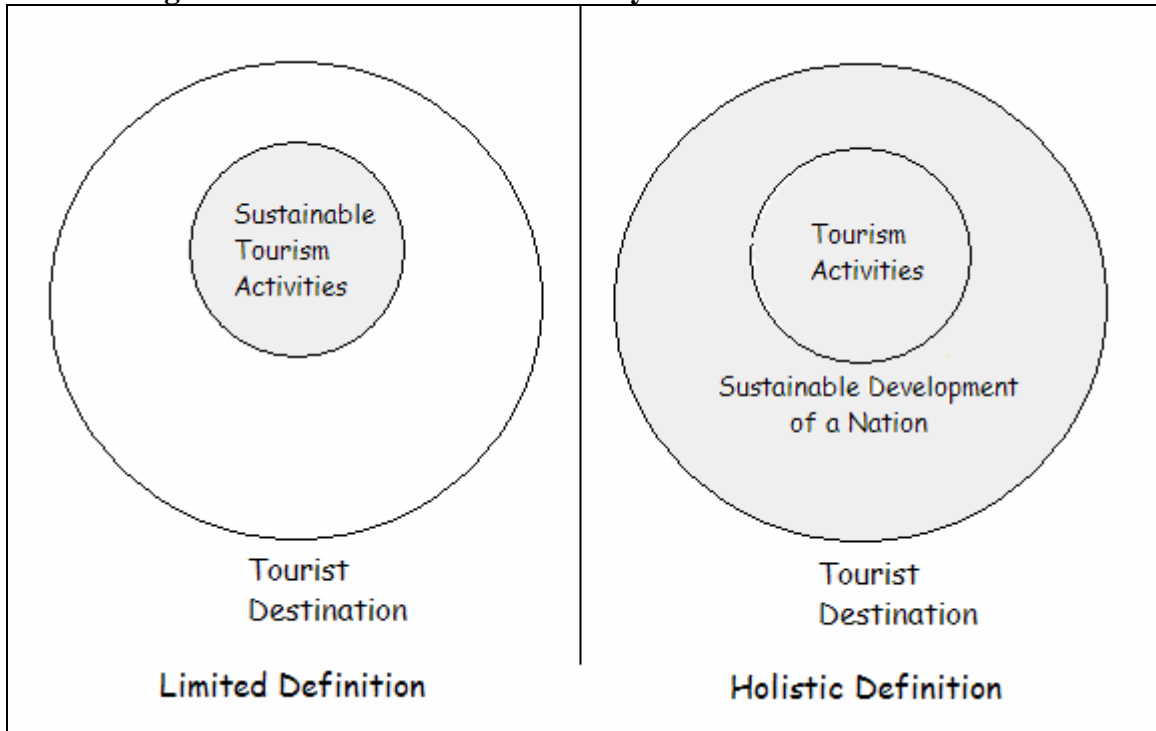
identify what aspects or areas they are covering. This can be more difficult to identify than expected. For instance when considering helping an area become more sustainable to provide them the best means for life should the resource be sustained or should the services. In other words should a forest be sustained or the lumber that it provides. Even though both things are essentially the same thing they would require different measurements to track or evaluate sustainability. Popp (2001) argues that sustainability should consider what is being sustained and should also be inclusive enough to account for multiple services. The term sustainable or sustainability in this paper refers to having the environment, culture, human resources, and economy at the most beneficial level with little 'negative' change for the current and future citizens of a nation. These aspects of a nation need to remain viable and managed in respect to the particular dynamics (environmental, social, and political) of the nation at hand.

Surprisingly although there are a multitude of groups that are working on sustainable development, they mainly focus on the physical and economic environments. Tourism development is disregarded as a main topic in sustainable development, and many of the indicators that are identified for sustainable development are not applicable for monitoring development in tourism. Figure 1 illustrates the differences between two different applications of sustainability in tourist destinations. The shaded region within the definitions refers to the areas that have sustainable practices. The limited definition on the left represents how tourism activities are treated in a sustainable manner; the nation itself is excluded from sustainable development. However, the holistic definition represents the concept of what should be happening in a nation in terms of sustainable development. In the holistic definition tourism activities and the nation are regarded as



one unit and both operate with sustainable practices in order to ensure that all dynamics of a nation are considered for optimal sustainability.

**Figure 1. Definitions of Sustainability within Tourist Destinations**



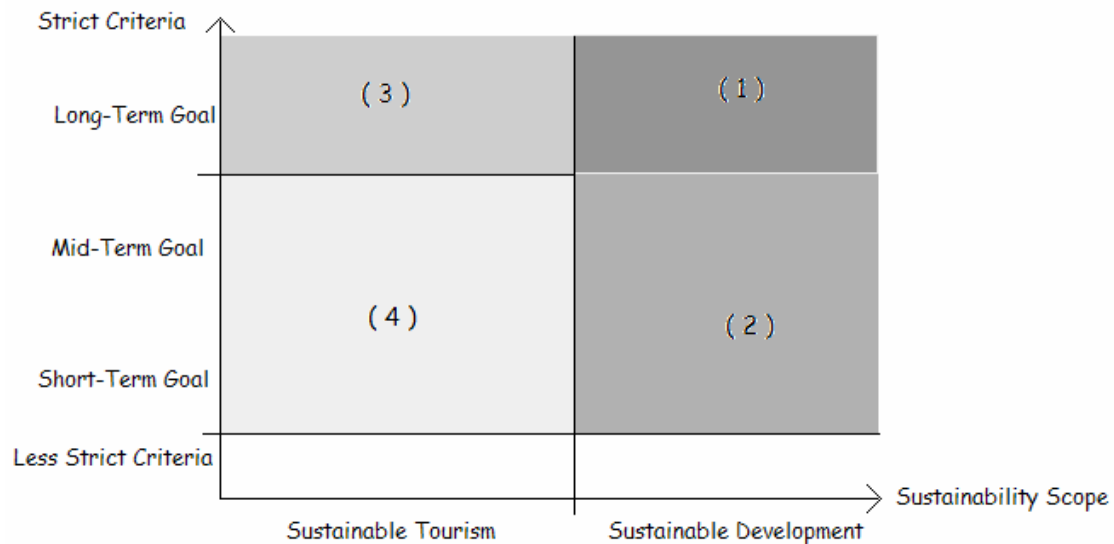
Source: Lee, 2001

The term or concept of sustainability can differ from author to author, and can be applied to numerous areas. The use of the term really depends on what the focus of the study is, as stated before it is important to clearly state what the particular focus is.

Different researchers have also classified sustainability assessments or practices as sustainable or unsustainable. Depending on the application a range should be used, some authors use low, medium or high sustainability. Two authors (IUCN, 1995 and Prescott-Allen, 1997) propose a five-sector scale (1-20, bad; 21-40, poor; 41-60, medium; 61-80, OK; and 81-100, good) the range of bad to good would be the same as unsustainable to

sustainable. Basically, depending on the depth that one wishes to make an evaluation and what level they would like to communicate this information with stakeholders would determine what scales they should use. Ko (2005) suggests that the simpler the scales are the more useful they may be in communicating basic information to the general public. More detailed scales would be beneficial in explaining more complicated information to stakeholders. Similarly to the scales used, researchers can use more or less information when developing sustainability goals. Figure 2 illustrates different ways that someone may develop sustainable development plans. The quadrants (1) - (4) represent the ideal to less ideal options. Quadrant (1) is the most optimal option in that it strives for sustainable development with the highest scope of sustainability. Also, this quadrant has long-term goals for development using the strictest criteria for measurement. A strict criterion means utilizing multiple indicators for evaluation rather than a simple indicator that may have multiple implications. On the opposite end quadrant (4) is the worst option for sustainable development. This quadrant focuses on short-term goals that apply only to tourism sustainability, and relies on less strict criteria to make its assumptions.

**Figure 2. Ranges of Sustainable Tourism Development**



Source: Foh Lee, 2001.

Many other groups have been involved in working to increase the applicability of sustainability and development. Some of the national and international bodies active in development of sustainability concepts are the United Nations, International Institute of Sustainable Development (IISD), United Nations Commission of Sustainable Development, the United Nations Commission of Sustainable Development (UNCSD), United Nations Development Program (UNDP), the World Bank, the National Round Table on the Environment and the Economy (NRTEE), and the US Interagency Working Group on Sustainable Development Indicators. Lee, 2001 explains how there are certain steps in sustainable development, the steps were originally only for use for sustainable tourism development, yet slightly tweaked can be used for an all-encompassing sustainable development. The first three steps are actions that should be developed or done by a national or state authority, and steps four through eight should be done by stakeholders. In this study the focus is on the first three steps.

Steps for Sustainable development:

- 1.) Understand the Sustainable Development Issues of a Destination
- 2.) Set Criteria
- 3.) Develop Performance indicators
- 4.) Build Consensus and Destination Level
- 5.) Formalize Sustainable Policy
- 6.) Agree on Roles and Responsibilities
- 7.) Design Management System for Sustainable Development
- 8.) Implement Initiatives and Monitor Process

## **1.2 Efforts to Develop Sustainability**

In 1992 in Rio de Janeiro the United Nations held a conference on Environment and Development. This conference produced a program titled Agenda 21, in which 3 main areas were highlighted. The three areas are social and economic dimensions, conservation and management of resources for development, and strengthening the role of major groups. Agenda 21 is successful in pinpointing key areas of concern, but still fails to elaborate on situations pertaining to SIDS. The need for a SIDS specific conference was identified and in 1994 there was a Global Conference in Barbados on the Sustainable Development of Small Island Developing States. From this conference a Programme of Action (POA) was developed for SIDS, this program highlights fourteen priority areas for action at the national, regional, and international levels. In 1999, the 22<sup>nd</sup> Special Session of the United Nations General Assembly undertook an assessment of

the Programme of Action. The outcome identified the need to track progress in SIDS and increased effort for implementation. In 2002, the World Summit on Sustainable Development (WSSD) developed the Johannesburg Plan of Action and included SIDS specific issues. The latest meeting to identify and assist SIDS in developing was in January 2005, when the international community met in Mauritius reporting on the need for increased implementation of the Programme of Action. These meeting are beneficial in that they acknowledge the need for identifying issues and projects to help SIDS in sustainable development. Many countries have taken these actions and developed while keeping in mind the fragile dynamics of their country. Unfortunately, many countries do not have the resources to conduct research to develop programs of implementation. This is the case with the Bahamas. In the Bahamas 2005 report on the National Sustainable Development Strategies they stated that they are not implementing an approved NSDS program nor do they have one developed. The Bahamas does have a National Environmental Management Action Plan (NEMAP) in place. However, the NEMAP simply identifies the problems for many environmental areas but fails to state how those specific problems will be solved.

### **1.3 Tourism**

In the last century the increased globalization, movements of populations, and progress in transportation technologies have helped to developed tourism into an ever-expanding industry. In the 1980's tourism and environmentalism grew, it became evident that tourism growth could not continue at its current rate (Berry, 1997). This revelation created a reassessment of tourisms role in the environment. Tourism is an activity that is

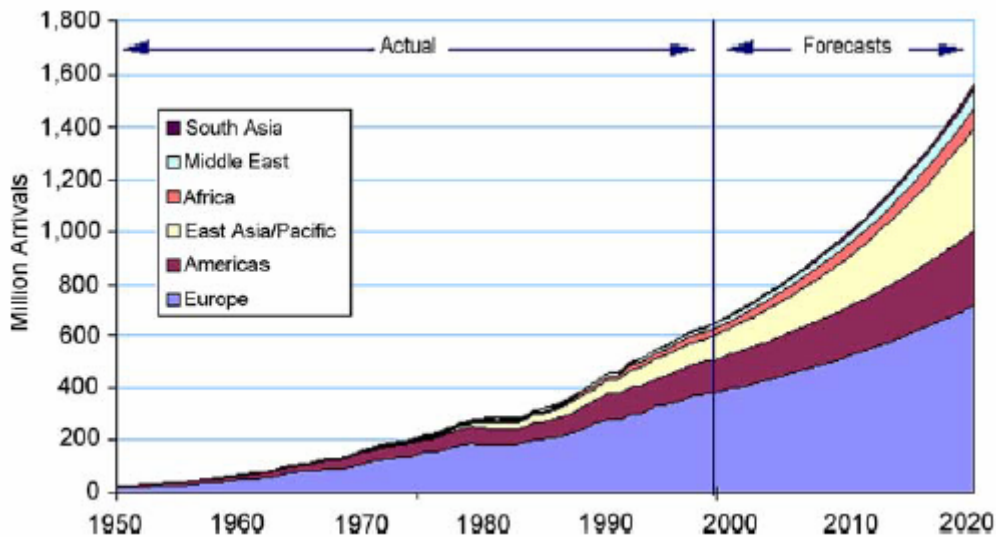
comprised of travel to and around a destination. The very concept of tourism implies 'consuming'. Visitors use a range of resources such as; shops, marinas, infrastructure (water, waste disposal, garbage, communication technologies), and local facilities (hospitals, restaurants, gas stations, banks, car rentals). These resources are also resources that locals use as well; therefore, consumption by tourists and locals can reduce the quantity available and the quality (Briassoulis, 2002). These simple resources are important to have to attract tourists to an area, to give them more comforts. Background tourism elements are important inputs for tourism, as they often are the reason that people visit a certain destination. These elements are things such as coasts, mountains, national parks, and cultural artifacts (Briassoulis, 2002).

Various researchers (Lee, 2001, Garrod, 1998, Budeanu, 2005, and Braissoulis, 2002) have noted the defining and redefining of the concept of sustainable tourism. Authors have written about sustainability, community sustainability, tourism sustainability, all are similar but the focus is very different. Budeanu (2005) states that researchers are, "inclined to study concepts like eco-tourism or alternative tourism, the tourism research community has largely overlooked the problems cause by mass tourism in *relation to* sustainability." This seems to be the main problem in review and development of a solid concept for sustainable development while noting the large role that tourism plays in affecting the very resources that need to be managed.

The World Travel and Tourism Council estimates that the travel and tourism economy will generate 234,305,000 jobs, and industry jobs will reach 76,729,000. In other words one in every 11.5 jobs will be in tourism. Economic activity is expected to grow by 4.6% to a total of \$6,477.2 billion U.S. dollars. Tourism growth that was

experienced in 2004 continued into 2005, tourism grew by more than 10% in 2005 (Ashe, 2005). Figure 3 below illustrates the growth in tourism over the years. It is evident that tourism has and will continue to grow at an ever-increasing rate. The impact of tourist activity has already been seen, and with the projections of increased arrivals can only be anticipated to grow as well.

**Figure 3. International Tourist Arrivals 1950-2020**



Source: WTO, 2000

Each countries share is different, but tourism has made development on certain countries possible. Countries are becoming more reliant on tourism due to the fact that tourism increases jobs, income, and taxes. “In most SIDS the tourism sector provides a disproportionate share of economic activity. Individually any one of the shared SIDS characteristics impacts on national economic development. Taken together they play a

critical role in the linkages between tourism and economic development” (Ashe, 2005). Although a large amount of money is generated in a country due to tourism, the World Trade Organization estimates that 50-70% of the gross tourism receipts leak out of the country of destination through imports.

Although tourism has a range of benefits for countries, it also significantly contributes to environmental degradation, negative social and cultural impacts, and habitat destruction (Choi, 2005). For these reasons international and national bodies have searched for tourism planning management and development methods. Just as sustainable development has changed and gained meanings and applicability over the years, so has sustainability in terms of tourism. Choi and Sirakaya (2005) discuss how the term sustainable community tourism (SCT) has developed yet has had limited application. Unfortunately as Choi and Sirakaya noted many countries lack a defined national policy. Many countries also lack a regular management framework with corresponding indicators that are applicable to manage sustainability in their area. Tourism development and sustainable development are both political concepts. Therefore, respective development is only as beneficial as a particular political system will allow.

#### **1.4 Tourism and the Environment**

An investigation was made into the causes and consequences of water abstraction by the tourist industry in Zanzibar, Tanzania through the use of surveys (Gossling, 2001). The results showed that present levels of withdrawal are not sustainable, and parts of the local populations are already experiencing water deficits on a daily basis. In the future, if the expected increase in tourist numbers occurs, the pressure on the aquifers will



correspondingly increase (Gossling, 2001). Results of this may include the possibility that tourism in the area becomes unsustainable, which could have an adverse effect on the national economy and also on the local population and environment. A study based in Turkey found that the coastal zones constituted 30% of the total land, whereas coast populations are about 20% but increase three to ten fold in the summer months. Concerns about the long-term viability of coastal areas have been rising due to worry of global warming. Some researchers believe that global warming will increase sea level, if this happens the coastal zones will shrink and the density and impacts of tourism can increase. The WWF (2002) estimates that if global warming continues at the current rate then in 100 years some of the most popular destination in the hottest regions will become undesirable due to severe increases in temperature. Even though the prediction is one hundred years down the road it is still a possibility, and still a serious concern. Turkey is experiencing an increase in sewage generated by the congested population, which has caused the pollution level of water to exceed standards related to human health and environmental protection. Also, water has been supplied mostly from groundwater to satisfy the demand for new settlements, lowering the water table and increasing salt water intrusion (Burak, 2004).

The marine and terrestrial environment has also been effected due to changes in tourism. In 1997, the Bahamas accommodated 1,617,595 visitors. 30% of these visitors reported that they were in the Bahamas for the beaches, and another 30% stated that they were there for SCUBA diving and snorkeling. The coastal environment is the main attraction in the Bahamas; therefore much development has taken place in these areas to accommodate visitors (Buchan, 2000). The WWF (2002) estimates that environmental

impacts (resource consumption and waste generation) created during a two week holiday account for 20-50% of the earth share of one person for an entire year. This fact is astounding considering what a short period of time visitors are at their destination in respect to the impacts that they leave.

There have been many studies of the impacts of human flow on terrestrial areas; however the impacts of human interaction with marine environments have been minimal. One study by Rouphael and Inglis examined the impacts of recreational SCUBA diving at sites with different reef topographies. The results of the study found that the impact of divers on the marine environment was determined by a multitude of factors, specifically the type of benthic assemblages that are present (sandy bottom, hard corals, soft corals, rubble, etc.). The study examined the frequency that SCUBA divers came into contact with the substratum. The examination found that 73% of divers made contact with the substratum during the 10-minute observation period. Given a longer period, a greater percentage of divers may have been in contact with the substratum. In addition to the amount of divers that come in contact with the substratum, the study also found that 45% of qualified divers who visit dive sites break coral colonies. The amount of damage done by each diver is usually minimal. The study suggests that the dive location should be dependent on the skill level and experience of divers. The less experienced diver should dive in more durable environments before entering fragile coral environments (Inglis, 1997). This study illustrates the impact that people have on the environment even when they think they may not be harming it all.

## Country Snapshot: Zanzibar, Tanzania

The island of Zanzibar (Unguja) in Tanzania is a “water poor” island that relies of freshwater derived from seasonal rains and stored in aquifers. In the 1960’s- 1970’s the island exported cloves, which accounted for 85% of foreign exchange earnings. The government decided that promoting the trade and tourism industry could bring in more money. In 1984 the government initiated a liberalization policy for trade and tourism, which lead to the tourism investment act of 1986. These actions by the government brought in mass changes on Zanzibar and development on the island began immediately. In 1984 the tourist arrivals were 8,967, the tourism industry grew rapidly and in 1997 tourist arrivals grew to 86,495.

The majority of the massive tourist infrastructure development in the 1980’s was built on the east coast of Zanzibar. Unfortunately, the topography divides the watersheds on the island and the west coast receives more rain, even though the east coast is where most of the resorts are located. The west half of the island is cultivated land and the east half of the island consists of coral rock, bushy vegetation, and beaches. Since the development salt-water intrusion has already been reported on the eastern portion of the island. The pressure on the aquifers occurs during the dry season, which is also the peak of the tourist season. Over fishing has also been reported around the island due to the high demand of seafood for tourists.

A survey of hotels and resorts found that a tourist’s demand for water is 15 times that of the daily demand of a local resident. 50% of a hotel/resorts water usage is for gardens and pools. The other half of water use was for direct use (showers, toilets, washing hands) and indirect use (cleaning, washing, restaurant purposes). Regarding sewage systems on the island the study found that out of 24 hotels, 12 of them had fully concreted tanks. The other 12 had open systems where the sewage would leak into fissures and caves. One particular guesthouse piped its waste directly into an empty cave and another pumped into a former well. Both the cave and the well provide access to the aquifer, leading to contamination of the water system.

Recommendations were provided upon conclusion of the study to area hotels and resorts. The study suggested that flow limiters be place on taps and showers and a reduced flush option be installed on toilets. Also, signs pointing out the limitations of the area resources would provide education to tourists who may not understand the impacts of their actions. On a grander scale, distributing wells may alleviate the stress on the aquifers and salt-water intrusion may be reduced when decreasing the pull on the aquifer in one particular hot spot.

Source: S.Gossling (2001)

## 2.0 Small Island Developing States

Small Island Developing States or SIDS are islands or low-lying coastal communities that are small in terms of population, physical area, and/or size of the economy. The United Nations uses the size of the economy to qualify a country, while other organizations and researchers may use only population or a variation of all three.

Many researchers believe that population is the most significant criterion in determining the true economic status of a country. Abeyratne (1999) discussed how population determines many of the basic characteristics of a national economy, because the size of the economy is considered directly proportionate to population levels and per capita income. Other researchers believe that GNP and GDP are not appropriate criterion to classify a nation as developing, as GNP and GDP may show growth and development but may not be sustainable over time. A Maltese Ambassador proposed to the United Nations in 1990 the need for a vulnerability index for SIDS, in his speech he noted

*“that the per capita GDP of Island Developing Countries is not by itself an adequate measurement of the level of development of island developing countries as it does not reflect the structural and institutional weaknesses and the several handicaps facing Island Developing Countries.”*

The UN has classified 51 countries as SIDS; 23 are located in Latin America and the Caribbean, 22 are in Asia and the Pacific, and six are in Africa. What is interesting is that all small island developing states do not have the same dynamics. For instance there are some SIDS that is considered high-income countries such as Aruba, the Bahamas,

Bermuda, Cyprus, and the United States Virgin Islands. There are also low-income countries such as Haiti, Maldives, Samoa, Solomon Islands, and Tuvalu and Vanuatu (Abeyratne, 1999). Although SIDS may differ in terms of their incomes or economies, they all still face the same disadvantages.

Small Island Developing States face multiple disadvantages, many of these disadvantages do occur in other countries, but the impacts are multiplied due to the smallness of the islands. Many researchers have discussed issues that SIDS face such as; small size, insularity and remoteness, proneness to natural disasters, and environmental factors. Each of these factors has multiple implications that affect the island, and should be considered when trying to create a development plan.

Small size of the island is the largest disadvantage as it has many other implications that are associated with it. Small islands usually have limited natural resources, which limits the ability to generate goods. This also creates a high dependence on imports so the nation has the goods that it needs. Importation also has issues due to the fact that these islands have limited import options and limited substitution possibilities. Many SIDS that do develop import substitution policies tend to have higher prices in order to regulate the economic environment (Briguglio, 1995). SIDS also need to keep a high foreign exchange in order to maintain or increase economic status, in order to do this many SIDS increase exports. Due to the small domestic markets the services and products that a country creates is limited; this often leads to limited control in the prices of exports and imports (Abeyratne, 1999; Briguglio, 1995). In addition, with limited production and limited specialization costs of production, construction, and specialized training increase. Apart from the economic disadvantages SIDS also face public

administration problems due to the 'small size' of the country. These types of issues deal with having a small resource base, for instance natives who become specialists in a particular field often leave the islands to find better work. Also, due to smaller populations the costs of government functions increase as the costs are distributed amongst fewer people. Lastly, it is hard to recruit and promote people within the government sectors due to the fact that the people in the workforce are often related.

Insularity and remoteness is another disadvantage of small island developing states (Abeyratne, 1999; Briguglio, 1995). Transport costs tend to be higher as a result of being distant from other main transport routes or commercial centers. Also, shipments tend to be smaller because the islands are not on route to main destinations, which again increases the costs of these goods. SIDS also face uncertainty with supplies, some countries are actually archipelagic which means they are made up of multiple islands. The dispersion of goods between all of these islands can be limited which creates the uncertainty with supplies. Many countries choose to keep a large stock of supplies on hand, but this increases costs for products because of operations for the warehouses and personnel.

Environmental factors in SIDS are a disadvantage as they increase pressures and make the countries more susceptible to additional problems. SIDS are extremely prone to natural disasters. As islands hurricanes, typhoons, earthquakes, landslides, and volcanic eruptions can devastate the countries as the actual size of the communities are relatively small so the impacts spread throughout the nation. Many of these disasters can wipe out agricultural areas and severely impair the produced goods of these countries (Briguglio, 1995). As SIDS continue to develop houses and other

industries continue to take over traditional agriculture areas, which increase the stress on the remaining environment. In addition, tourism relies heavily on coastal zones and other marine areas. Multiple uses of the environment can render significant negative impacts. Typical characteristics of SIDS is their unique and fragile ecosystems, they are large contributors to global biodiversity. In addition, they are also fragile in the sense that they have low resistance to changes in the environment such as global warming, rise in sea level, and erosion (Abeyratne, 1999).

## **2.1 Energy on SIDS**

The majority of islands are still using expensive and degrading fossil fuels as their main source of energy. One of the main reasons that islands have not been utilizing growing renewable energy is the lack of knowledge and awareness. The Danish non-governmental organization Forum for Energy and Development (FED) conducted a study that found that islands are great targets for renewable energy (Jensen, 2000). Already there has been an increased focus on renewable energy for islands, Samsøe was listed as a renewable island in 1997, in 1999 there were two global conferences on renewable energy islands (Spain & Denmark), and in 2000 four SIDS (St Lucia, Dominica, Vanuatu, and Tuvalu) announced their intentions to become a renewable energy nation (Jensen, 2000).

Duic, et al. (2003) studied the potential of the Kyoto Protocols' clean development mechanism in the transfer of clean energy technologies to SIDS. They found that SIDS typically use diesel fuel to produce their energy and that it was the most efficient way to produce energy on a small scale. Even though carbon emissions are

lower on SIDS than in other nations, there is still potential for renewable energy technologies for these countries, creating a strong market presence. One aspect of concern for SIDS is their specific characteristics that limit the degree that the power sector can be transformed in comparison to large continental developing countries (Weisser, 2004). Based on SIDS characteristics, Weisser found that there are options for renewable energy technology that does not decrease economic production. He found that reform programs should work with the market, strengthen human capacity, consider long term interests, and make selective choice for power sector reform (Weisser, 2004).

## **2.2 Solid Wastes**

The sustainable use of natural resources and the sound management of wastes play a large role in the status of the environment in small island developing states. As a result of SIDS unique social, economic, and environmental characteristics potential options for management strategies are minimal. Islands often have high population density, limited land space availability, and limited economic resources. In addition, tourists produce large amounts of waste during select tourist periods, increasing the difficulty of solutions.

Wastes are often deposited in landfills, composted, incinerated, or dumped in water bodies. Landfills that are appropriately designed are rarely managed properly and become a site to simply deposit all wastes and not separate materials. As a result of poor management many island communities simply dump their wastes around the island (United Nations, 1998). Tourism also plays a large role in stressing the carrying capacity of island nation's resources. If there is not a sufficient management structure set up, then



large numbers of visitors and the significant amount of materials they use can contribute to the depleting environment.

The United Nations Economic and Social Council's commission on sustainable development found five main aspects to improve the status of wastes on SIDS: improve management; separate types of wastes for disposal; secure long-term storage facilities and final disposal options; improve efficiency of septic systems; and require environmental impact assessments for all projects related to waste disposal (United Nations, 1998).

### **2.3 Tourism Impacts and water use in SIDS**

Many small islands face severe constraints in terms of both the quality and quantity of freshwater due to their small size and particular geological, topographical and climatic conditions. This is precisely the case for low-lying coral-based islands such as the Bahamas, where groundwater supplies are limited and are protected only by a thin permeable layer of soil. Even where rainfall is abundant, access to clean water has been restricted by the lack of adequate storage facilities and effective delivery systems.

Conservation seems to be an easy remedy to minimize the effects of overuse of water, and lack of water. There are a few freshwater augmentation technologies available to locations that cannot extract their own freshwater due to a variety of reasons which may include: lack of resources, pollution, or political reasons. Therefore, there are a few ways to provide better water and more water to communities. One way is through water quality improvement technologies and the other is through freshwater augmentation technologies. Water quality improvement is met through the desalination process. This

process treats water and separates the salts from the saline water to produce water that has low total dissolved solids. There are four different types of desalination processes, including: distillation, electro dialysis, reverse osmosis, and solar desalination.

Freshwater augmentation alternatives include importation of fresh water, and rainwater harvesting.

## Country Snapshot: Turkey

Turkey represents a case where there are enormous challenges to sustainable tourism. Tourism in turkey provides the main source of foreign currency. Poor management since the early 1960's has plagued the tourist industry. The tourism sector is represented and managed at the ministry level and has been for decades which has led to a lack of an approach to development. From 1963 to 1996 there have been 30 ministers appointed for tourism, a service average of 1.1 years each. This time frame does not provide adequate training and knowledge to develop and implement working programs. The government enacted the Tourism Encouragement Law, No.2634. This law encourages public and private entrepreneurs to invest in building hotels, yacht ports, pools, etc. The law provides fiscal and monetary incentives and appropriates state land for development, reduces bureaucratic formalities, reduces restrictions on the employment of foreigners, and provides telephone and postal priorities to investors.

There is uncontrolled hotel construction in coastal areas and developers are disregarding the land use planning codes and the coastal law to follow architectural styles. As hotels continue to pop up around the country the infrastructure for water and sewage remains the same as it was to support only the indigenous peoples. Many hotels extract hot water from a thermal supply to fill pools and baths, which is lowering the water table and exhausting the natural springs. Researchers are finding that water that is filling in the springs or dried up fissures is full of pollutants and solid wastes. Worse yet, some hotels are not even hooked up to sewage systems and simply leach their wastes into the ground. Other sources of wastes and pollution are yachts; the owners/ operators simply dispose of their solid waste and sewage into the ocean.

Tourism is truly developing at the expense of the local people. Places that were once small fishing villages are now homes to a tourist center, which can house 100,000 tourists. That is an astounding number considering the population capacity of 10,000. Indigenous people are now banned from hotel (public) beaches. Due to poor planning and the development of hotels instead of public housing Indigenous people live in slums where they have no water, no toilets, and no baths. The locals are employed by the tourism industry, but they only work the low service jobs with little to no opportunity for skill development and transferability to other jobs. In addition, the majority of stores fail to recognize the needs of the local people and only carry goods that would be of interest to tourists. Local people are concerned that even if laws are re-evaluated for sustainable development that they may be disregarded due to politics and economic priorities.

Source: Tosun, Cevat. (2001)

There are various options for producing fresh water on small island developing states. Two main categories are desalination and freshwater augmentation alternatives (described above). These options are shown in respect to one another based on the strengths and weaknesses in table 1.

**Table 1. Comparison of Water Resource Options**

Option	Description	Strengths	Weaknesses
Distillation	Saline water is heated in ambient conditions and the vapor that condenses provides fresh water.	Can be used in various locations. Can withstand poor quality feed water	High quality (expensive) materials are needed for the best productivity Capital costs are high, high production costs.
Electro dialysis	Saline water passes through a membrane stack creating desalinated water.	Can be used in any climate. Effective with heavy dissolved solids.	Freezing can decrease productivity. Not very effective with seawater. Small market, high costs.
Reverse Osmosis	Semi-permeable membrane separates water and dissolved materials.	No heating or phase change is required. Works well with seawater and brackish water. Operates in any climate. Large market, minimum costs. Easy transport of components.	Filters have to be kept clean and free of particles, more effective with brackish water than seawater.

**Table 1 (Continued). Comparison of Water Resource Options**

Option	Description	Strengths	Weaknesses
Solar Desalination	Humidification, distillation, and then photovoltaic separation of seawater.	Productive in areas of intense sunshine.	High Capital. Additional energy needed to pump water through process. Productivity is dependent on weather.
Barging Water	Water is transported from one place to another by sea vessel. Water is then pumped into tanks at destination.	Good for emergency purposes and areas with minimal resources.	Can be unreliable due to unpredictable seas. Reliability on other nations for water source is a concern.
Rainwater Harvesting	Catchment surface fills with rain, then treated and stored in tanks.	Can serve various size communities.	Amount of water extracted is dependent on: size of catchments, precipitation, efficiency in gutter transport, and size of storage tank.
Leakage Control	Installed monitoring devices reduce the amount of water escaping from system.	Effective as a water conservation measure. Suitable for all public water supplies.	Does not provide any additional water, simply reduces unaccounted water.

(Table 1) Extracted from: Green, M.G., Schwarz, D. (2001). Extracting Drinking Water from Salt Water: An overview of Desalination options for developing countries. *gtz-gate*. p. 1-6.

As the table shows there are multiple options for producing freshwater. The applicable options for each community is dependent on multiple factors, most notably economic conditions and climate. Therefore, the status of the small island developing states determines which process would be the most applicable.

Many developing countries in the tropics have focused on tourism to generate additional income sources and to diversify the economy. Coastlines in particular have been on the forefront of tourism infrastructure development. The presence of a large number of tourists has often had negative consequences for the sustainable use of the available resources, which in turn has had an effect on the ecosystems. The high numbers of tourists paired with their intense use of resources in a community of minimal resources depletes the ecosystem, decreasing resources for the natives and tourists.

## **2.4 The Bahamas**

The Bahamas consists of 700 islands and islets<sup>1</sup>. It covers nearly 13,940 square kilometers<sup>2</sup> and is located to the southeast of Florida down almost to Haiti. Since there are multiple islands that cover such a great area, the management of resources for the country is difficult. A large tourism industry increases the difficulty to manage resources. In 2004 tourism accounted for 40% of the gross domestic product (GDP), government

---

<sup>1</sup> [www.bartleby.com/65/ba/Bahamas.html](http://www.bartleby.com/65/ba/Bahamas.html)

<sup>2</sup> [www.cia.gov/cia/publications/factbook/geos/bf.html](http://www.cia.gov/cia/publications/factbook/geos/bf.html)

spending was 20%, financial services was 15%, construction (mainly tourism related) was 10%, and manufacturing (pharmaceuticals, rum) was 8%, and lastly agriculture and fisheries was 3% of GDP. Tourism and tourism related commerce accounts for 50% of the gross domestic product (GDP), as well as 60%<sup>3</sup> of employment. 80% of the eligible work force works in the service industry (tourism, banking, fishing, and agriculture). These values illustrate how the Bahamas is heavily dependant on the tourism industry.

Almost 60% of the Bahamas GDP was made up of tourism related activities and services in 1995 and in 2004 consist of 40%, this shows a substantial decrease. The downturn in tourism after September 11, 2001 created a period of economic struggles in 2001-2002. The Bahamian government has worked to increase large scale private sector investments in tourism. Three future goals of the current administration is to develop tourism properties on the Family Islands, expand ship-repair facilities, and begin film producing facilities on Grand Bahamas Islands. Knowing the intent to develop on family islands and the fact that their resources are minimal compared to the larger islands, a framework for sustainable development needs to be created for current hotels and operations to review the impacts on the local communities.

Educational attainment in the Bahamas is a critical issue; the main islands receive many resources while the outer islands have fewer resources. The data that was available for school enrollment was limited to years 1990 and 2002. Therefore, the dynamics of the educational system may be hard to recognize. There were 32,873 pupils enrolled in primary school in 1990, and 34,079 in 2002. The growth in pupils enrolled was almost 4%, higher then the increase in population for those years. This reflects the positive development of the educational system. In 2002, there were 31,975 pupils

---

<sup>3</sup> Regional Core Health Data System. Country Profile: The Bahamas. [www.paho.org/sha/prfbah.htm](http://www.paho.org/sha/prfbah.htm)

enrolled in secondary education, no other years are reported for comparison.

The Human Development Index (HDI) focuses on three different factors of human development; long healthy life, education, and standards of living. The measures that are analyzed for these three factors are life expectancy, school enrollment, literacy, and income. The Bahamas ranked 50<sup>th</sup> out of 177 countries in the HDI ranking. The islands GDP per capita rank was 37<sup>th</sup>, and the overall HDI value was 0.832<sup>4</sup>. Unfortunately, due to lack of data the HDI-1 score could not be calculated, this score evaluates poverty in developing countries. What is interesting of the Bahamas is how active women are in economic and political life. The gender empowerment measure or GEM reflects gender inequality in economic and political participation and decision-making. The Bahamas ranks 17<sup>th</sup> out of 177 nations. 26.8% of parliamentary seats are held by women, women make up 51% of professional and technical workers, and 40% of administrators and managers are women<sup>5</sup>

The Gross Domestic Product for 2002 was 4,815,877,000<sup>6</sup> an increase of only 1% from 2001 values. The Purchasing Price Parity GDP was 5,754,000,000 in comparison, reflecting that in comparison to U.S. goods the people could purchase more in the U.S. in 2002, the GDP per capita was 15,338 which was a 1% decrease from 2001 values. It is evident that although the GDP seems to be increasing steadily over the past 20 years, the GDP per capita has experienced many more extreme fluctuations. As one can see the slope of the trend line in Figure 4 illustrates the slow growth of GDP per capita or may reflect changes in the amount of producers in the Bahamas, changes in taxes, or in subsidies. Therefore, development has most likely been minimal as the GDP per capita

---

<sup>4</sup> Human Development Report, 2005. [hdr.undp.org/statistics/data/country\\_fact\\_sheets/cty\\_fs\\_BHS.html](http://hdr.undp.org/statistics/data/country_fact_sheets/cty_fs_BHS.html)

<sup>5</sup> Human Development Report, 2005. [hdr.undp.org/statistics/data/country\\_fact\\_sheets/cty\\_fs\\_BHS.html](http://hdr.undp.org/statistics/data/country_fact_sheets/cty_fs_BHS.html)

<sup>6</sup> The World Bank Group: GDN Data Query. [www.sima-ext.worldbank.org/WBQ](http://www.sima-ext.worldbank.org/WBQ)



growth didn't grow or decreased from 1986 to 1994, then decreased again after 2000.

**Figure 4<sup>7</sup> Contribution to the GDP in 1995 of various sectors of the Bahamian Economy.**

Contribution to the GDP in 1995 of various sectors of the Bahamian Economy.<sup>a</sup>

Sector	Contribution to GDP (US \$ million)	Contribution to GDP (%)
Wholesale and retail trade	409.70	14.90
Hotels	269.85	9.82
Real estate	227.05	8.27
Communications	106.28	3.87
Manufacturing	85.11	3.10
Electricity	75.56	2.75
Business activity	74.27	2.70
Construction	73.31	2.67
Fisheries	61.67	2.25
Insurance	60.22	2.19
Restaurants	48.38	1.76
Banking	48.36	1.76
Air transport and allied services	45.87	1.67
Transport (excluding shipping and air)	42.37	1.54
Shipping and allied serv- ices	38.12	1.39
Mining and quarrying	25.76	0.94
Agriculture	25.75	0.94
<b>Total</b>	<b>2746.13</b>	

<sup>a</sup>From Department of Statistics figures presented in BREEF and MacAlister, Elliot and Partners Ltd.; also includes other elements such as the public sector. The total also includes the public sector.

Figure 4 shows how the GDP was distributed in 1995. in 2004 (in shares of GDP), tourism was 40%, government spending was 20%, financial services was 15%, construction (mainly tourism related) was 10%, and manufacturing (pharmaceuticals, rum) was 8%, and lastly agriculture and fisheries was 3% of GDP. The main markets are the Americas (U.S.-77.5%, Canada-1.6%, and Mexico-.4%) and the European Union (17.8%)<sup>8</sup>

<sup>7</sup> The Bahamas. Kenneth C. Buchan. *Marine Pollution Bulletin* Vol. 41, Nos. 1-6, pp.94-111,2000.

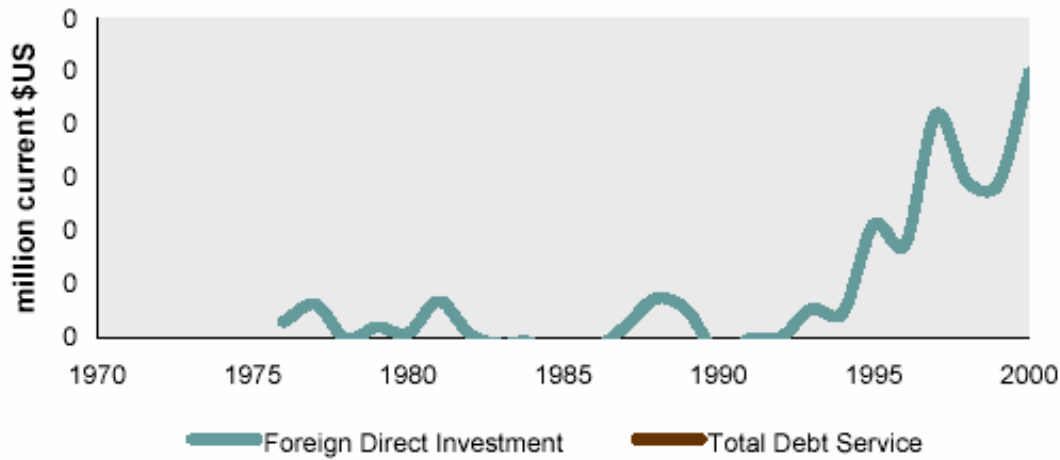
<sup>8</sup> U.S. Department of State. Background note: the Bahamas. [www.state.gov/r/pa/ei/bgn/1857.htm](http://www.state.gov/r/pa/ei/bgn/1857.htm)

Official Development Assistance (ODA) and Financial Flows show that comparatively to Central America and the rest of the Caribbean, the Bahamas is receiving much more assistance. From 1998-2000 the ODA was 13 million U.S. dollars<sup>9</sup>, comparatively the rest of the Caribbean has about 2 million in ODA. In per capita terms it is 44 U.S. dollars in the Bahamas compared to 14 U.S. dollars in Central America and the Caribbean. The Bahamas was suffering an account balance deficit in 2000 of -438 million \$U.S. Unfortunately, even though the islands are receiving a lot of ODA the amount of foreign investment seems weak compared to the surrounding areas, which may reflect the need for increase ODA. Foreign direct investment is investment in the country that acquires a lasting management interest (10% or more of voting stock) in a particular business that is operating in an economy other than that of the investor (WRI, 2003). In 2000, foreign direct investment was 250 million U.S. dollars, compared to other nations that receive 17,828 million dollars (figure 5, the values are of million current \$US from 0 to 300 in increments of 50) of investment. A particular strength for the Bahamas is the high amounts of tourism that it receives annually. From 1995 to 1997 the islands received 1,435 million U.S. dollars in International tourism receipts.

---

<sup>9</sup> Earth trends, World Research Institute, the Bahamas.  
[Earthtrends.wri.org/pdf\\_library/country\\_profiles/eco\\_cou\\_044.pdf](http://Earthtrends.wri.org/pdf_library/country_profiles/eco_cou_044.pdf)

**Figure 5. Foreign Direct Investment and Total Debt Service, Bahamas**  
**Foreign Direct Investment and Total Debt Service, Bahamas**



Source: World Resource Institute, Earth Trends 2003.

The Constitution of 1973 governs the Bahamas, which has a parliamentary form of government<sup>10</sup>. The head of government is the prime minister, as well as the monarch of the United Kingdom, which is an appointed governor-general. Perry Christie became the prime minister in 1997; the previous 25 years Lynden O. Pindling was the prime minister. The current administration is committed to social development, which is evidenced by 30% of the national recurrent budget going to social sectors, notably education, health, and housing. Bahamians have access to universal health care, regardless of the ability to pay

Tourism and tourism related commerce accounts for 50% of the gross domestic product (GDP), as well as 60%<sup>11</sup> of employment. 80% of the eligible work force works in the service industry (tourism, banking, fishing, and agriculture). In 1992 the

<sup>10</sup> The Columbia Encyclopedia, Sixth Edition.2001-05. The Bahamas.

<sup>11</sup> Regional Core Health Data System. Country Profile: The Bahamas. [www.paho.org/sha/prfbah.htm](http://www.paho.org/sha/prfbah.htm)

unemployment rate was 14.8% and decreased to 11.5% in 1996. According to the World Bank, 1992 experienced the worst unemployment when 15% of the total workforce was unemployed. Unemployment decreased overtime, and in 1998 (last record) the unemployment rate was 8%.<sup>12</sup>

Almost 60% of the Bahamas GDP was made up of tourism related activities and services in 1995, and in 2004 consists of 40% shows a substantial decrease. The downturn in tourism after September 11, 2001 created a period of economic struggles in 2001-2002. The Bahamian government has worked to increase large-scale private sector investments in tourism. Three future goals of the current administration is to develop tourism properties on the Family Islands, expand ship-repair facilities, and begin film producing facilities on Grand Bahamas Island.

The Bahamas faces many economic challenges ahead; employment is and will be a large concern as demand will increase in the upcoming years. Privatization is also lacking in the islands, and government debt is exorbitant. One change may be to instill taxes to alleviate the pressure and debt. Currently, the Bahamians do not have an income or sales tax. Trade and foreign investment is also low, reflecting the need to decrease the high tariffs and import fees.

The Bahamas has faced and is facing serious environmental changes. Wetlands have been altered, sand mining and dredging continues, water resources become diminished, and wastes have been increasing. Coastal wetlands are continuously altered for development. Wetlands in Nassau (New Providence), Freeport (Grand Bahama), Marsh Harbour (Abaco), and George Town (Great Exuma) were cleared for mosquito control and for waterfront access (Inniss, 2002). Mangroves are a particular feature of

---

<sup>12</sup> The World Bank Group: GDN Data Query. [www.sima-ext.worldbank.org/WBQ](http://www.sima-ext.worldbank.org/WBQ)

certain wetlands and are a very fragile ecosystem. A particular development in Bimini dredged, extracted, and in filled mangroves (Buchan, 2000).

Sand mining and dredging is occurring throughout the islands of the Bahamas. Bimini is being mined for oolitic sand that is sent to Florida to be used on beaches (Buchan, 2000). Many of the family islands use sand as a material for local construction purposes. Unfortunately, removing the sand alters the beach profile that reduces protection from the elements and increases erosion. In Montague Bay, Nassau sand from the beach is removed and used for the golf course at Paradise Island and for cable beach golf course in Goodman's bay. Apart from the areas of sand extraction being more susceptible to the elements, hotels that are down current from the extraction sites have reported loss of beach front due to erosional processes. In addition, Marina Access through natural channels has become more difficult as the walls of the current channels have begun erosion. Sand removal behind beach fronts have also become an issue, erosion as increased at the north coast on New Providence. At this location cars and pedestrians have damaged vegetation on the back beach areas. The vegetation helped to stabilize the sand and provided a place for sand to consolidate, without the vegetation the dunes have continued to shrink. A similar situation is happening at the sand dunes at Delaporte in New Providence, where litter lines the beaches now that the vegetation that once trapped it is gone. One disturbing fact is that from 1943 to 1995 approximately 29 hectares of seafloor were altered for construction, this included dredging and coral removal (Sullivan-Sealey, 1999).

There are no rivers or major freshwater lakes in the Bahamas; therefore, rainfall is the only source of freshwater. The average annual rainfall is from 34 inches to 58 inches

(BEST, 2005). Once this rain has percolated through the limestone it meets with the salt water where it forms a layer called the freshwater lens. Water resources have become an issue in the Bahamas. New Providence has a freshwater lens of 17,500 acres to serve a population of 171,542 people. Andros Island has a freshwater lens of 338,585 acres for a population of 8155. New Providence is an island that has a larger population and also hosts a large majority of the hotels in the Bahamas. In order to provide the freshwater to everyone on the island 40% of the needed water is pumped and shipped in by barge from Andros Island (Buchan, 2000). One of the positive actions on Paradise Island is that wastewater is recycled and used for irrigation on its golf courses.

The family islands are often used for whatever resources they have to support the larger islands. For instance, to make servicing cruise ships easier and so they can travel less distances for service the cruise ship companies developed facilities for garbage disposal and holding tanks for flushing on small islands and cays. Three cays (Gorda Cay, Little San Salvador, and Little Stirrup Cay) currently have these facilities and more are being proposed. In addition, the family islands have reported debris that has washed up on shore that is identifiable from cruise ships.

### **3.0 Research Methodology**

The main problem for small developing islands is that they can often be overused and mismanaged, resulting in creation of serious degradation to the island. Tourism has continued to grow through many regions of the world, and in less developed locations. In order to determine the impacts of tourism on the energy, waste, and water resources of small island developing states multiple aspects need to be reviewed. In order to

understand all of the systems dynamics a meta-analysis was conducted. A meta-analysis was conducted by reviewing articles from areas of sustainability, small island developing states, tourism, environment, development, and (environmental, tourism, and sustainability) frameworks. These articles provided information on the issues of sustainability and problems and concerns that apply to SIDS. Once frameworks were found the criteria (indicators) that were used were put into categories based on systems dynamics and a matrix was created that illustrated the main focus and evaluation of each framework. Once this was complete indicators that were appropriate for sustainability and tourism development were highlighted. Indicators that were missing or areas that were not covered by one of the six frameworks were then added. Missing indicators are indicators or areas that were discussed in literature to be important to the system of a particular nation or island. The criteria that were used to evaluate the six frameworks will be discussed in the next section. The criteria were selected based on understanding of what the literature stated regarding needs for sustainability and for tourism development. The two areas needs were merged as a result of SIDS strong dependence on tourism. Based on the strengths and weaknesses that were apparent after the evaluation, a framework was created using the strongest indicators. Added indicators that were lacking and the strongest aspects of the frameworks evaluated criteria. The new framework was then applied to the Bahamas to evaluate its feasibility.

### **3.0 The Six Frameworks**

Six studies are used to represent different ways that researchers are approaching sustainable development. There were not multiple frameworks for sustainability that were

accessible. Due to the fact that there are different types of “frameworks” different types of frameworks were found that included or associated tourism, sustainability, and development. Some frameworks are focused on eco-tourism, some on tourism management, eco-footprints, and/or general sustainability. Also, some of the “frameworks” covered indicators, processes, and/or the concepts of sustainability at different levels. A discussion follows on the description of each of the studies included and the reasoning on why it was included. The six studies that were used in this study are:

- *Definition of Indicators for Environmentally Sustainable Development* (1996). Harger, JRE. and Meyer, M. *Chemosphere* 33, 1749-1775.
- *Conceptualizing Yield: Sustainable Tourism Management* (2005). Northcote, J. and Macbeth, J. *Annals of Tourism Research* 33,199-220.
- *Development of a Tourism Sustainability Assessment Procedure, a Conceptual Approach* (2005). Ko, Tae Gyou. *Tourism Management* 26,431-445.
- *Ecological Footprint Analysis as a Tool to Assess Tourism Sustainability* (2002). Gossling, Stefan, et.al. *Ecological Economics* 43, 119-211.
- *World Statistics Pocketbook SIDS* (2003). U.N. Series V.No. 24/SIDS
- *2005 Environmental Sustainability Index, Benchmarking National Environmental Stewardship* (2005). Esty, Daniel. et al. Yale Center for Environmental Law and Policy.

The *Definition of Indicators for Environmentally Sustainable Development* study focuses on environmentally sound sustainable development indicators. The paper focuses



how “environmentally sound and sustainable development results from human actions which permit continued development with the environment as the final arbitrator.” The authors Harger and Meyer then attempt to create a useful model to “compare and correlate actions undertaken in environment...to do this a scale of indicators for sustainable development have to be identified.” Harger and Meyer present six aspects that are important when generating indicators (see table 2).

**Table 2. Six Aspects that are Important When Generating Indicators**

Simplicity- The final indicators should be as simple as possible
Scope- The indicators should cover the whole spectrum of human activities related to economy and environment but overlap amongst particular indicators should be as small as possible
Quantification- The elements should be readily measurable
Assessment- The elements should be capable of being monitored to establish performance trends
Sensitivity- The chosen indicators should be sensitive enough to reflect important changes in environmental characteristics
Timeliness- Frequency and coverage of the elements should be sufficient to enable timely identification of the performance trends
Source: Harger, 1996.

UNESCO in Indonesia created the indicators when UN agencies suggested general indicators. Three dominant processes were outlined then were broken down into subdivisions (see table 3).

**Table 3. Three Dominant Process areas as defined by ESSD (Harger and Meyer, 1996)**

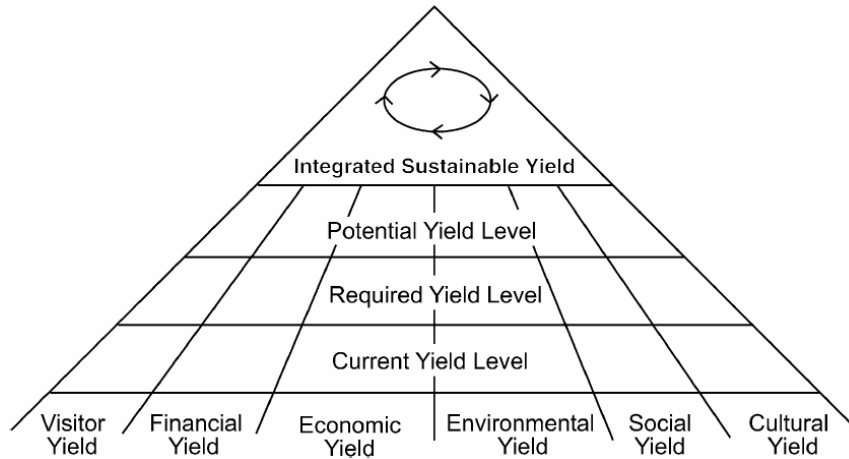
<b>Environmental processes:</b>	
Energy Use	Terrestrial Systems
Atmosphere	Natural Hazards
Climate	Biosphere
Aquatic Systems	
<b>Social Processes:</b>	
Agriculture	Environmental Management
Population	Development
Health	Education
Science	Rural Systems
Urban Systems	Public Infrastructure
Poverty	Culture and Society
Politics	
<b>Economic Processes:</b>	
Mining	Transport
Military Considerations	External Aid & Tech Transfer
Communications	Valuation/Accounting
Trade	Other Factors (General Economy)
Industry	

Agencies recommendations were compiled and then broken down to fit under the subdivisions. The authors chose to break these subdivisions down even further because the indicators are topics, actions, or specific parameters, and should be broken down further for better objective quantification.

The Harger and Meyer article was included in this study because it provides a breakdown of topics and a creation of indicators for evaluation. Major international parties were a source of input for Harger and Meyer's analysis. Having their compilation of evaluating measures by key agencies provides this study with actual information that is used than just academic purposes.

The study *Conceptualizing Yield: Sustainable Tourism Management* by Macbeth and Norcote developed a framework for evaluation of pros and cons of developments in tourism systems. The authors focus on the concept of "sustainable yield". This "term can incorporate non-economic gains in the environmental, cultural, and social spheres", thus the yield concept refers to these considerations. Macbeth and Norcote developed an Integrated Tourism Yield Framework to evaluate tourism systems in terms of sustainable parameters. The framework (figure 6) is shaped in a pyramid form with the base being general areas (tourist, financial, economic, environmental, social, and cultural). The second level is the expected returns from the base level, and the next (3<sup>rd</sup>) is the level that the system needs to be sustainable. The fourth level is the potential level, or the "maximum permissible conditions that will be allowed in a specific opportunity class." The pinnacle of the pyramid is the integrated yield dimension, which is the acceptable limit for sustainability.

**Figure 6. Integrated Tourism Yield Framework**



The Macbeth and Norcote paper was chosen because it seemed to highlight the interrelationships of tourism, sustainability, and the particular system of the location. Combining and creating a framework that takes into account a locality, tourism, and sustainability is the main focus of this study. Therefore, Macbeth and Norcote’s research of conceptualizing yield and sustainable tourism management seemed to be a good fit.

Tae Gyou Ko developed a procedure for tourism sustainability assessment. The study evaluated 12 case studies to “determine whether the case studies used explicit sustainability assessment methods or models to evaluate performance quality of STD”. The main purpose of this study was to develop a procedure for assessing tourism sustainability in terms of system quality. This study by Ko combines holistic and reductionism approaches. The model or framework provides eight steps (see figure 7). The author states that first systems should be identified (ex. Human, Ecosystem) then the main dimensions within the systems should be identified in sustainability assessment, then the main indicators to assess the tourism sustainability within the dimensions and systems. The next steps are to scale the indicators and determine levels of sustainability, build assessment maps, extend sustainability over time, and then evaluate outcomes.

**Figure 7. Conceptual framework for tourism sustainability assessment**

Conceptual framework for tourism sustainability assessment  
Components for tourism sustainability assessment<sup>a</sup>

Society	1. Systems	2. Dimensions <sup>b</sup>	3. Indicators <sup>b</sup>	Information requirements (to assess the three elements of STD objectives)	Data gathering methods <sup>b</sup>	4–8. Data analysis methods
A tourist destination	(A) The human system	(a) Political		Tourism's contribution to the needs of local residents	Household (or street) questionnaire survey of local residents	Determine scale of indicators
		(b) Economic				Determine gradations of sustainability
		(c) Socio-cultural				Develop sustainability assessment maps (SAMs)
		(d) Production structure (service and product quality)		Tourism's contribution to the needs of tourists	Street (site, user or visitor) questionnaire survey of tourists	Extend sustainability over time
	(B) The ecosystem	(e) General environmental impacts		Tourism's contribution to the needs of the natural environment	Delphi technique (or in-depth interviews, or focus group interviews) of environmental experts/groups	Evaluate the outcomes
		(f) Ecosystem quality				
		(g) Biodiversity				
		(h) Environmental policy and management				

Source: Developed from Ko (2001, p. 818; 2002, p. 93).

<sup>a</sup>In this model, determining systems and dimensions is based on a systemic (holistic) approach, while selecting and scaling indicators are based on a reductionist approach.

<sup>b</sup>Dimensions, indicators and data gathering methods may vary from one tourist destination to another according to the type and characteristics. The indicators can be collected from a number of references in tourism, environment and ecology. Stakeholders should be involved in the indicator selection process.

The Ko article was chosen to be included in this study because it captured the concepts of integrating tourism, sustainability, and the environment in a systems thinking approach. Ko's research also provided key concepts and issues that were used to develop criteria for evaluating the six studies. The article provides an explanation of the assessment process that Ko developed as well as elaborated on issues of frameworks that are used in sustainability assessment.

Gossling, et al. study titled *Ecological Footprint Analysis as a Tool to Assess Tourism Sustainability* discusses ecological footprint analysis (EFA) as a concept to assess sustainability in tourism and to test the hypothesis of ecotourism as a sustainable form of tourism. The article sets a study area of the Seychelles to apply the analysis tool,

due to the fact that the Seychelles base their marketing on the image of a pristine, exclusive eco-destination that integrates environmental conservation and development. The ecological footprint analysis uses space equivalents of the amount of biologically productive areas compared to the area that is required to support a certain lifestyle within the area. This allows the assessment to see if consumption is ecologically sustainable. The footprint calculation consisted of aggregated categories built up land, fossil energy land, arable land, pasture, forest, and sea space. Each category had additional criteria that were used in the final evaluation. For example, built up land in the Seychelles was determined by “hectares per capita per year” for roads, airports, accommodation, and activities/golf courses. The final result of the size of the eco-footprint was determined by the hectares per year for each category by the equivalence factor to determine world average space to test to see if it was below, at, or above world averages.

This article (Gossling, et al. 2002) was chosen to be included in this study because it illustrates the relationship between tourism and the environment. The assessment allows one to evaluate a particular location based on ecological impacts and gives an equivalence factor to evaluate sustainability. In addition, the article provides areas or categories that should be considered when evaluating sustainability of a location or nation.

As a result of the Programmed of Action for the Sustainable Development of Small Island Developing States special attention was given to the particular issues of these islands. The issues covered in the U.N annual World Statistics Pocketbook are areas of environment, tourism, transport, science, technology, and human resource development. The pocketbook provides a compilation of social, economic, and development indicators.

The combination of indicators provides a “framework for assessing in quantitative terms each state’s current development situation”. The indicators are to serve as benchmarks for assessment and monitoring of base information for SIDS. Each country or state’s data is broken down into four categories general, economic, social, and environmental. Each of these categories has indicators that are intended to cover needed areas applicable to the categories.

The U.N. article was chosen to be included in this study because it provided a perspective from an international body, on the particular issues of small island developing states. One of the significant milestones in helping SIDS become more sustainable was the Programme of Action for the Sustainable Development of Small Island Developing States. The pocketbook that was created by the U.N. serves as a way to quantitatively determine development status of SIDS. This was important to include due to the fact that the U.N. has influence on nations and by reviewing what the U.N. deems adequate will provide an understanding of what areas are covered and what may need to be changed.

The study *2005 Environmental Sustainability Index, Benchmarking National Environmental Stewardship* was created by the Yale Center for Environmental Law and Policy, and the Center for International Earth Science Information Network, Columbia University. “The Environmental Sustainability Index (ESI) benchmarks the ability of nations to protect the environment over the next several decades.” The index consists of 21 indicators that fall into five broad categories; environmental systems, reducing environmental stress, reducing human vulnerability to environmental stress, societal and institutional capacity to respond to environmental challenges, and global stewardship.

This evaluation provides a more analytical approach for environmentally based decision making. The higher the ESI score the better the country is positioned to “maintain favorable environmental conditions into the future”. One of the results of the ESI is that it benchmarks nations and allows different issues particular to a country to be evident.

The ESI study was included because it provided a similar perspective as the one in this study. The ESI study provides an example of the breakdown of different areas or “components” which are broken down into “indicators” and then into “variables”. The different variables show what is considered important for sustainability measurement in the ESI and provides some information that was adopted for use in this study. What stood out in the ESI study opposed to others was that it sought to include national tracking information, pollution control data, and natural resource management information. The dimensions in the ESI study cover more aspects on the management side than other studies. The importance of management evaluation was noted in the literature review as a key area to consider in sustainability analysis.

#### **4.0 Critique of Frameworks**

It is evident that a specific framework has not been developed that is beneficial and applicable worldwide or even just for SIDS. The enormous amount of literature on the subject serves to support this concept as researchers everywhere debate what the best way to evaluate sustainability globally, regionally, nationally, and locally. Based on a literature review of SIDS, sustainability, tourism, the environment, and frameworks certain indicators for evaluation tools and criteria that is needed for an ‘optimal framework’ was found.



Criteria on which the six frameworks were evaluated by were:

- Geographic Applicability
- Local Applicability
- Balance of Quantitative & Qualitative Information
- Sustainability Scale
- Capture System Dynamics
- Adaptability
- Time Horizons
- Balance of Social, Environmental, and Economic Indicators
- Use Ability
- Captures Tourism Interaction
- Overall Nation Sustainability

The analysis of the six frameworks follows on the next page.

**Table 4. Framework Evaluation Matrix**

Criteria	Harger and Meyer, 1996	Macbeth and Northcote, 2006	Ko,2005	Gossling, et al. 2002	UN, 2003	Esty, 2005
Geographic Applicability	◆◆	◆	◆◆	◆◆◆	◆◆◆	◆
Local Applicability	◆◆	◆◆◆	◆◆◆	◆◆◆	◆◆◆	◆◆
Balance of Quantitative & Qualitative Information	◆◆		◆◆◆			◆◆
Sustainability Scale			◆			
Capture System Dynamics	◆◆	◆◆	◆◆		◆◆	◆
Adaptability	◆	◆◆◆	◆◆	◆◆	◆	◆
Time Horizons		◆◆				
Balance of Social, Environmental, and Economic Indicators	◆◆	◆◆◆	◆		◆	
Use Ability		◆◆◆		◆◆◆	◆◆	
Captures Tourism Interaction	◆	◆◆◆	◆◆◆	◆◆		
Overall Nation Sustainability			◆		◆	◆

Key	
Blank	Does not satisfy criteria
◆	Low support of criteria
◆◆	Medium (satisfactory) support of criteria
◆◆◆	Good support of criteria

**Table 5. Framework Evaluation Matrix, Highlighted Strong and Weak Aspects**

Criteria	Harger and Meyer, 1996	Macbeth and Northcote, 2006	Ko,2005	Gossling, et al. 2002	UN, 2003	Esty, 2005
Geographic Applicability	♦♦	♦	♦♦	♦♦♦	♦♦♦	♦
Local Applicability	♦♦	♦♦♦	♦♦♦	♦♦♦	♦♦♦	♦♦
Balance of Quantitative & Qualitative Information	♦♦	♦	♦♦♦	♦	♦	♦♦
Sustainability Scale	♦	♦	♦	♦	♦	♦
Capture System Dynamics	♦♦	♦♦	♦♦	♦	♦♦	♦
Adaptability	♦	♦♦♦	♦♦	♦♦	♦	♦
Time Horizons	♦	♦♦	♦	♦	♦	♦
Balance of Social, Environmental, and Economic Indicators	♦♦	♦♦♦	♦	♦	♦	♦
Use Ability	♦	♦♦♦	♦	♦♦♦	♦♦	♦
Captures Tourism Interaction	♦	♦♦♦	♦♦♦	♦♦	♦	♦
Overall Nation Sustainability	♦	♦	♦	♦	♦	♦

Key	
Green Highlight	Strong fulfillment of criteria
Yellow Highlight	Adequate fulfillment of criteria
Red Highlight	Poor/Weak fulfillment of criteria

Based on the critique of the six frameworks it is evident that there are key areas where there is poor or just adequate fulfillment of the criteria. The frameworks fail to provide adequate coverage of both qualitative and quantitative data. It is important that both types of data are present so that some of the attributes that are not quantifiable are included in the evaluation of sustainability. Another data concern was that the frameworks did little to try and capture the system dynamics of the particular area of evaluation. This relates to the corresponding poor consideration for a balance of environmental, economic, and social indicators. Many of the studies stress the importance of one area over another. As noted in the literature review, tourism is an important aspect in the development and operation of sustainability in SIDS. The frameworks provide a limited inclusion of tourism interaction with other sustainable principles. For the most part the studies also lacked geographic applicability to nations with various conditions, which also limits the adaptability of the framework for other nations. Lastly, the frameworks fail to provide a sustainability scale and time horizons for tracking the changes and the progress towards a sustainable nation. One of the positive findings of the critique is that the frameworks did have good local applicability for the particular region or nation that was reviewed.

#### **4.1 New Framework Development**

Given that a framework for analysis needs to consider multiple dimensions of sustainability dimensions are stressed in the analysis pertaining to tourism and its relationship towards sustainability. Particular areas that tourism affects are; energy, solid wastes, water resources, and the environment. These four areas are included as a focus

due to the fact that they are the resources that tourism can stress within communities. Therefore, they are reviewed more stringently within the development of a sustainability framework.

There are many frameworks and indices that have been created for sustainable development programs. Frameworks have been developed that outline the general concept of what sustainable development is. However, tourism has failed to be included in many of the frameworks. Currently, many designs for tourism and sustainability relate to how tourism can be managed in order to be sustainable in its own context (discusses further in the tourism review). What is important is that tourism relates to sustainability on a greater scale, and significantly affects the dynamics that many have identified in previous frameworks.

Mog (2004) discussed six main criteria that are important when evaluating sustainable development programs. This criterion is beneficial in knowing how to compare established frameworks. Harger (1996) also presents six topics that need to be considered when developing a framework (table 6). Both Mog and Harger identify criteria that are pertinent in order to insure that frameworks are effective and feasible.

**Table 6. Process-oriented criteria for evaluating the approach of sustainable development programs**

1.) Character of participation
2.) Success and nature of institution- and capacity-building efforts
3.) Diversity, multiplicity and adaptability of ideas promoted by the program
4.) Accounting for heterogeneity, diversity and dynamism
5.) Understanding and use of local knowledge, skills, initiative and constraints
6.) Recognizing the influence of external conditions, markets and policies
Source: Mog, 2004.

Mog (2004) presents other criteria for evaluating sustainable rural development projects (table 7). In the Article he discusses his criteria as a framework for rural development projects. However, the information simply identifies different areas of importance within economic, socio-political, and ecological dimensions. There is value in Mog's outline, as it identifies key topics within the different dimensions.

**Table 7. Outcome-oriented criteria for evaluating sustainable rural development projects**

<i>Economic</i>
- Reduce inequality- improve intra- and inter-temporal wealth, land and benefit distribution with regard to age, gender, ethnicity, geography, economic class, and social position
-Reduce poverty- quantitatively and qualitatively enhance income, employment, productivity, food security, and livelihood opportunities while reducing involuntary landlessness
-Increase security of land tenure- to encourage long-term investments in the health and productivity of land
-Increase access to credit- for the poor and small landholders, especially targeted to encourage long-term investments and conservation of natural resources
-Reduce dependency on external farm inputs- particularly expensive, inorganic, and non-indigenous inputs
- Diversify farm operations and livelihood strategies- to reduce risk and increase resilience
-Increase access to efficiently functioning markets and market information
<i>Socio-Political</i>
-Cultural acceptability- of the project's goals and methods, as well as the changes, technologies and policies promoted.
-Policy Support- promote policies favorable to project's goals or tailor interventions to work within existing policy structure
-Facilitate learning and knowledge sharing- to empower individuals and communities, e.g., through extension, farmer-to-farmer exchanges, participatory experimentation, school programs, technical assistance, etc.
-Institutional flexibility/adaptability- to ensure resilience and continued relevance both within the program itself and among the organizations it helps create or strengthen

**Table 7. Outcome-oriented criteria for evaluating sustainable rural development projects, continued**

<i>Social, Continued</i>
-Facilitate a process of social change- to improve attitudes, values, awareness, and behaviors as they relate to the goals of sustainable development
-Minimize local growth in human population and consumption of non-renewable resources
-Organize communities and mobilize local resources- material, human, financial, institutional, political, and cultural-toward the achievement of project objectives
<i>Ecological</i>
-Maintain ecological integrity- by promoting the stability and healthy function of balanced and biodiversity (agro-) ecosystems
-Protect and/or increase biological and genetic diversity (particularly of indigenous species)-both on- and off-farm to improve nutrient cycling, soil conditions, productivity, and food security, while minimizing pests and risk overall.
-Prevent land degradation- preserve soil health and fertility, e.g. through fallowing, crop rotation, careful management of organic matter, planting of nitrogen-fixing species, and through means to minimize erosion, nutrient loss, and soil acidification or pollution
-Protect air and water quality- prevent both point source and nonpoint source pollution, e.g. by minimizing erosion, nutrient runoff, and the application of inorganic agrochemicals
Source: Mog, 2004.



Choi (2005) created sustainability indicators (table 8) for managing community tourism, many of the indicators are similar to indicators identified by Mog, yet they are still too vague to comprehend the particulars of how tourism relates/impacts sustainable development. Kernel (2005) takes established indicators one-step further in creating models for sustainable tourism enterprises (table 9). The structure of Kernel's model presents more of a systems understanding of tourism and sustainability. Kernel presents a framework for tourism enterprises that takes into account the need to reduce impacts on the environment to contribute to sustainability, rather than to make tourism sustainable within itself. Kernel does identify some key environmental issues of waste, energy, and the environment, but again at such a simple level that possible implications could be missed.

**Table 8. Top three objective indicators of each dimension**

Ranking	Economic Dimension
Economic	
1	Availability of local credit to local business
2	Employment growth in tourism
3	Percent of income leakage out of the community
Social Dimension	
1	Resident involvement in tourism industry
2	Visitor satisfaction/attitude toward TD
3	Litter/pollution
Cultural Dimension	
1	Availability of cultural site maintenance fund and resources
2	Type and amount of training given to tourism employees
3	Types of building material and décor
Ecological Dimension	
1	Air quality index
2	Amount of erosion on the natural site
3	Frequency of environmental accidents related to tourism
Political Dimension	
1	Availability and level of land zoning policy
2	Availability of air, water pollution, waste management and policy
3	Availability of development control policy
Technological Dimension	
1	Accurate data collection
2	Use of low-impact technology
3	Benchmarking
Extracted from Choi and Sirakaya 2005.	

**Table 9. A Journey towards sustainability for tourism enterprises**

	Step 1 Good House-Keeping	Step 2 Environmental Management	Step 3 Front-Runners	Step 4 Sustainability
Activity Indicators	<ul style="list-style-type: none"> <li>-Make environmental policy</li> <li>-Designate a person responsible for the environment</li> <li>-Compliance with regulations</li> <li>-Systematic recycling of waste and composting of organic waste</li> </ul>	<ul style="list-style-type: none"> <li>-Implement systematic environmental management (simple model with new targets and action plans every year) compatible with the Green Key</li> <li>-Eco-friendly maintenance of green areas</li> <li>-Develop green shopping policy</li> <li>-Offer organic food</li> </ul>	<ul style="list-style-type: none"> <li>- Implement certified environmental management system compatible with ISO or EMAS</li> <li>-Eco-friendly building and construction</li> <li>-Extended green shopping policy</li> </ul>	<ul style="list-style-type: none"> <li>-Sustainability is integrated in the vision and development plans of the enterprise</li> <li>-Making customer investigations (focus interviews)</li> </ul>
Performance Indicators	<ul style="list-style-type: none"> <li>- Review and begin to reduce use of electricity, water, heating , and disposables</li> <li>- Management of cleaning and washing</li> </ul>	<ul style="list-style-type: none"> <li>-Reduce use of electricity, water, heating, disposables, and waste</li> <li>-Review health and safety</li> <li>-Management of noise and air emissions</li> </ul>	<ul style="list-style-type: none"> <li>-Management of health and safety and indoor climate</li> <li>-Make a review of important environmental impacts</li> <li>-Management of own transport</li> <li>-Management of environment-and health-damaging substances</li> </ul>	<ul style="list-style-type: none"> <li>-Make indicators based on life cycle assessment</li> <li>-Social and ethical indicators</li> </ul>
Communication	<ul style="list-style-type: none"> <li>-Internal environmental report (green account)</li> </ul>	<ul style="list-style-type: none"> <li>-Green account, including green areas</li> <li>-Tourist information on green services, activities and public transport</li> <li>-Initiating eco-friendly behavior by tourists</li> </ul>	<ul style="list-style-type: none"> <li>-Green account, including transport</li> <li>-Health and safety account</li> <li>-Green and socio-cultural activities for tourists in the local community</li> </ul>	<ul style="list-style-type: none"> <li>-Economic, environmental and social account (triple bottom line: profit, planet, and people)</li> </ul>
Stakeholder Relations	<ul style="list-style-type: none"> <li>-Employee participation in the environmental activities</li> </ul>	<ul style="list-style-type: none"> <li>-Involvement in local networks</li> <li>-Employees have had an introduction to environmental management</li> </ul>	<ul style="list-style-type: none"> <li>-Green demands to suppliers</li> </ul>	<ul style="list-style-type: none"> <li>-Surplus on the “ethical balance” in local community</li> </ul>

Source: Kernel, 2005.

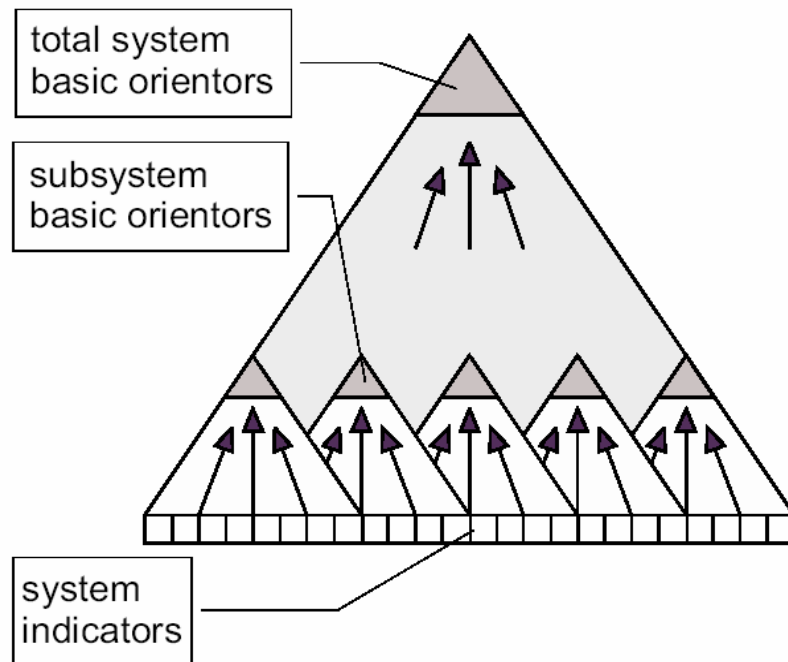
## 4.2 Indicators

Threats to sustainability require attention when/if their rate of change approach the speed when the system cannot adequately respond. When this happens researchers begin to look for ways to evaluate what is happening in their system. To do this indicators are needed to evaluate and guide policies and decisions. “An indicator is a set of statistics that can serve as a proxy or metaphor for phenomena that are not directly measurable” (Cobband 1998). Indicators provide the means for us to watch our development and when needed respond with appropriate actions. Indicators give us the capability to condense information to a set of observations to use for evaluation.

Deciding what indicators to use is a complex task. Many authors discuss processes for determining indicators for sustainable development (Bossel, 1999; Cobband, 1998; Hardi, et al., 1995; IISD, 2000). The topics range from simple economic indicators to environmental indicators and everything in between. The general consensus is that indicators need to be included that capture all of the relevant systems and all aspects. They should be comprehensive enough to encompass the system but not too large where the actual use becomes ineffective. The indicators need to inform researchers of the state of the system and what the needs, interests, and objectives are (Bossel, 1999). Figure 8 below illustrates the breakdown of deciding what indicators to use. The top triangle ‘total system basic orientors’ refers to the main system. ‘Orientors’ simply refers to orientations, guidelines, or objectives. Depending on the system at hand the orientors are things that would be included on a list as areas that would be included as minimal aspects that make up a system. The ‘subsystem basic orientors’ account for things that look into the total system areas a bit deeper. Moving down the triangle, the

orientors or indicators become more focused. Lastly, the 'systems indicators' are indicators that build up each of the areas that eventually make a whole system.

**Figure 8. System indicators leading towards system orientors**



Source: Bossel, 1999.

The Bellagio Principles provides essential elements that are needed for successful indicators. These principles state that indicators need to consider equity and disparity within current populations and between present and future generations with issues such as resource use, over consumption, poverty, and human rights. One of the most important aspects is that they consider the ecological conditions present within the system, because other systems tend to rely on it. Apart from the ecological dimension, the principles state

that indicators need to consider the economic development and other non- market activities that contribute to human and social well being. Often researchers focus on indicators that are aggregates of multiple indicators, such as GDP. These types of indicators can actually hide what problems there might be within a system

### **4.3 Optimal Framework**

Based on the meta-analysis and the analysis of the six frameworks a ‘optimal’ framework or indicator list was developed see Appendix A. The new framework was developed using the ‘best’ or ‘optimal’ indicators from the six frameworks. Table 10 provides a list of the general categories and subcategories; Appendix A provides detailed information about each Indicator area. Indicators that were not covered by any of the six frameworks but were stressed in other literature were included in the new framework and marked by author KK (2006), the author of each of the indicators can be found in Appendix B. The indicators that were included from outside resources (not one of the six frameworks) are listed in Appendix C with a listing of the sources where they were extracted. Indicators were extracted when literature either noted the need for the indicator or when an issue was discussed where the indicator could provide a means of tracking.

**Table 10. General Indicator Categories and Subcategories**

<p>Political (total number of indicators 27)</p> <ul style="list-style-type: none"> <li>-Planning/Management</li> <li>-Policy</li> <li>-Tourism</li> </ul>	<p>Ecological (total number of indicators 66)</p> <ul style="list-style-type: none"> <li>-Air</li> <li>-Water/Energy</li> <li>-Land</li> <li>-Built Up Land</li> <li>-Fauna</li> <li>-Natural Hazards</li> <li>-Tourism</li> </ul>
<p>Social (total number of indicators 46)</p> <ul style="list-style-type: none"> <li>-Tourism</li> <li>-Health</li> <li>-Education</li> <li>-Population</li> <li>-Crime</li> <li>-Miscellaneous</li> </ul>	<p>Economic (total number of indicators 33)</p> <ul style="list-style-type: none"> <li>-Employment</li> <li>-Wealth</li> <li>-Tourism</li> </ul>
<p>Cultural (total number of indicators 15)</p>	

#### **4.4 Application to the Bahamas**

After the framework was developed it was then applied to the Bahamas (see Appendix D). The idea was once the framework was applied to the Bahamas then the data that was provided would be analyzed and criteria for different levels of sustainability would be developed. However, after looking at the list of data it was evident that too little information was available to expand the framework to encompass ranges of sustainability.

## **5.0 Issues with Framework**

Concluding the evaluation of the different frameworks and the construction of the new framework it is evident that data issues are a main concern. In many of the frameworks that were evaluated data was not available for all indicators for all countries. Data available specifically for the Bahamas was limited. The main sources of data used for the Bahamas data are from the World Research Institute, and the Bahamas Ministry of the Environment, Bahamas Environment Science and Technology (BEST) Commission, and the World Bank Group. Given the variety of sources it is surprising that data just is not available for certain categories and indicators.

The lack of data that was used in this study can be a result of many things. Foremost, the data may not be published online or in books and used strictly for governmental or research purposes for the Bahamas. Another explanation of the lack of data can be that the research and monitoring in different areas is just not conducted. Therefore, if no one is researching and recording information it just is not available for further study.

Another data issue apart from the sheer lack of data is that frameworks, especially the one developed in this study, are too data dependant. It was not evident when evaluating the other frameworks that the amount of data needed to conduct the evaluation of sustainability would be such an issue, hence the large amount of indicators in the new framework. It seems that it would be difficult for anyone to review sustainability using frameworks that require so much information and therefore, so many resources. The ease of using a framework is important when designing a framework. In this study the useability of the framework was considered in the evaluation of the frameworks. What was



not considered was the amount of effort and resources it would take to use the framework. Therefore, use-ability should be expanded to include the resources needed to obtain the needed data.

There are a few recommendations to make the new framework more flexible. One idea is to restructure the framework so that it could be used or altered based on the data available for a specific location. Instead of having multiple indicators for one category, evaluate what indicator may be most representative of the particular category for a specific location and limit the required information through that process for each category. It is important to note that by changing the indicators the evaluation of sustainability may be limited in the holistic concept, yet will still provide a basic status review of sustainability for the location. Even though there is a way increase the flexibility of the framework the main concern is to make sure that needed measures are not eliminated.

Another way in which the framework could be more flexible is in looking at other structures. The new framework is a simple matrix where values are inputted. One structure that was interesting was that of the study *Conceptualizing Yield: Sustainable Tourism Management* by Macbeth and Norcote. The structure that was used in that study was a triangle. The base of the triangle is made up of general areas (tourist, financial, economic, environmental, social, and cultural). The second level is the expected returns from the base level, and the next (3<sup>rd</sup>) is the level that the system needs to be sustainable. The fourth level is the potential level, or the “maximum permissible conditions that will be allowed in a specific opportunity class.” The pinnacle of the pyramid is the integrated yield dimension, which are the acceptable limits for sustainability. The complexity of the

new framework would be difficult to work into the triangle structure as described above. However, the integrated structure may prove to be useful and easier to use for all locations.

## **5.1 Policy Implications**

The policy implications of this study on the issues of sustainability in small island developing states and the particular issues of tourism span a range of disciplines and stakeholders. Based on the findings the main parties interested in improving the sustainability of SIDS are the local governments, country governments, other SIDS, the tourist industry, and the local citizens. There are incentives for the local government to put more resources towards the evaluation of and development of sustainable practices. Efforts could first be focused on the tourism industry and creating regulations and programs to educate local citizens to employ them in the workforce, improving efficiency and effectiveness of waste programs, energy programs, and water programs, and land use. By focusing efforts towards the tourism sector initially areas of substantial impact could be addressed. When more resources became available the local and country governments can evaluate more aspects of sustainability such as the developed infrastructure of water resources, road systems, energy production, etc.

It is anticipated that although there are global discussions on the sustainability of SIDS that significant change will not take place until there are regulations and policies in place that are more forceful for sustainable development. Also, as noted in this report, many SIDS may be reluctant to enact serious policies that may hinder the industry on which they rely. Therefore, another stakeholder that would be interested in increasing the

sustainability of a locality would be multiple industries that have to do with or rely on tourism (hotels, resorts, airlines, energy companies, water companies, local businesses, etc). It seems that the tourist industry has a large stake in the pristine condition of the locality. Beautiful landscapes and pristine beaches are typical conditions that a tourist seeks out to pick their destination. If these environments deteriorate then tourists will pick other locations. Therefore, it is of the tourist industry best interest to ensure that the destination is in the best condition as to continue to entice visitors. Considering that many of the funds for resorts comes from international finances they may not be aware of the large role that the industry plays in the local livelihood. If the international tourism parties were involved in sustainability discussions and made aware of their role as contributors and potential modifiers they may be surprisingly supportive in sustainability efforts.

The tourism industry has multiple ways that it can become more sustainable. Environmental management systems and ISO standards are available to better operations within different facilities. Corporate Social Responsibility (CSR) is a growing concept that the tourism industry can adopt to better its practices for the environment and provides means in which the industry can promote better operations. Another tool that the industry can use is the life cycle analysis tool, which can be employed to evaluate the life cycle and environmental impacts of different operations or product development. Along the same lights design for the environment (DfE) can be utilized to design resort accommodations and amenities to be environmentally friendly. It is unlikely that the tourism industry will see the benefits of voluntary initiatives to become more 'sustainable' or more 'eco-friendly'. Therefore, regulations should be created locally,

nationally, globally to require that businesses ensure that their operations are not causing negative impacts to the local society and environment.

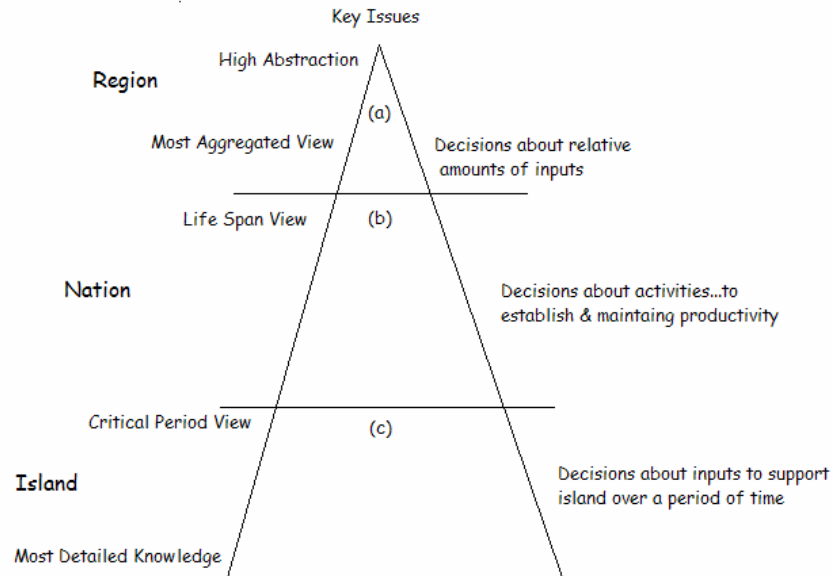
It is anticipated that while regulations may be laborious to enact this step could spur technological innovation by the tourism industry to focus on sustainable practices. Long-term objectives can often promote the development and adoption of new technologies. There are incentives for industry to voluntarily enact sustainable practices. First, if a particular company is maintaining the environment (which tourist's destination choices heavily depend on) they may bring in more business. If tourist numbers drop if the environmental/societal conditions diminish then it is of the company's best interest to manage the resources that it has. Also, negative publicity does not entice visitors...protecting the resources can promote environmentally friendly destinations. Secondly, it makes sense that the tourism industry would want to enact sustainable practices before certain standards become mandatory. Once policies are in place then companies will be reviewed and costs/fines could be incurred if they are found to be non-compliant. Particular governments have the incentive to develop sustainable policies; this would provide the nations with some enforcement power to demand the care of resources. If governments do nothing it is expected that over time the natural environment would diminish and the locality would no longer be able to support tourism. Then the natural resources would be diminished and the source of the localities livelihood would be gone, leaving the area with limited options for development.

Action should be taken quickly to promote initiatives by the industry and governments to move operations towards being sustainable. As noted in the tourism discussion the growth of the tourist industry is steadily rising. Tourism will continue to

grow and travels to warmer countries will receive much of the influx. The majority of these warm countries are small island developing states. Therefore, to ensure that SIDS fragile dynamics are not increasingly harmed regulations and policy towards developing standards of sustainability should be hastily applied. One idea for sustainability standards would be to develop them globally. These global standards could be cluster specific depending on the particular dynamics of nations.

One contribution of this study was the identification of the strong importance of planning and policy development at different levels. Figure 9 illustrates the concept that decisions need to be made at all levels in order to correctly identify and solve key issues. Abstraction at higher level requires integration at lower level, implying a reduction of details and progression towards an aggregated view. Island regions have a critical view within a period of time. The information that the Island needs to make decisions are very detailed and requires decisions about specific inputs to support the island in a period of time. Nations have a greater period of time to manage for and require decisions in a life span view about programs and activities to maintain status. Lastly, Regions require decisions to be made at the highest abstraction, with the most aggregated view. Just as the Triangle illustrates in figure 9, the issues that each area (region, nation, island) face are different. By the time issues make their way to a regional level they tend to be more aggregated and less detailed. Therefore, in decision making decision makers and/or planners should be present at each level to ensure that the correct and most important information is passed on.

**Figure 9. Regional, National, and Island Decision Triangle**



## 5.2 Community Involvement

Important outcomes of this research is the acknowledgement, and in some cases reiteration of the large importance that communities play in sustainable development. Communities need to be involved at various aspects during development regardless if sustainability is the goal at hand. When data dependence becomes a concern often locals can provide the knowledge of the topic so that aspect may be understood. Also, many times evaluations take place and the locals are not involved in the decision making which influences their livelihood in numerous ways. Also, locals provide a great resource or knowledge base of an area. Often times they know key issues and problems and have a concept of what causes and potential solutions are.

It is important to have someone local involved in the decision making and review process. Many times bias can occur and decisions may favor economies or lean towards

political favors. Local people may also have a bias but they present very important concerns and can help prevent development and decision making from becoming detrimental to their livelihood, culture, and aspirations. Five main indicators that were selected for the new framework represent how important it is for communities to be involved in all aspects of sustainable development. The indicators are present below with the corresponding amount of studies that speak to the importance of community participation in the development process (see also Appendix C).

Key 'community involvement' indicators:

- PL 2: Local resident participation in the planning process (16 studies)
- PL3: Stakeholder Collaboration (13 studies)
- SC1: Host communities satisfaction towards tourism development (8 studies)
- SC2: Host communities attitude towards tourism development (7 studies)
- SC3: Resident involvement in tourism industry (8 studies)

It is known that reaching a decision where all parties get everything they want in a project or program is a difficult process, and may not necessarily be accomplished all of the time. However, the important aspect to remember is that sometimes decisions are made where everyone is content with the outcome. Some of the particular stakeholders desires may or may not have been included, but for the most part had at least been taken into account during the planning process. When everyone participates in developing a solution sometimes the most feasible and most comprehensive solution can be the one where a little bit of everything is considered. At least if as many stakeholders as possible can participate in the process then the best solution can be developed, which is integral in trying to develop sustainable development.

## 6.0 Conclusion

### Country Snapshot: East Sussex, UK

Agenda 21 created by the United Nations in 1992 identified travel and tourism as an industry that could positively contribute to a better planet. The planning department of East Sussex County Council commissioned a study highlighting three themes of tourism and sustainability. The study involved focus groups in three towns of varying types of tourism (market towns, seaside resorts, and villages). The types of attractions in East Sussex include: historic attractions, modern leisure facilities, country houses and gardens, fun parks, zoos, castles religious foundations, sports facilities, theatres, and shopping centers.

The three themes that were identified from the focus groups were; (1) How is sustainability understood by small businesses in tourism, (2) How concepts can be made into workable practices, and (3) Major barriers to implementing sustainable tourism. Research on the first theme found that there was concern about the term “sustainable”, and the groups could not identify what was “sustainable”. The groups recognized that a good environment is essential to preserve tourism. They also thought that negative impacts could be avoided/ diminished if people were managed better to stay in one area for a longer period of time rather than traveling around to multiple locations. Small business owners also noted that many of the areas have reached capacity and if visitors increase then the damage to the local area is going to increase as well.

Research on the second theme found that the focus groups thought that sustainability equals accessibility. Accessibility means improving roads and public transport and managing where tours are allowed to go. The groups also thought that better marketing could disperse tourists to other locations and reduce stress in one particular area. Particular fragile areas would not be advertised to allow for “healing”. One highlight of the focus group was the identification of the need for education for businesses and children on sustainability and the actions they can take to protect/ reduce impacts in their areas. Another suggestion was for destinations to only sell local products and produce which would provide incentives for locals to produce products and increase the economy of the area. Regarding energy and wastes the focus groups thought that they already did their best to conserve the amount of energy and recycle. They were skeptical as to how much recycling really decreases the amount of resources use.

Barriers were identified to sustainable tourism by the focus groups. The groups thought that the role of the public sector in the administration and legislation of sustainable policies was a main concern. They were also concerned with who would be responsible for the costs of environmental initiatives. They felt that by having administration of policies local would increase their effectiveness, decision makers for the country are too far away and thus too far removed. It was important to the groups to use legal forces that are in place to initiate change before new control measures were implemented. If current legal forces are not enough then more stringent penalties would be enforced for environmental damage.

Source: Berry, S. and Ladkin, A. (1997)



The framework has some defective areas but also parts that serve a purpose. The negative aspects of the framework include data dependence, breakdown of framework, and asking too much from the user. The framework requires a large amount of input from the user and can require more original research and/or difficult research trying to obtain the data necessary. Quantitative and qualitative data is more than often limited or unavailable in SIDS, serving as a major barrier to evaluating the sustainability of the area. Also, the framework breaks down due to the lack of an absolute measure of sustainability. Most areas do not know what their base resource is, in other words, what amount of a resource is available or was originally available before use began. This makes evaluating if the current use on resources is reasonable.

On the positive side the framework helps communities, businesses, and governments realize areas of concern by presenting a systems perspective. Breaking down different areas broken down into social, ecological, economic, political, and cultural helps to realize the interdependence within the different areas. Also, the framework can show relative relationships within one area or across multiple areas. However, the strength of the relationships is dependant on the quantity and quality of data. The framework can also be used to help structure data collection by allowing the person conducting the evaluation an inventory structure to determine what data is available and what data gaps need to be filled in.

The principles of sustainable development in Small Island Developing States should be comprehensive in order to provide a stable community that can then foster the development of tourism. It seems possible that these principles would be beneficial to any developing country that has high degrees of tourism development. Therefore, general

conclusions can be made. Development should contribute to basic needs of the community (social, economical, ecological). Development should reduce absolute poverty and inequality, and should provide means for local people to gain the ability to 'free' themselves from social servitude. Possibly the most important principle should be that development must benefit local, regional, and national economic growth.

As stated elsewhere in this paper, sustainable development requires a multi-disciplinary approach in order to make substantial positive changes. Sustainable issues in SIDS spread across a range of disciplines, economics, environment, social factors, tourism, and policy. The problems lay in the fundamental structure on which the SIDS communities depend, the international tourism system. The national governments have economic priorities that are met through foreign investments for tourism. Until the priorities of the national government change, a sustainable community cannot be developed.

Many SIDS and other developing countries do not have alternatives to tourism to fund programs and to provide the number of jobs needed. It seems that many SIDS are operating in the short-term and not finding long-term alternatives to maintain and then improve the quality of life within their nations. Without having apparent alternatives to tourism the governments have little other choice than to continue operations as is, even though it does not support sustainable development. Essentially, without other means of foreign investment developing countries will likely support any industry regardless if they are sustainable or not.

Developing nations need to develop their own approaches to tourism, and sustainable development. Recommendation can come from other nations, but it is

important to remember that local socio-economic, political, and environmental conditions determine the best approach. One approach for all nations and/or all SIDS may not be feasible. Local bodies have a better connection with local conditions and can better identify issues or problems than a central authority. The central authority may have better means to implement regulations, policies, etc. Therefore, the best measure seems to be a working group for the whole nation with representatives from different levels of the country. This way, local and national perspectives are considered and the best options for sustainable development can be implemented.

In retrospect it is interesting to look at the attempt to make one framework work for sustainable development and be applicable to all nations. It truly is a futile effort. The efforts however, should be applied towards identifying the different social, political, economical, cultural, and environmental dynamics of each nation, then determining the path towards sustainability. It seems that a significant change, potentially a significant social change may have to take place for SIDS to become 'Sustainable'.

## **Acknowledgements**

I personally would like to thank you for taking the time to read this paper. It is my hope that the reader will take away key understandings of SIDS and the impacts of tourism. It does take time, effort, and money to be a conscious traveler, likely the enjoyment that you will have in being conscientious will be greater than your efforts. I would like to thank my advisor Dr. James Winebrake and other committee members M. Ann Howard, J.D. and Dr. Lei Lani Stelle for their help and patients during the development of this paper. Great thanks go to my partner Christopher Robinson. Through his dedication and support enabled me to finish this paper. Lastly, appreciation goes out to my parents Roger and Sharon Kimmel, for without their role modeling, support and generosity I would not have the broad perceptions of life that I do today.

## Selected References

- Adriaens, P. et al. (2003) Intelligent infrastructure for sustainable potable water: a roundtable for emerging transnational research and technology development needs. *Biotechnology Advances*. 22, 119-134.
- Abeyratne, Ruwantissa I.R. (1999) Management of the environmental impact of tourism and air transport on small island developing states. *Journal of Air Transport Management*, 5 p.31-37.
- Aguilio, E., et al. (2005) The persistence of the sun and sand tourism model. *Tourism Management*, 26 p.219-231.
- Ahn, B.Y., et al. (2002) Operationalizing sustainability in regional tourism planning: an application of the limits of acceptable change framework. *Tourism Management*, 23 p. 1-15.
- Ashe, John W. (2005). Tourism investment as a tool for development and poverty reduction: The experience in small island developing states (SIDS). *The Commonwealth Finance Ministers Meeting*, Sept. 2005.
- Azar, C. et al. (1996) Socio-ecological indicators for sustainability. *Ecological Economics*. 18, 89-112.
- Beedasy, J. and Duncan, W. (1999). Diverting the tourists: a spatial decision-support system for tourism planning on a developing island. *JAG*. 1, 163-174.
- Berry, Sue and Ladkin, Adele. (1997) Sustainable tourism: a regional perspective. *Tourism Management*, 18 p. 433-440.

- Bahamas Environment Science and Technology Commission (BEST). (2005) National Environmental Management Action Plan. August.
- Bossel, Hartmut. (1999) Indicators for Sustainable Development: Theory, Method, Applications, A Report to the Balaton Group. *International Institute for Sustainable Development*.
- Briassoulis, Helen. ( 2002 ) Sustainable Tourism and the Question of the Commons. *Annals of Tourism Research*, 29 p.1065-1085.
- Briguglio, Lino. (1995) Small Island Developing States and Their Economic Vulnerabilities. *World Development*, 23 p.1615-1632.
- Buchan, Kenneth C. (2000) The Bahamas. *Marine Pollution Bulletin*, 41 p.94-111.
- Budeanu, Adriana. (2005) Impacts and responsibilities for sustainable tourism: a tour operator's perspective. *Journal of Cleaner Production*, 13 p. 89-97.
- Burak, S, et al. (2004). Impact of urbanization and tourism on costal environment. *Ocean and Coastal Management*, p 1-13.
- Byrne, J. et al. (2005). Island Bellwether: Climate Change and Energy Policy Strategy for Small Island Developing States. Prepared for International meeting for the ten year review of the Barbados Programme of Action.
- Carew, J. L. and Mylroie, J. E. (1991). The Pleistocene and Holocene Stratigraphy of San Salvador Island, Bahamas, with Reference to Marine and Terrestrial Lithofacies at French Bay. *Guidebook for Geological Society of America* ,11-61.
- Choi, H.C., Sirakaya, E. (2005). Sustainability Indicators for Managing Community Tourism. *Tourism Management*. Pg.1-16.

- Cocklin, C. and Blunden, G. (1998) Sustainability, Water Resources and Regulation. *Geoforum*. 29, 51-68.
- Davis, D., and Gartside, D.F. (2001) Challenges for economic policy in sustainable management of marine natural resources. *Ecological Economics*. 36,223-236.
- Dudley, E. (1993) *The critical villager: Beyond community participation*. London: Routledge, Pg. 165.
- Duic, N., et al. (2003). Potential of Kyoto Protocol Clean Development Mechanism in transfer of clean energy technologies to Small Island Developing States: case study of Cape Verde. *Renewable and Sustainable Energy Reviews*, 7,83-98.
- Duim, R., and Caalders. J. (2002) Biodiversity and Tourism Impacts and Interventions. *Annals of Tourism Research*. 29, 743-761.
- Esty, Daniel., et. al. (2005) Environmental Sustainability Index, Benchmarking National Environmental Stewardship Yale Center for Environmental Law and Policy.
- Frei, C.W., et al. (2003) Dynamic formulation of a top-down and bottom-up merging energy policy model. *Energy Policy*. 31, 1017-1031.
- Fyall, Alan., Garrod, Brian. (1998). Beyond the rhetoric of sustainable tourism? *Tourism Management*, 19,p.199-212.
- Gibson, J. et al. (1998) Coral reef management in Belize: an approach through Integrated Coastal Zone Management. *Ocean & Coastal Management*. 39, 229-244.
- Gossling, Stefan, et.al. (2002) Ecological Footprint Analysis as a Tool to Assess Tourism Sustainability. *Ecological Economics* 43, 119-211.

- Gossling, Stefan. (2002) Human-Environmental Relations with Tourism. *Annals of Tourism Research*. 29, 539-556.
- Gossling, S. (2001). The consequences of tourism for sustainable water use on a tropical island- Zanzibar, Tanzania. *Journal of Environmental Management*, 61,179-191.
- Green, M.G., Schwarz,D. (2001). Extracting Drinking Water from Salt Water: An overview of Desalination options for developing countries. *gtz-gate*. p. 1-6.
- Harger, J.F.M, Meyer, F.M. (1996). Definition of Indicators for Environmentally Sustainable Development. *Chemosphere*, 33, 1749-1775.
- Inglis,G., Roupael , A. (1997) Impacts of Recreational SCUBA Diving at Sites with Different Reef Topographies. *Biological Conservation*,82. p.329-336.
- Inniss, Sean. (2002) Concerns over Exuma Dredging. The Nassau Guardian, Aug.27. Available at: <http://www.bahamasb2b.com/news/index.php>
- International Union for Conservation of Nature and Natural Resources (IUCN). (1995) A sustainable world: Defining and measuring sustainable development, p 152-174
- Jefferson, Michael. (2006). Sustainable energy development: performance and prospects. *Renewable Energy*. 31, 571-582.
- Jenson, T.L. (2000). Unique worldwide overview of renewable energy on small islands. *Forum for Energy Development*, p.1-5.
- Kent, M. et al. (2002). Tourism and sustainable water supply in Mallorca: a geographical analysis. *Applied Geography*. 22, 351-374.
- Kernel, Pernille. (2005). Creating and Implementing a model for Sustainable Development in Tourism Enterprises. *Journal of Cleaner Production*, 13,151–164.



- Ko, Tae Gyou. (2005). Development of a tourism sustainability assessment procedure: a conceptual approach. *Tourism Management*, p.431-445
- Lee, Kian Foh. (2001). Sustainable tourism destinations: the importance of cleaner production. *Journal of Cleaner Production*, 9, p. 313-323.
- Lehtonen, M. (2004). The environmental-social interface of sustainable development: capabilities, social capital, institutions. *Ecological Economics*. 49, 199-214.
- Lim, C. and McAleer, M. (2005) Ecologically Sustainable *Tourism Management. Environmental Modelling & Software*, 20 1431-1438.
- Machbeth, J. and Northcote, J. (2005). Conceptualizing Yield: Sustainable Tourism Management. *Annals of Tourism Research* 33, 199-220.
- Mog, Justin.M. (2004). Struggling with Sustainability- a Comparative Framework for Evaluating Sustainable Development Programs. *World Development*, 32, p. 2139-2160.
- Myroie, J.E., Carew,J.L. (1995). Karst development on Carbonate Islands. *The Virtual Scientific Journal*. p.116-134.
- Patterson, T., et al. (2004). Integrating environmental, social and economic systems: a dynamic model of tourism in Dominica. *Ecological Modeling*, 175, p.121–36.
- Prescott-Allen, R. (1997). Barometer of sustainability: Measuring and communicating well being and sustainable development. Found in IUCN Tools and Training Series.
- Tosun, Cevat. (2001). Challenges of sustainable tourism development in the developing world: the case of Turkey. *Tourism Management*, 22, p.289-303.

United Nations, Economic and Social Council. (1998). Progress in the implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Sixth Session. E/CN.17/1998/7/Add.2

United Nations, (2003). World Statistics Pocketbook SIDS U.N. Series  
V.No. 24/SIDS

Weisser, Daniel. (2004). Power sector reform in small island developing states: what role for renewable energy technologies? *Renewable and Sustainable Energy Reviews* ,  
8,101-127

WTO. (2000). Tourism Highlights. Available from: [http:// www.world-tourism.org/  
market\\_research/facts&figures/menu.htm](http://www.world-tourism.org/market_research/facts&figures/menu.htm).

WWF- UK. (2002). Holiday Foot printing: A practical tool for responsible tourism.  
WWF-UK.

**APPENDIX A**  
New Framework/ Indicators

<b><i>Cultural</i></b>	
CL1	Building Materials (local)
CL 2	Décor
CL 3	Number of Official sites
CL 4	Retention of Customs
CL 5	Shift in Cultural Pride
CL 6	% Satisfied with cultural integrity
CL 7	Loss of authenticity
CL 8	Type & amount of training given to tourism employment
CL 9	Type of information given to tourists
CL 10	Artistic Value
CL 11	Heritage Value
CL 12	Iconic Value
CL 13	Lifestyle Value
CL 14	Multicultural Value
CL 15	Ritual Value

<b><i>Ecological</i></b>	
<i>Air</i>	
EC1	# of good air quality days
EC2	Urban Population weighted NO <sub>2</sub> , SO <sub>2</sub> , and TSP Concentration
EC3	Indoor Air Pollution From Solid Fuel Use
EC4	Indoor Air Pollution From Solid Fuel Use
EC5	Anthropogenic Nox, SO <sub>2</sub> , VOC emissions per populated land area
EC6	Carbon emission per capita
<i>Water/Energy</i>	
EC7	Water Quality
EC8	Water Quantity
EC9	Freshwater Availability per capita
EC10	Internal groundwater availability per capita
EC11	Precipitation
EC12	Water quality monitoring and management
EC13	Percentage of country under severe water stress
EC14	Per capita water/energy consumption data
EC15	Commercial Energy Production
EC16	Hydropower and renewable energy production as a % of energy consumption
<i>Land</i>	
EC17	Amount of Coastline
EC18	Forest Area
EC19	Amount of eroding coastline
EC20	Amount of nourished beaches
EC21	Volume of dredged material
EC22	Amount of Coastal armoring
EC23	Cliff erosion index
EC24	Availability, size, condition of urban forest
EC25	Timber growth removal

**APPENDIX A**  
**New Framework/ Indicators: Ecological Continued**

EC26	Annual average forest cover change
EC27	% of Wetlands
EC28	Amount of altered seafloor / Reef Damage
<i>Built Up Land</i>	
EC29	Amount of Roads
EC30	Amount of Airports
EC31	Amount of Accommodation
EC32	Amount of Activities
EC33	Amount of Sea Space (fishing area)
<i>Fauna</i>	
EC34	Resilience indicators (Biodiversity; spatial patchiness, etc.)
EC35	% Territory in threatened ecoregions
EC36	% of bird species threatened
EC37	% of mammal species threatened
EC38	% of fish, amphibian, and reptile species threatened
EC39	Fisheries Utilization
<i>Natural Hazards</i>	
EC40	Generation of Hazardous Waste
EC41	Frequency of environmental accidents related to tourism
EC42	Ave. # of deaths per million inhabitants from floods, cyclones, and droughts
EC43	Ave. # of deaths per million inhabitants from floods, cyclones, and droughts
EC44	Waste Recycling Rates
EC45	Waste management strategies
EC46	Number of Sewage Treatment Systems
EC47	Import of pollution goods and raw materials as % of total imports
<i>Management</i>	
EC48	Restoration
EC49	Land use guidelines
EC50	Level of protection (parks, species, etc)
EC51	% Environmentally managed
EC52	Formal control over development sites & use densities
EC53	# of ISO 14001 certified companies
<i>Tourism</i>	
EC54	Number of cars
EC55	Vehicles in use per populated area
EC56	Number of registered recreational vessels
EC57	Number of divers per location
EC58	Number of visitors to beach
EC59	Number of Hotel/ Tourist developments
EC60	Number of Upgraded tourist destinations
EC61	Site attractivity
EC62	Annual Influx
EC63	Seasonality
EC64	Length of Stay
EC65	Mode of Stay
EC66	Density

<i>Economic</i>	
<i>Employment</i>	
EN 1	General Employment
EN 2	Employment in tourism
EN 3	Unemployment Rate
EN 4	Economically Active Population
<i>Wealth</i>	
EN 5	GDP
EN6	Growth Rate of GDP
EN 7	Balance of Payments
EN 8	Economic Activity Rate
EN 9	Consumer Price Index
EN 10	Purchasing Power Parody
EN 11	External Aid and Technology Transfer
EN 12	Military Considerations
EN 13	Inflation
EN 14	State Revenue (tax)
EN 15	Staff
EN 16	Administration
EN 17	Facilities
<i>Tourism</i>	
EN 18	% income leakage from community
EN 19	Tourism % of the local economy
EN 20	% foreign ownership
EN 21	% of profit reinvested in community development
EN 22	Availability of local credit to local business
EN 23	% of profit reinvested in natural/cultural area
EN 24	Internal/external ownership of business
EN 25	Comparative ratio of wages in tourism sector to local wage
EN 26	Existence of fee structure (tourist vs. local)
EN 27	Tourism \$ to infrastructure
EN 28	Primary Energy Production
EN 29	Industrial Production
EN 30	Agricultural Production Index
EN 31	Food Production Index
EN 32	Major Export and Import Trading Partners
EN 33	Exchange Rate

<b><i>Political</i></b>	
<i>Planning/ Management</i>	
PL 1	Incorporate & implementation of local idea in community/ site management
PL 2	Local resident participation in planning process
PL 3	Stakeholder collaboration
PL 4	Level of cooperation among stakeholder groups
PL 5	Building permits issued
PL 6	Attitude of local political NGO leaders toward development and conservation
PL 7	Availability of funding resources
PL 8	Low impact technology
PL 9	Benchmarking
PL 10	Participation in Int'l Environmental Agreements
PL 11	Conservation/ development support at national level
PL 12	# Of memberships in environment intergovernmental organizations
PL 13	Local environmental NGO's
PL 14	Democracy Measure
PL 15	Government effectiveness
PL 16	Rule of law
PL 17	Civil and Political Liberties
PL 18	Government education expenditures
<i>Policy</i>	
PL 19	Available/developing control policy
PL 20	Availability of air, water pollution, waste management & policy
PL 21	Availability and level of land zoning policy
PL 22	National economic policy priorities
PL 23	Financial and fiscal policy
PL 24	Knowledge creation in environmental science, technology, and policy
<i>Tourism</i>	
PL 25	Tourism authority/ planner in local community
PL 26	Tourism related master plan
PL 27	Tourism inclusion in planning process
<b><i>Social</i></b>	
<i>Tourism</i>	
SC1	Host community satisfaction toward tourism development
SC2	Host community attitude toward tourism development
SC3	Resident involvement in tourism industry
SC4	Continue of trade activities by local residents
SC5	Change in social cohesion
SC6	Change in family cohesion
SC7	Change in community structure
SC8	Tourist satisfaction/attitude toward tourism development
SC9	Degradation/erosion of natural/cultural resource
SC10	% Of managerial employment from local residents
SC11	Citizen's awareness in environment
SC12	Public awareness toward value of tourism
SC13	Community Engagement

**APPENDIX A**  
**New Framework/ Indicators: Social Continued**

<i>Health</i>	
SC14	Health care
SC15	Life expectancy at birth
SC16	Infant mortality rate
SC17	Total fertility rate
SC18	Death rate from intestinal disease
SC19	Child Death rate from respiratory diseases
SC20	Children under 5 mortality rate
SC21	% Of undernourished in total population
SC22	% Of population with access to improved drinking water
SC23	Public infrastructure
SC24	Freshwater resources and availability
SC25	Water supply
SC26	Sanitation
SC27	Women's status
SC28	Sex Ratio
SC29	Available Goods
<i>Education</i>	
SC30	Primary Secondary Gross Enrollment
SC31	Education (# of schools)
SC32	Gross Tertiary enrollment rate
SC33	Number of researchers per million inhabitants
SC34	Educational attainment
<i>Population</i>	
SC35	Annual Population Growth
SC36	Population age-group
SC37	Population Density
SC38	Foreign Born Population
SC39	Migration and refugees
<i>Crime</i>	
SC40	Crime rate
SC41	Intentional Homicides
SC42	Corruption measure
<i>Miscellaneous</i>	
SC43	Newspaper Circulation
SC44	Television Receivers
SC45	Internet Users
SC46	Telephone Lines

**APPENDIX B**  
**Corresponding Author with Indicator List**

<i>Political</i>		
<i>Planning/ Management</i>		<i>Author</i>
PL 1	Incorporate & implementation of local idea in community/ site management	KK (2006)
PL 2	Local resident participation in planning process	KK (2006)
PL 3	Stakeholder collaboration	KK (2006)
PL 4	Level of cooperation among stakeholder groups	KK (2006)
PL 5	Building permits issued	KK (2006)
PL 6	Attitude of local political NGO leaders toward development and conservation	KK (2006)
PL 7	Availability of funding resources	KK (2006)
PL 8	Low impact technology	KK (2006)
PL 9	Benchmarking	KK (2006)
PL 10	Participation in Int'l Environmental Agreements	Esty, D., et al. (2005)
PL 11	Conservation/ development support at national level	KK (2006)
PL 12	# Of memberships in environment intergovernmental organizations	Esty, D., et al. (2005)
PL 13	Local environmental NGO's	KK (2006)
PL 14	Democracy Measure	Esty, D., et al. (2005)
PL 15	Government effectiveness	Esty, D., et al. (2005)
PL 16	Rule of law	Esty, D., et al. (2005)
PL 17	Civil and Political Liberties	Esty, D., et al. (2005)
PL 18	Government education expenditures	United Nations. (2003)
<i>Policy</i>		
PL 19	Available/developing control policy	KK (2006)
PL 20	Availability of air, water pollution, waste management & policy	KK (2006)
PL 21	Availability and level of land zoning policy	KK (2006)
PL 22	National economic policy priorities	KK (2006)
PL 23	Financial and fiscal policy	Harger, J. and Meyer, F. (1996)



**Appendix B**  
**Corresponding Author with Indicator List: Political Continued**

PL 24	Knowledge creation in environmental science, technology, and policy	Esty, D., et al. (2005)
<i>Tourism</i>		
PL 25	Tourism authority/ planner in local community	KK (2006)
PL 26	Tourism related master plan	KK (2006)
PL 27	Tourism inclusion in planning process	KK (2006)

<i>Ecological</i>		
<i>Air</i>		<i>Author</i>
EC1	# of good air quality days	KK (2006)
EC2	Urban Population weighted NO <sub>2</sub> , SO <sub>2</sub> , and TSP Concentration	Esty, D., et al. (2005)
EC3	Indoor Air Pollution From Solid Fuel Use	Esty, D., et al. (2005)
EC4	Indoor Air Pollution From Solid Fuel Use	Esty, D., et al. (2005)
EC5	Anthropogenic Nox, SO <sub>2</sub> , VOC emissions per populated land area	Esty, D., et al. (2005)
EC6	Carbon emission per capita	Esty, D., et al. (2005)
<i>Water/Energy</i>		
EC7	Water Quality	Esty, D., et al. (2005)
EC8	Water Quantity	Esty, D., et al. (2005)
EC9	Freshwater Availability per capita	Esty, D., et al. (2005)
EC10	Internal groundwater availability per capita	Esty, D., et al. (2005)
EC11	Precipitation	United Nations. (2003)
EC12	Water quality monitoring and management	Harger, J. and Meyer, F. (1996)
EC13	Percentage of country under severe water stress	Esty, D., et al. (2005)
EC14	Per capita water/energy consumption data	KK(2006)
EC15	Commercial Energy Production	United Nations. (2003)
EC16	Hydropower and renewable energy production as a % of energy consumption	Esty, D., et al. (2005)

**Appendix B**  
**Corresponding Author with Indicator List: Ecological Continued**

<i>Land</i>		
EC17	Amount of Coastline	KK (2006)
EC18	Forest Area	United Nations. (2003)
EC19	Amount of eroding coastline	KK (2006)
EC20	Amount of nourished beaches	KK (2006)
EC21	Volume of dredged material	KK (2006)
EC22	Amount of Coastal armoring	KK (2006)
EC23	Cliff erosion index	KK (2006)
EC24	Availability, size, condition of urban forest	KK (2006)
EC25	Timber growth removal	KK (2006)
EC26	Annual average forest cover change	Esty, D., et al. (2005)
EC27	% of Wetlands	KK (2006)
EC28	Amount of altered seafloor / reef damage	KK (2006)
<i>Built Up Land</i>		
EC29	Amount of Roads	Gossling, S., et al. (2002)
EC30	Amount of Airports	Gossling, S., et al. (2002)
EC31	Amount of Accommodation	Gossling, S., et al. (2002)
EC32	Amount of Activities	Gossling, S., et al. (2002)
EC33	Amount of Sea Space (fishing area)	Gossling, S., et al. (2002)
<i>Fauna</i>		
EC34	Resilience indicators (Biodiversity; spatial patchiness, etc.)	Harger, J. and Meyer, F.(1996)
EC35	% Territory in threatened ecoregions	Esty, D., et al. (2005)
EC36	% of bird species threatened	Esty, D., et al. (2005)
EC37	% of mammal species threatened	Esty, D., et al. (2005)
EC38	% of fish, amphibian, & reptile species threatened	Esty, D., et al. (2005)
EC39	Fisheries Utilization	KK (2006)
<i>Natural Hazards</i>		
EC40	Generation of Hazardous Waste	Esty, D., et al. (2005)
EC41	Frequency of environmental accidents related to tourism	KK (2006)
EC42	Ave. # of deaths per million inhabitants from floods, cyclones, and droughts	Esty, D., et al. (2005)

**Appendix B**  
**Corresponding Author with Indicator List: Ecological Continued**

EC43	Ave. # of deaths per million inhabitants from floods, cyclones, and droughts	KK (2006)
EC44	Waste Recycling Rates	Esty, D., et al. (2005)
EC45	Waste management strategies	KK (2006)
EC46	Number of Sewage Treatment Systems	KK (2006)
EC47	Import of pollution goods and raw materials as % of total imports	Esty, D., et al. (2005)

<i>Social</i>		
<i>Tourism</i>		<i>Author</i>
SC1	Host community satisfaction toward tourism development	KK (2006)
SC2	Host community attitude toward tourism development	KK (2006)
SC3	Resident involvement in tourism industry	KK (2006)
SC4	Continue of trade activities by local residents	KK (2006)
SC5	Change in social cohesion	KK (2006)
SC6	Change in family cohesion	KK (2006)
SC7	Change in community structure	KK (2006)
SC8	Tourist satisfaction/attitude toward tourism development	KK (2006)
SC9	Degradation/erosion of natural/cultural resource	KK (2006)
SC10	% Of managerial employment from local residents	KK (2006)
SC11	Citizen's awareness in environment	Harger, J. and Meyer, F.(1996)
SC12	Public awareness toward value of tourism	KK (2006)
SC13	Community Engagement	MacBeth, J. and Northcote, J. (2005)
<i>Health</i>		
SC14	Health care	Harger, J. and Meyer, F. (1996)
SC15	Life expectancy at birth	United Nations. (2003)
SC16	Infant mortality rate	United Nations. (2003)
SC17	Total fertility rate	United Nations. (2003)

**Appendix B**  
**Corresponding Author with Indicator List: Social Continued**

SC18	Death rate from intestinal disease	Esty, D., et al. (2005)
SC19	Child Death rate from respiratory diseases	Esty, D., et al. (2005)
SC20	Children under 5 mortality rate	Esty, D., et al. (2005)
SC21	% Of undernourished in total population	Esty, D., et al. (2005)
SC22	% Of population with access to improved drinking water	Esty, D., et al. (2005)
SC23	Public infrastructure	Harger, J. and Meyer, F. (1996)
SC24	Freshwater resources and availability	Harger, J. and Meyer, F. (1996)
SC25	Water supply	Harger, J. and Meyer, F. (1996)
SC26	Sanitation	Harger, J. and Meyer, F. (1996)
SC27	Women's status	Harger, J. and Meyer, F. (1996)
SC28	Sex Ratio	United Nations. (2003)
SC29	Available Goods	KK (2006)
<i>Education</i>		
SC30	Primary Secondary Gross Enrollment	United Nations. (2003)
SC31	Education (# of schools)	MacBeth, J. and Northcote, J. (2005)
SC32	Gross Tertiary enrollment rate	Esty, D., et al. (2005)
SC33	Number of researchers per million inhabitants	Esty, D., et al. (2005)
SC34	Educational attainment	Harger, J. and Meyer, F.(1996)
<i>Population</i>		
SC35	Annual Population Growth	United Nations. (2003)
SC36	Population age-group	United Nations. (2003)
SC37	Population Density	United Nations. (2003)
SC38	Foreign Born Population	United Nations. (2003)
SC39	Migration and refugees	Harger, J. and Meyer, F. (1996)
<i>Crime</i>		
SC40	Crime rate	KK (2006)
SC41	Intentional Homicides	United Nations. (2003)
SC42	Corruption measure	Esty, D., et al. (2005)
<i>Miscellaneous</i>		
SC43	Newspaper Circulation	United Nations. (2003)
SC44	Television Receivers	United Nations. (2003)
SC45	Internet Users	United Nations. (2003)
SC46	Telephone Lines	United Nations. (2003)

<i>Cultural</i>		<i>Author</i>
CL1	Building Materials (local)	KK (2006)
CL 2	Décor	KK (2006)
CL 3	Number of Official sites	KK (2006)
CL 4	Retention of Customs	KK (2006)
CL 5	Shift in Cultural Pride	KK (2006)
CL 6	% Satisfied with cultural integrity	KK (2006)
CL 7	Loss of authenticity	KK (2006)
CL 8	Type & amount of training given to tourism employment	KK (2006)
CL 9	Type of information given to tourists	KK (2006)
CL 10	Artistic Value	MacBeth, J. and Northcote, J. (2005)
CL 11	Heritage Value	MacBeth, J. and Northcote, J. (2005)
CL 12	Iconic Value	MacBeth, J. and Northcote, J. (2005)
CL 13	Lifestyle Value	MacBeth, J. and Northcote, J. (2005)
CL 14	Multicultural Value	MacBeth, J. and Northcote, J. (2005)
CL 15	Ritual Value	MacBeth, J. and Northcote, J. (2005)

<i>Economic</i>		
<i>Employment</i>		<i>Author</i>
EN 1	General Employment	United Nations. (2003)
EN 2	Employment in tourism	KK (2006)
EN 3	Unemployment Rate	KK (2006)
EN 4	Economically Active Population	United Nations. (2003)
<i>Wealth</i>		
EN 5	GDP	United Nations. (2003)
EN6	Growth Rate of GDP	United Nations. (2003)
EN 7	Balance of Payments	United Nations. (2003)
EN 8	Economic Activity Rate	United Nations. (2003)
EN 9	Consumer Price Index	United Nations. (2003)
EN 10	Purchasing Power Parody	KK (2006)
EN 11	External Aid and Technology Transfer	Harger, J. and Meyer, F. (1996)
EN 12	Military Considerations	Harger, J. and Meyer, F. (1996)
EN 13	Inflation	MacBeth,J.and Northcote,J.(2005)
EN 14	State Revenue (tax)	MacBeth,J.and Northcote,J.(2005)
EN 15	Staff	MacBeth,J.and Northcote,J.(2005)
EN 16	Administration	MacBeth,J.and Northcote,J.(2005)
EN 17	Facilities	MacBeth,J.and Northcote,J.(2005)

**Appendix B**  
**Corresponding Author with Indicator List: Economic Continued**

<i>Tourism</i>		
EN 18	% income leakage from community	KK (2006)
EN 19	Tourism % of the local economy	KK (2006)
EN 20	% foreign ownership	KK (2006)
EN 21	% of profit reinvested in community development	KK (2006)
EN 22	Availability of local credit to local business	KK (2006)
EN 23	% of profit reinvested in natural/cultural area	KK (2006)
EN 24	Internal/external ownership of business	KK (2006)
EN 25	Comparative ratio of wages in tourism sector to local wage	KK (2006)
EN 26	Existence of fee structure (tourist vs. local)	KK (2006)
EN 27	Tourism \$ to infrastructure	KK (2006)
EN 28	Primary Energy Production	United Nations. (2003)
EN 29	Industrial Production	United Nations. (2003)
EN 30	Agricultural Production Index	United Nations. (2003)
EN 31	Food Production Index	United Nations. (2003)
EN 32	Major Export and Import Trading Partners	United Nations. (2003)
EN 33	Exchange Rate	United Nations. (2003)

**APPENDIX C**  
**Information on KK (2006) Indicators**

<i>Political</i>		
<i>Planning/ Management</i>		<i>Author</i>
PL 1	Incorporate & implementation of local idea in community/ site management	KK (2006)
<p>Ahn, B.Y., et al. (2002). Pg. 2, 9,11-13            Lim, C. and McAleer, M. (2005). Pg. 1432-1434            Mog, Justin.M. (2004). Pg. 2140-2142, 2151            Fallon, L D. and Kirwoken, LK. (2003). Pg. 300            Choi, H C. and Sirakaya, E. (2005)</p>		
PL 2	Local resident participation in planning process	KK (2006)
<p>Kernel, Pernille. (2005). Pg. 156.            Briassoulis, Helen. (2002). Pg.1081.            Ahn, B.Y., et al. (2002). Pg. 2,13            Lee, Kian Foh. (2001). Pg. 318            Lim, C. and McAleer, M. (2005). Pg.1432-1433, 1436            Mog, Justin.M. (2004). Pg. 2140-2142,2151-2152            Bryne, J. et al. (2005). Pg. 15,21            Duim, R and Caaldes, J. (2002). Pg. 748-749            Gibson, J. et al. (1998). Pg. 240,243            Lehtonen, M. (2004). Pg. 209            Cocklin, C. and Blunden, G. (1998). Pg. 63            Berry, S. and Ladkin, A. (1996)            Fyall, A. and Garrod, B. (1998). Pg. 202            Tosun, C. (2001). Pg. 292            Fallon, L D. and Kirwoken, LK. (2003)            Choi, H C. and Sirakaya, E. (2005)</p>		
PL 3	Stakeholder collaboration	KK (2006)
<p>Kernel, Pernille. (2005). Pg. 156            Briassoulis, Helen. (2002). Pg. 1081.            Ahn, B.Y., et al. (2002). Pg. 2,13            Lee, Kian Foh. (2001). Pg. 318-319            Lim, C. and McAleer, M. (2005). Pg.1433, 1436            Bryne, J. et al. (2005). Pg. 12,15,21            Duim, R and Caaldes, J. (2002). Pg. 748-749            Gibson, J. et al. (1998). Pg. 240,243            Abeyrantne, R. (1999). Pg. 33,36            Fyall, A. and Garrod, B. (1998). Pg. 202            Tosun, C. (2001). Pg. 292            Fallon, L D. and Kirwoken, LK. (2003)            Choi, H C. and Sirakaya, E. (2005)</p>		

**APPENDIX C**  
**Information on KK (2006) Indicators, Political Continued**

PL 4	Level of cooperation among stakeholder groups	KK (2006)
Kernel, Pernille. (2005). Pg.153. Duim, R and Caaldes, J. (2002). Pg. 748-749 Gibson, J. et al. (1998). Pg. 235,240,243 Fyall, A. and Garrod, B. (1998). Pg. 202 Tosun, C. (2001). Pg. 292 Fallon, L D. and Kirwoken, LK. (2003) Choi, H C. and Sirakaya, E. (2005)		
PL 5	Building permits issued	KK (2006)
Lim, C. and McAleer, M. (2005). Pg. 1437 Choi, H C. and Sirakaya, E. (2005)		
PL 6	Attitude of local political NGO leaders toward development and conservation	KK (2006)
Kernel, Pernille. (2005). Pg.155. Lim, C. and McAleer, M. (2005). Pg.1437 Mog, Justin.M. (2004). Pg. 2141 Bryne, J. et al. (2005. Pg. 12-13 Gibson, J. et al. (1998. Pg.235, 240,243 Choi, H C. and Sirakaya, E. (2005)		
PL 7	Availability of funding resources	KK (2006)
Briassoulis, Helen. (2002. Pg.1066-1071. Ahn, B.Y., et al. (2002. Pg. 3,10 Bryne, J. et al. (2005. Pg. 6 Gibson, J. et al. (1998). Pg. 230,241 Choi, H C. and Sirakaya, E. (2005)		
PL 8	Low impact technology	KK (2006)
Briassoulis, Helen. (2002). Pg. 1078-1079 Mog, Justin.M. (2004). Pg.2142 Frei, C.W. et al. (2003. Pg.1018 Bryne, J. et al. (2005. Pg. 29 Adriaens, P. et al. (2003). Pg.130-132 Abeyrantne, R. (1999). Pg.37 Choi, H C. and Sirakaya, E. (2005)		
PL 9	Benchmarking	KK (2006)
Choi, H C. and Sirakaya, E. (2005)		
PL 11	Conservation development support at national level	KK (2006)
Aguilio, E., et al. (2005. Pg.226-227 Lee, Kian Foh. (2001). Pg. 318 Lim, C. and McAleer, M. (2005). Pg.1436 Mog, Justin.M. (2004). Pg.2151 Bryne, J. et al. (2005. Pg. 12-13 Duim, R and Caaldes, J. (2002). Pg. 752 Davis, D. and Gartside, D. (2001). Pg. 227 Gibson, J. et al. (1998). Pg. 240,243 Abeyrantne, R. (1999). Pg.36 Tosun, C. (2001). Pg.292		



**APPENDIX C**  
**Information on KK (2006) Indicators, Political Continued**

PL 13	Local environmental NGO's	KK (2006)
Kernel, Pernille. (2005). Pg.155 Lim, C. and McAleer, M. (2005). Pg. 1437 Bryne, J. et al. (2005). Pg. 12-13 Gibson, J. et al. (1998). Pg. 235, 240,243 Choi, H C. and Sirakaya, E. (2005)		
<i>Policy</i>		
PL 19	Available development control policy	KK (2006)
Aguilio, E., et al. (2005). Pg.226-227 Ahn, B.Y., et al. (2002). Pg. 10 Lee, Kian Foh. (2001). Pg. 314,318 Lim, C. and McAleer, M. (2005). Pg. 1432 Bryne, J. et al. (2005). Pg. 12-13 Duim, R and Caaldes, J. (2002). Pg. 753 Gibson, J. et al. (1998). Pg. 234-235,243 Cocklin, C. and Blunden, G. (1998). Pg. 56-59 Choi, H C. and Sirakaya, E. (2005)		
PL 20	Availability of air, water pollution, waste management, energy and marine policy	KK (2006)
Briassoulis, Helen. (2002). Pg.1066-1071 Budeanu, Adriana. (2005). Pg.92&95 Aguilio, E., et al. (2005). Pg.226-227 Lee, Kian Foh. (2001). Pg. 316 Frei, C. W. et al. (2003).Pg. 1019 Bryne, J. et al. (2005). Pg. 8,12-13 Duim, R and Caaldes, J. (2002). Pg. 753 Davis, D. and Gartside, D. (2001). Pg. 224 Gibson, J. et al. (1998). Pg. 234-235 Abeyrantne, R. (1999). Pg. 32 Tosun, C. (2001) Choi, H C. and Sirakaya, E. (2005)		
PL 21	Availability and level of land and ocean zoning policy	KK (2006)
Ahn, B.Y., et al. (2002). Pg. 2 Lim, C. and McAleer, M. (2005). Pg. 1437 Bryne, J. et al. (2005). Pg. 19-20 Duim, R and Caaldes, J. (2002). Pg. 753 Davis, D. and Gartside, D. (2001). Pg. 228 Gibson, J. et al. (1998). Pg. 233-234,236-239 Beedasy, J. and Duncan, W. (1999). Pg.167 Tosun, C. (2001)		
PL 22	National economic policy priorities	KK (2006)
Bryne, J. et al. (2005). Pg. 12-13 Tosun, C. (2001)		

**APPENDIX C**  
**Information on KK (2006) Indicators, Political Continued**

<i>Political</i>		
PL 4	Level of cooperation among stakeholder groups	KK (2006)
Kernel, Pernille. (2005). Pg.153. Duim, R and Caaldes, J. (2002). Pg. 748-749 Gibson, J. et al. (1998). Pg. 235,240,243 Fyall, A. and Garrod, B. (1998). Pg. 202 Tosun, C. (2001). Pg. 292 Fallon, L D. and Kirwoken, LK. (2003) Choi, H C. and Sirakaya, E. (2005)		
PL 5	Building permits issued	KK (2006)
Lim, C. and McAleer, M. (2005). Pg. 1437 Choi, H C. and Sirakaya, E. (2005)		
PL 6	Attitude of local political NGO leaders toward development and conservation	KK (2006)
Kernel, Pernille. (2005). Pg.155. Lim, C. and McAleer, M. (2005). Pg.1437 Mog, Justin.M. (2004). Pg. 2141 Bryne, J. et al. (2005. Pg. 12-13 Gibson, J. et al. (1998. Pg.235, 240,243 Choi, H C. and Sirakaya, E. (2005)		
PL 7	Availability of funding resources	KK (2006)
Briassoulis, Helen. (2002. Pg.1066-1071. Ahn, B.Y., et al. (2002. Pg. 3,10 Bryne, J. et al. (2005. Pg. 6 Gibson, J. et al. (1998). Pg. 230,241 Choi, H C. and Sirakaya, E. (2005)		
PL 8	Low impact technology	KK (2006)
Briassoulis, Helen. (2002). Pg. 1078-1079 Mog, Justin.M. (2004). Pg.2142 Frei, C.W. et al. (2003. Pg.1018 Bryne, J. et al. (2005. Pg. 29 Adriaens, P. et al. (2003). Pg.130-132 Abeyrantne, R. (1999). Pg.37 Choi, H C. and Sirakaya, E. (2005)		
PL 9	Benchmarking	KK (2006)
Choi, H C. and Sirakaya, E. (2005)		
PL 11	Conservation development support at national level	KK (2006)
Aguilio, E., et al. (2005. Pg.226-227 Lee, Kian Foh. (2001). Pg. 318 Lim, C. and McAleer, M. (2005). Pg.1436 Mog, Justin.M. (2004). Pg.2151 Bryne, J. et al. (2005. Pg. 12-13 Duim, R and Caaldes, J. (2002). Pg. 752 Davis, D. and Gartside, D. (2001). Pg. 227 Gibson, J. et al. (1998). Pg. 240,243 Abeyrantne, R. (1999). Pg.36 Tosun, C. (2001). Pg.292		

**APPENDIX C**  
**Information on KK (2006) Indicators, Political Continued**

PL 13	Local environmental NGO's	KK (2006)
Kernel, Pernille. (2005). Pg.155 Lim, C. and McAleer, M. (2005). Pg. 1437 Bryne, J. et al. (2005). Pg. 12-13 Gibson, J. et al. (1998). Pg. 235, 240,243 Choi, H C. and Sirakaya, E. (2005)		
<i>Policy</i>		
PL 19	Available development control policy	KK (2006)
Aguilio, E., et al. (2005). Pg.226-227 Ahn, B.Y., et al. (2002). Pg. 10 Lee, Kian Foh. (2001). Pg. 314,318 Lim, C. and McAleer, M. (2005). Pg. 1432 Bryne, J. et al. (2005). Pg. 12-13 Duim, R and Caaldes, J. (2002). Pg. 753 Gibson, J. et al. (1998). Pg. 234-235,243 Cocklin, C. and Blunden, G. (1998). Pg. 56-59 Choi, H C. and Sirakaya, E. (2005)		
PL 20	Availability of air, water pollution, waste management, energy and marine policy	KK (2006)
Briassoulis, Helen. (2002). Pg.1066-1071 Budeanu, Adriana. (2005). Pg.92&95 Aguilio, E., et al. (2005). Pg.226-227 Lee, Kian Foh. (2001). Pg. 316 Frei, C. W. et al. (2003).Pg. 1019 Bryne, J. et al. (2005). Pg. 8,12-13 Duim, R and Caaldes, J. (2002). Pg. 753 Davis, D. and Gartside, D. (2001). Pg. 224 Gibson, J. et al. (1998). Pg. 234-235 Abeyrantne, R. (1999). Pg. 32 Tosun, C. (2001) Choi, H C. and Sirakaya, E. (2005)		
PL 21	Availability and level of land and ocean zoning policy	KK (2006)
Ahn, B.Y., et al. (2002). Pg. 2 Lim, C. and McAleer, M. (2005). Pg. 1437 Bryne, J. et al. (2005). Pg. 19-20 Duim, R and Caaldes, J. (2002). Pg. 753 Davis, D. and Gartside, D. (2001). Pg. 228 Gibson, J. et al. (1998). Pg. 233-234,236-239 Beedasy, J. and Duncan, W. (1999). Pg.167 Tosun, C. (2001)		
PL 22	National economic policy priorities	KK (2006)
Bryne, J. et al. (2005). Pg. 12-13 Tosun, C. (2001)		

**APPENDIX C**  
**Information on KK (2006) Indicators, Political Continued**

<i>Tourism</i>		
PL 25	Tourism authority/ planner in local community	KK (2006)
Lee, Kian Foh. (2001). Pg. 318		
PL 26	Tourism related master plan	KK (2006)
Budeanu, Adriana. (2005). Pg. 95 Aguilio, E., et al. (2005). Pg.226-227 Ahn, B.Y., et al. (2002). Pg.11-13		
PL 27	Tourism inclusion in planning process	KK (2006)
Kernel, Pernille. (2005). Pg. 158. Briassoulis, Helen. (2002). Pg.1077 Budeanu, Adriana. (2005). Pg. 95 Aguilio, E., et al. (2005). Pg.226-227 Ahn, B.Y., et al. (2002). Pg. 11-13 Lee, Kian Foh. (2001). Pg. 314 Lim, C. and McAleer, M. (2005). Pg.1432, 1438 Fyall, A. and Garrod, B. (1998). Pg. 202		

<i>Ecological</i>		
<i>Air</i>		<i>Author</i>
EC1	# of good air quality days	KK (2006)
Briassoulis, Helen. (2002). Pg.1066 Lim, C. and McAleer, M. (2005). Pg. 1432 Mog, Justin.M. (2004). Pg.2145, 2152 Jefferson, M. (2005). Pg. 581 Davis, D. and Gartside, D. (2001). Pg.224 Choi, H C. and Sirakaya, E. (2005)		
<i>Water/Energy</i>		
EC14	Per capita water/energy consumption data	KK (2006)
Kernel, Pernille. (2005). Pg.159. Briassoulis, Helen. (2002). Pg.1066-1071 Aguilio, E., et al. (2005). Pg.220 Lim, C. and McAleer, M. (2005). Pg. 1432-1434 Mog, Justin.M. (2004). Pg.2145, 2152 Frei, C.W et al. (2003). Pg. 1018,1030 Jefferson, M. (2005). Pg.573 Bryne, J. et al. (2005). Pg. 8,19 Adriaens, P. et al. (2003). Pg. 120-122 Kent, M. et al. (2002). Pg.360, 366-367 Abeyrantne, R. (1999). Pg. 32 Choi, H C. (2005) Gossling, S. (2002)		

**APPENDIX C**  
**Information on KK (2006) Indicators, Ecological Continued**

<i>Land</i>		
	EC17	Amount of Coastline
KK (2006)		
Aguilio, E., et al. (2005). Pg.220 Mog, Justin.M. (2004). Pg.2145 Bryne, J. et al. (2005). Pg. 12		
	EC19	Amount of eroding coastline
KK (2006)		
Briassoulis, Helen. (2002). Pg.1073 Aguilio, E., et al. (2005). Pg.220 Ahn, B.Y., et al. (2002). Pg. 4,9 Lim, C. and McAleer, M. (2005). Pg. 1433-1434 Mog, Justin.M. (2004). Pg.2145 Bryne, J. et al. (2005). Pg. 12 Gibson, J. et al. (1998). Pg.231-233		
	EC20	Amount of nourished beaches
KK (2006)		
Lim, C. and McAleer, M. (2005). Pg. 1433-1434 Mog, Justin.M. (2004). Pg.2145 Gibson, J. et al. (1998). Pg.231		
	EC21	Volume of dredged material
KK (2006)		
Briassoulis, Helen. (2002). Pg.1073-1074 Ahn, B.Y., et al. (2002). Pg. 4 Lim, C. and McAleer, M. (2005). Pg. 1433-1434 Gibson, J. et al. (1998). Pg.232		
	EC22	Amount of Coastal armoring
KK (2006)		
	EC23	Cliff erosion index
KK (2006)		
Briassoulis, Helen. (2002). Pg.1073-1074		
	EC24	Availability, size, condition of urban forest
KK (2006)		
Briassoulis, Helen. (2002). Pg.1066-1071 Lim, C. and McAleer, M. (2005). Pg. 1433-1434 Bryne, J. et al. (2005). Pg. 19 Duij, R and Caaldes, J. (2002). Pg. 744,750 Gibson, J. et al. (1998). Pg. 239 Azar, C. et al. (1996). 92,101 Abeyrantne, R. (1999). Pg. 32 Choi, H C. and Sirakaya, E. (2005)		
	EC25	Timber growth removal
KK (2006)		
Lim, C. and McAleer, M. (2005). Pg. 1434 Bryne, J. et al. (2005). Pg. 19 Duij, R and Caaldes, J. (2002). Pg. 744,750 Gibson, J. et al. (1998). Pg. 239 Azar, C. et al. (1996). 92,101 Choi, H C. and Sirakaya, E. (2005)		

**APPENDIX C**  
**Information on KK (2006) Indicators, Ecological Continued**

EC27	% of Wetlands	KK (2006)
Lim, C. and McAleer, M. (2005). Pg. 1436-1438 Gibson, J. et al. (1998). Pg. 232		
EC28	Amount of altered seafloor/ Reef Damage	KK (2006)
Davis, D. and Gartside, D. (2001). Pg. 224-227 Briassoulis, Helen. (2002). Pg. 1077 Ahn, B.Y., et al. (2002). Pg. 4,8 Gibson, J. et al. (1998). Pg. 230,232-233 Beedasy, J. and Duncan, W. (1999). Pg.165		
<i>Fauna</i>		
EC39	Fisheries Utilization	KK (2006)
Briassoulis, Helen. (2002) Pg. 1068 Ahn, B.Y., et al. (2002). Pg. 8 Bryne, J. et al. (2005). Pg. 6 Davis, D. and Gartside, D. (2001). Pg. 224, 227,229-231 Gibson, J. et al. (1998). Pg. 233 Choi, H C. and Sirakaya, E. (2005) Gossling, S. (2001)		
<i>Natural Hazards</i>		
EC41	Frequency of environmental accidents related to tourism	KK (2006)
EC43	Ave. # of deaths per million inhabitants from floods, cyclones, and droughts	KK (2006)
Bryne, J. et al. (2005). Pg. 18 Gibson, J. et al. (1998). Pg. 230 Azar, C. et al. (1996). Pg. 92 Kent, M. et al. (2002). Pg.360		
EC45	Waste management strategies	KK (2006)
Briassoulis, Helen. (2002). Pg. 1072 Lee, Kian Foh. (2001). Pg. 316 Lim, C. and McAleer, M. (2005). Pg. 1432-1435 Jefferson, M. (2005). Pg.581 Bryne, J. et al. (2005). Pg. 8 Davis, D. and Gartside, D. (2001). Pg. 225 Gibson, J. et al. (1998). Pg. 231 Kent, M. et al. (2002). Pg.367 Abeyrantne, R. (1999). Pg. 32 Tosun, C. (2001)		

**APPENDIX C**  
**Information on KK (2006) Indicators, Ecological Continued**

EC46	Number of Sewage Treatment Systems	KK (2006)
Briassoulis, Helen. (2002). Pg. 1068-1071 Aguilio, E., et al. (2005). Pg.220 Lim, C. and McAleer, M. (2005). Pg. 1435 Bryne, J. et al. (2005). Pg. 8 Davis, D. and Gartside, D. (2001). Pg. 225 Gibson, J. et al. (1998). Pg. 231 Adriaens, P. et al. (2003). Pg.127 Tosun, C. (2001)		
<i>Management</i>		
EC49	Land use guidelines	KK (2006)
Aguilio, E., et al. (2005). Pg.226-227 Lim, C. and McAleer, M. (2005). Pg. 1432 Lim, C. and McAleer, M. (2005). Pg. 1432 Gibson, J. et al. (1998). Pg. 236 Tosun, C. (2001)		
EC50	Level of protection (parks, species, etc)	KK (2006)
Briassoulis, Helen. (2002) Pg. 1074 Davis, D. and Gartside, D. (2001). Pg. 225-227 Gibson, J. et al. (1998). Pg. 243,236-239 Tosun, C. (2001) Choi, H C. and Sirakaya, E. (2005)		
EC51	% Environmentally managed	KK (2006)
Kernel, Pernille. (2005). Pg.159 Budeanu, Adriana. (2005). Pg. 95 Jefferson, M. (2005). Pg. 581 Davis, D. and Gartside, D. (2001). Pg. 225-227 Kent, M. et al. (2002). Pg.367 Cocklin, C. and Blunden, G. (1998). Pg. 61 Abeyrantne, R. (1999). Pg. 32		
EC52	Formal control over development sites & use densities	KK (2006)
Aguilio, E., et al. (2005). Pg. 228 Ahn, B.Y., et al. (2002). Pg. 10 Lim, C. and McAleer, M. (2005). Pg.1432 Jefferson, M. (2005). Pg. 574-580 Davis, D. and Gartside, D. (2001). Pg. 225-227 Cocklin, C. and Blunden, G. (1998). Pg. 61 Beedasy, J. and Duncan, W. (1999). Pg.165-167 Tosun, C. (2001). Pg. 295 Choi, H C. and Sirakaya, E. (2005)		

**APPENDIX C**  
**Information on KK (2006) Indicators, Ecological Continued**

<i>Tourism</i>		
EC56	Number of registered recreational vessels	KK (2006)
Ahn, B.Y., et al. (2002). Pg. 8 Davis, D. and Gartside, D. (2001). Pg. 224-225,228 Gibson, J. et al. (1998). Pg. 232 Tosun, C. (2001). Pg.295		
EC57	Number of divers per location	KK (2006)
Briassoulis, Helen. (2002). Pg. 1077 Ahn, B.Y., et al. (2002). Pg. 4,8 Davis, D. and Gartside, D. (2001). Pg. 225-227 Gibson, J. et al. (1998). Pg. 230,232-233 Beedasy, J. and Duncan, W. (1999). Pg.165		
EC58	Number of visitors to beach	KK (2006)
Ahn, B.Y., et al. (2002). Pg. 9 Beedasy, J. and Duncan, W. (1999). Pg.165		
EC59	Number of Hotel/ Tourist developments	KK (2006)
Budeanu, Adriana. (2005). Pg.92 Aguilio, E., et al. (2005). Pg.228 Ahn, B.Y., et al. (2002). Pg.8-9 Tosun, C. (2001).		
EC60	Number of Upgraded tourist destinations	KK (2006)
Budeanu, Adriana. (2005). Pg.92 Aguilio, E., et al. (2005). Pg.228 Ahn, B.Y., et al. (2002). Pg.8		
EC61	Site attractivity	KK (2006)
Budeanu, Adriana. (2005). Pg.92		

<i>Social</i>		
<i>Tourism</i>		<i>Author</i>
SC1	Host community satisfaction toward tourism development	KK (2006)
Briassoulis, Helen. (2002). Pg. 1081 Ahn, B.Y., et al. (2002). Pg. 2-3,11-13 Lim, C. and McAleer, M. (2005). Pg. 1432 Mog, Justin.M. (2004). Pg.2151 Bryne, J. et al. (2005). Pg. 15,21 Gibson, J. et al. (1998). Pg. 240,243 Fyall, A. and Garrod, B. (1998) Choi, H C. and Sirakaya, E. (2005)		



**APPENDIX C**  
**Information on KK (2006) Indicators, Social Continued**

SC2	Host community attitude toward tourism development	KK (2006)
<p>Ahn, B.Y., et al. (2002). Pg. 2-3,11-13          Lim, C. and McAleer, M. (2005). Pg. 1433          Mog, Justin.M. (2004). Pg.2151          Bryne, J. et al. (2005). Pg. 15,21          Gibson, J. et al. (1998). Pg. 240,243          Fyall, A. and Garrod, B. (1998)          Choi, H C. and Sirakaya, E. (2005)</p>		
SC3	Resident involvement in tourism industry	KK (2006)
<p>Briassoulis, Helen. (2002). Pg. 1081          Ahn, B.Y., et al. (2002). Pg. 2-3, 7-8, 11-13          Lim, C. and McAleer, M. (2005). Pg. 1433, 1436          Mog, Justin.M. (2004). Pg.2145          Gibson, J. et al. (1998). Pg. 240,243          Tosun, C. (2001). Pg. 295          Choi, H C. and Sirakaya, E. (2005)          Barry, S. and Ladkin, A. (1996). Pg. 6</p>		
SC4	Continue of traditional activities by local residents	KK (2006)
<p>Briassoulis, Helen. (2002). Pg.1079          Ahn, B.Y., et al. (2002). Pg. 3          Lim, C. and McAleer, M. (2005). Pg. 1435-1436          Gossling, S. (2004). Pg. 543,545          Choi, H C. and Sirakaya, E. (2005)</p>		
SC5	Change in social cohesion	KK (2006)
<p>Ahn, B.Y., et al. (2002). Pg.3          Gossling, S. (2004). Pg. 543-545          Choi, H C. and Sirakaya, E. (2005)          Tosun, C. (2001). Pg. 296</p>		
SC6	Change in family cohesion	KK (2006)
<p>Ahn, B.Y., et al. (2002). Pg.3          Gossling, S. (2004). Pg. 543-545          Choi, H C. and Sirakaya, E. (2005)</p>		
SC7	Change in community structure	KK (2006)
<p>Ahn, B.Y., et al. (2002). Pg.2-3, 9          Gossling, S. (2004). Pg. 543-545          Choi, H C. and Sirakaya, E. (2005)          Tosun, C. (2001). Pg. 296</p>		
SC8	Tourist satisfaction/attitude toward tourism development	KK (2006)
<p>Ahn, B.Y., et al. (2002). Pg.11-15          Bryne, J. et al. (2005). Pg. 15          Choi, H C. and Sirakaya, E. (2005)</p>		

**APPENDIX C**  
**Information on KK (2006) Indicators, Social Continued**

SC9	Degradation/erosion of natural/cultural resource	KK (2006)
Briassoulis, Helen. (2002). Pg. 1073 &1079 Ahn, B.Y., et al. (2002). Pg.2, 4,9 Lim, C. and McAleer, M. (2005). Pg. 1436 Davis, D. and Gartside, D. (2001). Pg. 224-225 Gossling, S. (2004). Pg. 542 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 296		
SC10	% Of managerial employment from local residents	KK (2006)
Budeanu, Adriana. (2005). Pg.91&95 Ahn, B.Y., et al. (2002). Pg.3 Mog, Justin.M. (2004). Pg.2145 Choi, H C. and Sirakaya, E. (2005) Fyall, A. and Garrod, B. (1998)		
SC12	Public awareness toward value of tourism	KK (2006)
Ahn, B.Y., et al. (2002). Pg.11-13 Mog, Justin.M. (2004). Pg.2145 Bryne, J. et al. (2005). Pg. 15 Choi, H C. and Sirakaya, E. (2005)		
<i>Health</i>		
SC29	Available Goods	KK (2006)
Gossling, S. (2004). Pg. 544		
<i>Crime</i>		
SC40	Crime rate	KK (2006)
Ahn, B.Y., et al. (2002). Pg.7 Lim, C. and McAleer, M. (2005). Pg. 1432 Choi, H C. and Sirakaya, E. (2005)		

**APPENDIX C**  
**Information on KK (2006) Indicators, Cultural Continued**

<i>Cultural</i>		<i>Author</i>
CL1	Building Materials (local)	KK (2006)
Briassoulis, Helen. (2002). Pg. 1073 Budeanu, Adriana. (2005). Pg.92 Lee, Kian Foh. (2001). Pg. 318 Lim, C. and McAleer, M. (2005). Pg. 1433 Jefferson, M. (2005). Pg. 573  Gossling, S. (2004). Pg. 547, 551 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 296		
CL 2	Décor	KK (2006)
Budeanu, Adriana. (2005). Pg.92 Lee, Kian Foh. (2001). Pg. 318 Gossling, S. (2004). Pg. 547,551 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 295		
CL 3	Number of Official sites	KK (2006)
Davis, D. and Gartside, D. (2001). Pg. 225-228 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 296		
CL 4	Retention of Customs	KK (2006)
Briassoulis, Helen. (2002). Pg.1079 Ahn, B.Y., et al. (2002). Pg.2-3 Lee, Kian Foh. (2001). Pg. 315 Lim, C. and McAleer, M. (2005). Pg. 1435 Gossling, S. (2004). Pg. 542,545,549 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 297		
CL 5	Shift in Cultural Pride	KK (2006)
Briassoulis, Helen. (2002). Pg.1079 Ahn, B.Y., et al. (2002). Pg.2-3 Gossling, S. (2004). Pg. 542,545,549 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). 297		
CL 6	% Satisfied with cultural integrity	KK (2006)
Ahn, B.Y., et al. (2002). Pg.2-3, 11-13 Lim, C. and McAleer, M. (2005). Pg. 1432, 1435 Gossling, S. (2004). Pg. 543 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 296 Fallon, L D. and Kiwoken, LK. (2003). Pg.297		

**APPENDIX C**  
**Information on KK (2006) Indicators, Cultural Continued**

CL 7	Loss of authenticity	KK (2006)
Budeanu, Adriana. (2005). Pg.91&92 Gossling, S. (2004). Pg. 542-545,547 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 296 Fallon, L D. and Kiwoken, LK. (2003). Pg.297		
CL 8	Type & amount of training given to tourism employment	KK (2006)
Budeanu, Adriana. (2005). Pg.91&95 Ahn, B.Y., et al. (2002). Pg.8 Lim, C. and McAleer, M. (2005). Pg. 1432 Mog, Justin.M. (2004). Pg.2145 Bryne, J. et al. (2005). Pg. 21 Gibson, J. et al. (1998). Pg. 235 Lehtonen, M. (2004). Pg. 209 Adriaens, P. et al. (2003). Pg. 123 Abeyrantne, R. (1999). Pg. 33 Choi, H C. and Sirakaya, E. (2005) Fallon, L D. and Kiwoken, LK. (2003). Pg.297		
CL 9	Type of information given to tourists	KK (2006)
Budeanu, Adriana. (2005). Pg 91&95 Ahn, B.Y., et al. (2002). Pg.8 Lim, C. and McAleer, M. (2005). Pg. 1432 Abeyrantne, R. (1999). Pg. 33 Choi, H C. and Sirakaya, E. (2005) Fallon, L D. and Kiwoken, LK. (2003). Pg.298		

<b><i>Economic</i></b>		
<b><i>Employment</i></b>		<i>Author</i>
EN 2	Employment in tourism	KK (2006)
Budeanu, Adriana. (2005). Pg 91 Ahn, B.Y., et al. (2002). Pg.3, 8 Gossling, S. (2004). Pg. 543 Beedasy, J. and Duncan, W. (1999). Pg.164 Choi, H C. and Sirakaya, E. (2005)		
EN 3	Unemployment Rate	KK (2006)
Gossling, S. (2004). Pg. 543 Beedasy, J. and Duncan, W. (1999). Pg.164 Choi, H C. and Sirakaya, E. (2005)		
<b><i>Wealth</i></b>		
EN 10	Purchasing Power (PPP)	KK (2006)
Bryne, J. et al. (2005). Pg. 6		

**APPENDIX C**  
**Information on KK (2006) Indicators, Economic**

<i>Tourism</i>		
EN 18	% Income leakage from community	KK (2006)
Budeanu, Adriana. (2005). Pg. 91 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 291		
EN 19	Tourism % of the local economy	KK (2006)
Budeanu, Adriana. (2005). Pg. 91 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 294		
EN 20	% Foreign ownership	KK (2006)
Briassoulis, Helen. (2002). Pg.1072 Budeanu, Adriana. (2005). Pg. 91 Lim, C. and McAleer, M. (2005). Pg. 1432 Bryne, J. et al. (2005). Pg. 6 Davis, D. and Gartside, D. (2001). Pg. 227 Gibson, J. et al. (1998). Pg.230 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 292		
EN 21	% Of profit reinvested in community development	KK (2006)
Lim, C. and McAleer, M. (2005). Pg. 1432 Bryne, J. et al. (2005). Pg. 6 Gibson, J. et al. (1998). Pg. 241 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 291		
EN 22	Availability of local credit to local business	KK (2006)
Mog, Justin.M. (2004). Pg.2145, 2152 Choi, H C. and Sirakaya, E. (2005) Tosun, C. (2001). Pg. 294		
EN 23	% Of profit reinvested in natural/cultural area	KK (2006)
Budeanu, Adriana. (2005). Pg. 91 Aguilio, E., et al. (2005). Pg.226-227 Davis, D. and Gartside, D. (2001). Pg. 231-234 Gibson, J. et al. (1998). Pg.241 Abeyrantne, R. (1999). Pg. 36 Choi, H C. and Sirakaya, E. (2005)		
EN 24	Internal/external ownership of business	KK (2006)
Aguilio, E., et al. (2005). Pg.230 Lim, C. and McAleer, M. (2005). Pg. 1432 Choi, H C. and Sirakaya, E. (2005). Pg. 292		
EN 25	Comparative ratio of wages in tourism sector to local wage	KK (2006)
Budeanu, Adriana. (2005). Pg. 91 Ahn, B.Y., et al. (2002). Pg.3 Gosling, S. (2004). Pg. 543 Choi, H C. and Sirakaya, E. (2005)		

**APPENDIX C**  
**Information on KK (2006) Indicators, Economic**

EN 26	Existence of fee structure (tourist vs. local)	KK (2006)
<p>Davis, D. and Gartside, D. (2001). Pg. 231-234  Kent, M. et al. (2002). Pg.369-371  Choi, H C. and Sirakaya, E. (2005)</p>		
EN 27	Tourism \$ to infrastructure	KK (2006)
<p>Aguilio, E., et al. (2005). Pg.226-227  Ahn, B.Y., et al. (2002). Pg.3, 10  Davis, D. and Gartside, D. (2001). Pg. 231-235  Kent, M. et al. (2002). Pg.360, 366-367  Kent, M. et al. (2002). Pg.369-371  Abeyrantne, R. (1999). Pg. 36</p>		

**APPENDIX D**  
**Framework Applied to the Bahamas**

<i>Political</i>		<i>Bahamas Data:</i>
<i>Planning/ Management</i>		
PL 1	Incorporate & implementation of local idea in community/ site management	
PL 2	Local resident participation in planning process	
PL 3	Stakeholder collaboration	
PL 4	Level of cooperation among stakeholder groups	
PL 5	Building permits issued	
PL 6	Attitude of local political NGO leaders toward development and conservation	
PL 7	Availability of funding resources	
PL 8	Low impact technology	
PL 9	Benchmarking	
PL 10	Participation in Int'l Environmental Agreements	
PL 11	Conservation/ development support at national level	
PL 12	# Of memberships in environment intergovernmental organizations	
PL 13	Local environmental NGO's	515
PL 14	Democracy Measure	
PL 15	Government effectiveness	
PL 16	Rule of law	
PL 17	Civil and Political Liberties	
PL 18	Government education expenditures	3.6% of GNP
<i>Policy</i>		
PL 19	Available/developing control policy	
PL 20	Availability of air, water pollution, waste management & policy	Agenda 21 reporting status pending
PL 21	Availability and level of land zoning policy	ICZM established
PL 22	National economic policy priorities	
PL 23	Financial and fiscal policy	
PL 24	Knowledge creation in environmental science, technology, and policy	
<i>Tourism</i>		
PL 25	Tourism authority/ planner in local community	
PL 26	Tourism related master plan	
PL 27	Tourism inclusion in planning process	

<i>Ecological</i>		<i>Bahamas Data:</i>
<i>Air</i>		
EC1	# of good air quality days	
EC2	Urban Population weighted NO2, SO2, and TSP Concentration	SO2= 2,000 metric tons, NO2= 2,000 metric tons
EC3	Indoor Air Pollution From Solid Fuel Use	
EC4	Indoor Air Pollution From Solid Fuel Use	
EC5	Anthropogenic Nox, SO2, VOC emissions per populated land area	
EC6	Carbon emission per capita	6.0 thousand metric tons (Caribbean 3.2)
<i>Water/Energy</i>		
EC7	Water Quality	
EC8	Water Quantity	
EC9	Freshwater Availability per capita	
EC10	Internal groundwater availability per capita	
EC11	Precipitation	
EC12	Water quality monitoring and management	
EC13	Percentage of country under severe water stress	
EC14	Per capita water/energy consumption data	New Providence (17,500 acres for 171,542 people) 40% of water shipped from Andros/ Caribbean 1% consumption increase since 1990
EC15	Commercial Energy Production	(Caribbean 51% production increase since 1980)
EC16	Hydropower and renewable energy production as a % of energy consumption	
<i>Land</i>		
EC17	Amount of Coastline	(Coastline 11,238 km)
EC18	Forest Area	842,000 ha (84% of land)
EC19	Amount of eroding coastline	New Providence, Grand Bahamas, Channels
EC20	Amount of nourished beaches	
EC21	Volume of dredged material	Bimi, Family Islands, Paradise Island, Goodman's Bay, Channels
EC22	Amount of Coastal armoring	New Providence, Grand Bahamas
EC23	Cliff erosion index	
EC24	Availability, size, condition of urban forest	0% change in forest (1990-2000)
EC25	Timber growth removal	
EC26	Annual average forest cover change	



**APPENDIX D**  
**Framework Applied to the Bahamas, Ecological Continued**

EC27	% of Wetlands	Nassau, Freeport, Marsh Harbor, George Town (cleared for mosquito/water front access), Bimi - dredged, extracted, infilled ( 1 protected site, 33,000 ha)
EC28	Amount of altered seafloor/ Reef Damage	29ha were altered from 1943-1995
<i>Built Up Land</i>		
EC29	Amount of Roads	
EC30	Amount of Airports	
EC31	Amount of Accommodation	
EC32	Amount of Activities	
EC33	Amount of Sea Space (fishing area)	
<i>Fauna</i>		
EC34	Resilience indicators (Biodiversity; spatial patchiness, etc.)	
EC35	% Territory in threatened ecoregions	5 tree species threatened
EC36	% of bird species threatened	4 of 57 (7%)
EC37	% of mammal species threatened	5 of 12 (41.6%)
EC38	% of fish, amphibian, and reptile species threatened	10 of 55 (18%)(amphibian)
EC39	Fisheries Utilization	Fish and Fish Product Trade 708% increase (since 1980)
<i>Natural Hazards</i>		
EC40	Generation of Hazardous Waste	
EC41	Frequency of environmental accidents related to tourism	
EC42	Ave. # of deaths per million inhabitants from floods, cyclones, and droughts	
EC43	Ave. # of deaths per million inhabitants from floods, cyclones, and droughts	
EC44	Waste Recycling Rates	
EC45	Waste management strategies	
EC46	Number of Sewage Treatment Systems	Paradise Island, waste water used for golf courses, Cruise ships established facilities on small islands and cays
EC47	Import of pollution goods and raw materials as % of total imports	
<i>Management</i>		
EC48	Restoration	
EC49	Land use guidelines	
EC50	Level of protection (parks, species, etc)	12 protected locations (1.6% of land)
EC51	% Environmentally managed	
EC52	Formal control over development sites & use densities	
EC53	# of ISO 14001 certified companies	
<i>Tourism</i>		
EC54	Number of cars	
EC55	Vehicles in use per populated area	285.4 per 1,000 inhabitants

**APPENDIX D**  
**Framework Applied to the Bahamas, Ecological Continued**

EC56	Number of registered recreational vessels	
EC57	Number of divers per location	
EC58	Number of visitors to beach	
EC59	Number of Hotel/ Tourist developments	
EC60	Number of Upgraded tourist destinations	Harbor Expansion Nassau, Freeport
EC61	Site attractivity	
EC62	Annual Influx	1,598,000
EC63	Seasonality	
EC64	Length of Stay	
EC65	Mode of Stay	
EC66	Density	

<b><i>Cultural</i></b>		
CL1	Building Materials (local)	
CL 2	Décor	
CL 3	Number of Official sites	
CL 4	Retention of Customs	
CL 5	Shift in Cultural Pride	
CL 6	% Satisfied with cultural integrity	
CL 7	Loss of authenticity	
CL 8	Type & amount of training given to tourism employment	
CL 9	Type of information given to tourists	
CL 10	Artistic Value	
CL 11	Heritage Value	
CL 12	Iconic Value	
CL 13	Lifestyle Value	
CL 14	Multicultural Value	
CL 15	Ritual Value	

<b><i>Economic</i></b>		
<b><i>Employment</i></b>		
EN 1	General Employment	
EN 2	Employment in tourism	
EN 3	Unemployment Rate	10.90%
EN 4	Economically Active Population	( in industry 15.5%)
<b><i>Wealth</i></b>		
EN 5	GDP	4220 million \$US
EN6	Growth Rate of GDP	2%
EN 7	Balance of Payments	\$-438 million
EN 8	Economic Activity Rate	
EN 9	Consumer Price Index	121
EN 10	Purchasing Power Parody	5,154 million international dollars
EN 11	External Aid and Technology Transfer	
EN 12	Military Considerations	

**APPENDIX D**  
**Framework Applied to the Bahamas, Economic Continued**

EN 13	Inflation	
EN 14	State Revenue (tax)	
EN 15	Staff	
EN 16	Administration	
EN 17	Facilities	
EN 18	Development Assistance	\$12 (per capita)
<i>Tourism</i>		
EN 19	% income leakage from community	
EN 20	Tourism % of the local economy	
EN 21	% foreign ownership	
EN 22	% of profit reinvested in community development	
EN 23	Availability of local credit to local business	
EN 24	% of profit reinvested in natural/cultural area	
EN 25	Internal/external ownership of business	
EN 26	Comparative ratio of wages in tourism sector to local wage	
EN 27	Existence of fee structure (tourist vs. local)	
EN 28	Tourism \$ to infrastructure	
EN 29	Primary Energy Production	
EN 30	Industrial Production	
EN 31	Agricultural Production Index	
EN32	Tourism Receipts	1435 million \$US
EN 33	Foreign Direct Investment	250 million \$ US
EN 34	Food Production Index	
EN 35	Major Export and Import Trading Partners	
EN 36	Exchange Rate	1.00 per US \$

<i>Social</i>		
<i>Tourism</i>		
SC1	Host community satisfaction toward tourism development	
SC2	Host community attitude toward tourism development	
SC3	Resident involvement in tourism industry	
SC4	Continue of trade activities by local residents	
SC5	Change in social cohesion	
SC6	Change in family cohesion	
SC7	Change in community structure	
SC8	Tourist satisfaction/attitude toward tourism development	

**APPENDIX D**  
**Framework Applied to the Bahamas, Social Continued**

SC9	Degradation/erosion of natural/cultural resource	
SC10	% Of managerial employment from local residents	
SC11	Citizen's awareness in environment	
SC12	Public awareness toward value of tourism	
SC13	Community Engagement	
<i>Health</i>		
SC14	Health care	3.5% of Population
SC15	Life expectancy at birth	Male 65.2, Female: 73.9
SC16	Infant mortality rate	17
SC17	Total fertility rate	2.3 (decreasing)
SC18	Death rate from intestinal disease	
SC19	Child Death rate from respiratory diseases	
SC20	Children under 5 mortality rate	
SC21	% Of undernourished in total population	
SC22	% Of population with access to improved drinking water	
SC23	Public infrastructure	
SC24	Freshwater resources and availability	98%-Urban, 86% -Rural
SC25	Water supply	
SC26	Sanitation	
SC27	Women's status	
SC28	Sex Ratio	103 women per 100 men
<i>Education</i>		
SC30	Primary Secondary Gross Enrollment	
SC31	Education (# of schools)	
SC32	Gross Tertiary enrollment rate	24%
SC33	Number of researchers per million inhabitants	
SC34	Educational attainment	
<i>Population</i>		
		312 thousand (2002)
SC35	Annual Population Growth	1.90%
SC36	Population age-group	
SC37	Population Density per square km	21.9
SC38	Foreign Born Population	10.50%
SC39	Migration and refugees	103 (of concern)
<i>Crime</i>		
SC40	Crime rate	
SC41	Intentional Homicides	8 (per 100,000 people)
SC42	Corruption measure	
<i>Miscellaneous</i>		
SC43	Newspaper Circulation	99 (per 1,000 people)
SC44	Television Receivers	247 (per 1,000 people)
SC45	Internet Users	55 (per 1,000 people)
SC46	Telephone Lines	400 (per 1,000 people)