Cleaner Technologies as an Aspect of Sustainable Tourism: Caribbean Case Studies

Fitzgerald J. Yaw Jr.

University of Southern Mississippi

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CLEANER TECHNOLOGIES AS AN ASPECT OF SUSTAINABLE TOURISM: CARIBBEAN CASE STUDIES

by

Fitzgerald J. Yaw, Jr.

Abstract of a Dissertation Submitted to the College of Business and Economic Development of the University of Southern Mississippi in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

May 2004
ABSTRACT

CLEANER TECHNOLOGIES AS AN ASPECT OF SUSTAINABLE TOURISM: CARIBBEAN CASE STUDIES

by Fitzgerald J. Yaw, Jr.

May 2004

Tourists are becoming increasingly sophisticated in their selection of tourism destination. A major factor that has been gaining importance in their choice set is the environmental quality of their preferred destination. Tourism planners need to recognize that the sustainability of their destination and its various offerings necessitates the consideration of environmental protection and conservation-related issues. This dissertation undertakes the case study methodology to explore the link between implementing cleaner technologies, a major environmental issue, and sustainable tourism.

The Caribbean is a region in the world that is strongly dependent on tourism for its economic development. Thus the analysis of how cleaner technology is being used to enhance and sustain the tourism industry should be of interest to policymakers and managers in the tourism industry, not only in the Caribbean, but also in other tourism destinations worldwide, including those in the United States.

As part of this project, case studies were conducted in five Caribbean islands. Case studies analysis indicates that cleaner technologies are playing a role in enhancing the sustainability of the Caribbean tourism industry by generating positive environmental/physical as well as economic impacts on the destination. It was also found that there is a Caribbean tourism cluster focused on developing an environmentally sound tourism product.
The study revealed that Caribbean governments are to some extent aware of the
need to facilitate the widest use of cleaner technology in the hotel sector. It was found
that pressure from civil society on the islands studied was not a factor in the use of
cleaner technologies in the tourism sector. Rather hotel operators recognized the cost
saving from using cleaner technologies, as well as the marketing benefits. The evidence
thus suggests that over time more hotels in the tourism sector will invest in cleaner
technology.
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SUSTAINABLE TOURISM: CARIBBEAN CASE STUDIES

by
Fitzgerald J. Yaw, Jr.

A Dissertation
Submitted to the College of Business and Economic Development
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Approved:

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Director

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Dean, College of Business and Economic Development

May 2004
DEDICATION

This dissertation is dedicated to five family members who passed away while I was working on this document, 1999 to 2003. They were: my Aunt Kay (1949-1999); Maternal Grandmother Olga Wray (1913-2001); Aunt Sheila (1940 – 2001); Father-in-Law Alfred Meikle (1917-2003); Brother-in-Law Kenny (1963-2003). Their love was a source of inspiration.
ACKNOWLEDGEMENTS

First of all, I thank God for giving me the strength to persevere through the challenges I have faced in completing this dissertation. Without God’s support I would never have accomplished this task.

I would like to express my heartfelt gratitude to the members of my Dissertation Committee: Dr. Tim Hudson, Dr. David Butler, Dr. Anthony Clayton, Dr. Zaher Hallab, and Dr. Ken Malone. Special appreciation and thanks are extended to Dr. Tim Hudson for the guidance he provided as my Committee Chair. I must extend a special word of appreciation to Dr Mark Miller for making this all possible by his vision in establishing the PhD program in International Development (IDV) at the University of Southern Mississippi. His confidence in me expressed by him offering me a position in the first cohort of the then new PhD program is also appreciated.

Special thanks are due to my wife who provided wonderful support all along, including reading all those early drafts, and providing her insightful comments. Thanks Paulette. My other colleagues in the first cohort were also a source of great support. I want to single our for special mention Dr. Sara Kimmel, the first Ph.D graduate from the IDV program.

There were many friends along the way who were a source of support over this process. Those that I want to highlight include Dr. Jessica Dorsett, Dr. Frank McKenzie, Raoul Thomas, Arlene Wilson, Dr. Margaret Young, Dr. Mark Dickie, Dr. Mike Harrison, Deborah Yaw, Elize Benfield, Ann Jones-Reid, Reggie Burke, Deirdre Shurland, Jeannelle Blanchard, Jennifer Whyte, Carol and Ralph McKenzie, Renee Goins, Joylyn Dennis, Dr. Porfírio Fuentes, Frank Farley, Andre Greaves, Phil and Joy
Williams, Daniel Drennen, Dr. Beverly Brereton, Dr. Ric Keaster, Barbara Whitt-Jackson and Sharon Basir-Singh.

Last but certainly not least I am grateful for the support of my family, including the extended family on my wife’s side. My Mother and Father have always been there with their encouragement and wisdom over the years. My sisters, Karen and Rosamunde, and my brother Chris were always there urging me on. Uncle Norman and his family have been a great example, as were Aunt Marlene and her family. My wife’s parents, brother and sisters always had encouraging words and prayers. Special thanks to my brothers-in-law Trevor, Dennis, Cleve, Donald, and sisters-in-law Cecile, Valrie and Lorraine. I am truly blessed to be part of such a loving extended family.
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LIST OF ABBREVIATIONS

AHTA – Antigua Hotels & Tourist Association
BHTA – Barbados Hotel & Tourism Association
CAST – Caribbean Alliance for Sustainable Tourism
CEHI – Caribbean Environmental Health Institute
CHA – Caribbean Hotel Association
CHEMI – Caribbean Hotel Environment Management Initiative
CPACC – Caribbean Planning for Adaptation to Climate Change
CTO – Caribbean Tourism Organization
EAST – Environmental Audits for Sustainable Tourism
ECLAC – United Nations Economic Commission for Latin America and the Caribbean
EPA - United States of America Environmental Protection Agency
GEF – Global Environment Facility
GIS – Geographic Information Systems
GPM – Gross Profit Margin
IBRD – International Bank for Reconstruction and Development (The World Bank)
JHTA – Jamaica Hotel and Tourist Association
NGO – Non-Governmental Organization
NSF – National Science Foundation
PET - PolyEthylene Terephthalate
SALISES – Sir Arthur Lewis Institute for Social and Economic Studies
SLHTA – St. Lucia Hotel & Tourism Association
SRI – Sandals Resorts International
UN – United Nations
UNDP – UN Development Program
UNEP – UN Environment Program
USA – United States of America
USAID - United States Agency for International Development
USM – University of Southern Mississippi
UWI – University of the West Indies
WTO – World Tourism Organization
WTTC – World Travel & Tourism Council
CHAPTER I
INTRODUCTION
Problem Statement

A good number of tourists are becoming increasingly sophisticated in their choice of tourism destination (Poon 1993 (b); Swarbrooke and Horner 1999). In this regard a major factor in the choice set of these tourists is the environmental quality of their preferred destination. As Bhat puts it “[c]ustomers are demanding environmentally benign products” (Bhat 1999). Distribution channels that connect tourists with destinations and travel-related services, such as tour operators, are also becoming more demanding in terms of their requirements with regard to the environmental policies of the hotels/resorts with which they do business (Cresser 2000, 16, World Travel & Tourism Council et al. 2002).¹

Tourism destinations need to be economically viable (economic sustainability) and should not lead to the destruction or corruption of the destination’s social and cultural values (socio-cultural sustainability). In addition to economic and socio-cultural sustainability, planners of tourism destinations also understand that the sustainability of their product necessitates consideration of issues of environmental protection and conservation. This is attested to by the fact that “[a] fundamental principle of all sustainable tourism development policies is that the natural, social and cultural resources upon which tourism depends should be protected and enhanced” (Sharpley 2000, 12). This dissertation used the case study methodology to explore the link between implementing cleaner technologies (which improves environmental quality), and the

¹ For more on the sustainable tourism policies of tour operators see: Finnair Travel Services http://www.toinitiative.org/good_practices case%20studies/Finnair.pdf
destination’s level of sustainable tourism. It did this by seeking to answer the following question: To what extent have Caribbean hotels/resorts implemented the use of cleaner technologies?

Sustainable tourism is here defined as a process that allows “tourism growth while at the same time preventing degradation of the environment, as this may have important consequences for future quality of life” (Nijkamp & Verdonkschot 1995, 127).

The question of to what extent have Caribbean hotels/resorts implemented the use of cleaner technologies is asked based on the hypothesis that the use of cleaner technologies can contribute to the environmental sustainability of the tourism industry in the Caribbean. This industry is a critical component of the well being of many Caribbean nations, and thus needs to be sustained to ensure that it continues to support the Caribbean economy for generations to come. Table 1 illustrates some of the impacts of tourism, and other important social data for the sample countries.

Delimitations

It is appropriate to state here that even though this study focuses on cleaner technology and the environmental sustainability of tourism it is understood that there are other economic and socio-cultural factors which impact on the sustainability of the tourism industry such as: effective marketing, air access at competitive prices, the security of tourists, and public acceptance (see e.g. Jean Holder in Harrison and Husbands 1996). These factors were not examined in this study. In addition, cruise tourism was excluded from the analysis in this study.

Furthermore this study focused on the facilities/services sector of the tourism system. The tourism system has other sectors such as: attractions, information/promotion,
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<tbody>
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<td>Barbados</td>
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<td>640</td>
<td>15,494</td>
<td>-2**</td>
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<td>8.5</td>
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<td>7</td>
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<td>3,639</td>
<td>1.1**</td>
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<td>46.31</td>
<td>69</td>
<td>1.7</td>
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* PPP: an index that accounts for price differences across countries, allowing international comparisons of real output and incomes. As used here PPP US$1 has the same purchasing power in the domestic economy as $1 has in the United States.

** 2000 Estimated

** 2001 Estimated
and transportation (Gunn 1988). These sectors are interrelated, and therefore the sustainability of a destination’s tourism industry depends on sustainable practices in each sector.

In addition, consideration of issues such as carrying capacity play a role in the sustainability of the tourism industry (Clayton 2002). At the system level, improvements in environmental practices could lead to lower costs that can be passed on to visitors. This could lead to increased visitor levels that could be an added stress on the environment that eliminates any improvements from better environmental performance as a result of the use of cleaner technologies.

Hypothesis

This study was guided by the following hypotheses:

H\textsubscript{1}: The use of cleaner technologies impacts positively on maintaining a sustainable tourism industry.

H\textsubscript{2}: The use of cleaner technologies impacts negatively on maintaining a sustainable tourism industry.

Definition of terms

The following terms are conceptually defined in order to establish their use in this study:

**Cleaner technology**: Cleaner technologies are technologies that allow production with little or no waste through total recycling of by-products. In other words, these are technologies that contribute to the closure of the production-process life cycle.
Asolekar 1999; Rao 1995; United Nations Environment Program [UNEP] Industry & Environment 1998). Examples of cleaner technology related to the tourism sector include:

1. Tertiary treated sewage used for irrigation. This innovative approach to management of water resources provides an economic value to waste water. Technically this approach also closes the loop in terms of water usage by capturing water that previously would have gone to the sea for use in the maintenance of green areas, e.g. golf courses, playing fields, road verges and lawns. In terms of the dependence of the Caribbean region on its tourism product the maintenance of green spaces through irrigation with wastewater cannot be taken lightly (Yaw 1997).

2. Metals, glass, and plastics recycled. The benefits of recycling include: reduction in demand for landfill capacity; reduction in the cost for disposal; income generation through the sale of recovered materials (Yaw 1997).

3. Compost from organic solid waste. Composting involves the biological decomposition of organic materials to produce a stable humus-like product. The composting process is an environmentally sound and beneficial means of recycling organic waste which has revenue earning potential. It converts food waste into a fertiliser product and reduces the amount of solid waste generated (Yaw 1997).

4. Use of renewable energy sources. Solar energy systems, wind power, and geo-thermal wells all have potential for providing renewable energy for various applications in the tourism sector. Solar hot water heating systems are now generally economically feasible for the hotel/resort sector in Caribbean countries (Headley and Moseley 2002).
5. Smart building design to reduce energy demand for lighting and cooling systems. With sustainable design, hotels/resorts can use less energy for room cooling and water heating, harvest water runoff for irrigation (and treat it for potable purposes), and generate electric power using photovoltaic solar power production arrays (Romm and Browning 1998; Melby and Catchart 2002).

**Sustainable Development:** a process “aimed at protecting and enhancing the environment, meeting basic human needs, promoting current and intergenerational equity, and improving the quality of life of all peoples” (Tourism Stream Action Strategy Committee 1990). In terms of implications for the economy sustainable development can be defined as “development without growth in throughput of matter and energy beyond regenerative and absorptive capacities” (Goodland and Daly 1996, 1002).

**Sustainable Tourism:** a tourism industry that operates to satisfy the needs of current tourists and host regions while protecting and enhancing opportunities for future generations (Inskeep 1998). There are several elements that go into sustaining a tourism industry. This study emphasizes the environmental aspect. From this perspective sustainability is achieved when a destination/establishment undertakes tourism planning that maximizes the destination/establishment’s economic returns, while preserving the destination/establishment’s environmental benefits and communally desired socio-cultural traits (Gunn 1988; Hayle 2000)

**Technology:** The application of science to meeting human industrial and commercial objectives. The body of knowledge or “information required to design, build and put to use artifacts for solving human problems” (Ndongko and Vivekananda 1988, 142).
Tourism: The activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business, and other purposes, including:

1. domestic tourism: residents of a country travelling in their own country
2. inbound tourism: non-residents visiting a country other than their own
3. outbound tourism: residents of a country visiting other countries (Elliott 1997).

Tourism system: The inter-linked demand side and supply side of the tourism industry. The demand side comprises the potential tourists while the supply side comprises the information promotion, transportation, attractions, and services that must function together to provide the geographically fixed product that tourists demand (Gunn 1988, 68-69).

Tourists: persons who travel to a country other than that in which they usually reside but outside their usual environment for a period not exceeding twelve months and whose main purpose of visit is other than the exercise of an activity remunerated from within the place visited. Tourists stay in the country for at least one night (Elliott 1997).

Why study cleaner technologies and sustainable tourism?

Sustainable tourism is an important issue given the limits imposed on the human economy by the ecological system (Chichilnisky and Heal 1993; Clarke 1997). There are conflicting views on whether tourism can be sustainable. Sharpley (2000), for example holds that tourism cuts across so many sectors that it is impossible to discuss sustainable tourism. Cater also holds this view, taking the position that the conflicts of interest faced
by investors means that sustainable tourism, from whatever perspective, would be
difficult to achieve (Cater 1995).

In spite of the disagreements about what is meant by sustainable development it is
widely held that for there to be sustainable development “the amount of all mass fluxes
between the anthroposphere and the environment (biosphere and lithosphere) has to be
reduced substantially” (Schnitzer 1995, 310). Sustainable tourism becomes a useful
concept when it is defined as a process that allows “tourism growth while at the same
time preventing degradation of the environment, as this may have important
consequences for future quality of life” (Nijkamp & Verdonkschot 1995, 127). Defined
this way it is a merger of sustainable development and the tourism sector.

The utilization of cleaner technologies leads to a reduction of the environmental
impact of hotel/resort operations (see Asolekar 1999 and United Nations Environment
Program [UNEP] Industry & Environment 1998). This assertion is based on how cleaner
technologies impact the production processes for goods and services in the tourism sector
(Irwin and Hooper 1992). Given that island Caribbean states are very vulnerable to
environmental shocks (ECLAC 2000), the development and diffusion of cleaner
technologies, as defined earlier, increases the viability and sustainability of the Caribbean
model of the tourism industry.

With a role for cleaner technology established in the sustainable development of
the tourism sector the question, therefore, that this dissertation attempted to answer is, to
what extent have Caribbean hotels/resorts implemented the use of cleaner technologies?
This question was answered on the basis of the conceptual model illustrated in Figure 1
of this manuscript. In the form of a hypothesis this dissertation sought to test this
statement: “the use of cleaner technologies impacts positively on maintaining a sustainable tourism industry”.

Figure 1. Linkage between Cleaner Technology and the Tourism Sector

Source: Author

Data were gathered from five Caribbean countries to facilitate case study analysis of selected properties. This case study analysis examined the relationship between the use of clean technology in the lodgings sector of the tourism industry (the dependent variable) and its determinants (the independent variables). Among the independent variables identified for analysis were: (a) gross profit margins, (b) membership in industry associations, (c) the destination’s government policy/regulations, (d) compliance with local environmental laws/regulations, (e) the region of origin of tourists, and (f) the number of guest rooms in a hotel/resort property. These independent variables were selected based on discussions with professionals and managers in the tourism industry. Discussion in the literature of the factors influencing innovation also had a role in the selection of the independent variables specific to the tourism industry (Gold 1981; Hjalager 1994; Rogers, 1995).
This analysis of the use of clean technology in the tourism sector is much needed. Caribbean tourism needs to be sustained to prolong the product’s life cycle and to ensure the economic survival of the region (Blommestein 1995; Holder 1996; ECLAC 2000). In this study, by demonstrating to what extent Caribbean hotels/resorts have undertaken the use of cleaner technologies, it is shown that the use of cleaner technologies is contributing to the sustainability of the Caribbean tourism industry.

This study thus encourages efforts to promote the use of these technologies. Similar work has not being done thus far in the region. Studies of the use of cleaner technology have been done for some major industries in Europe, but not in one study for the Caribbean tourism industry for all the cleaner technologies identified here, and across the five islands in this study (see e.g. Clayton 1999; Dragan 2000; Attzs 2002; Cresser 2002; Headley and Moseley 2002; McDavid 2002; Vernon 2000; Johnson et al. n.d.).

Various regional bodies have acknowledged the knowledge gap in this area for the Caribbean. These bodies include the Caribbean Alliance for Sustainable Tourism (CAST) and the Caribbean Environmental Health Institute (CEHI). CAST provided the author with a cover letter to use in the data collection phase of this research as an indication of the importance they attach to the results of this work (see Appendix A). The research for this dissertation will also contribute to the implementation and output of the cleaner production project that CEHI expects to implement with partial funding from the United States Agency for International Development (USAID) (P. Aquing, pers. comm.).
CHAPTER II

LITERATURE REVIEW

Overview of sustainability

Around the globe people are engaged in activities on a continuum aimed at a minimum at ensuring their survival, and ranging to a maximum of acquiring material possessions to the greatest extent possible, and engaging in cultural and artistic activities. These can be labelled life sustaining/improving activities or economic activities. Humankind carries out life sustaining/improving activities within the context of an ecosystem that imposes limits. Accessible inputs such as energy and other natural resources, for example, constrain nature's productive capacity for humans. The interchange between energy, matter, and waste can be considered the operation of the human economy. Since the ecosystem remains constant in scale except for the very long term (millions of years), as the human economy grows, it is inevitable that over time the economy becomes larger relative to the containing ecosystem (see Figs. 2 & 3). What this means for man’s existence on earth has attracted different viewpoints. Opinions range from the viewpoint that this is of little consequence (see e.g. Lomborg 2001), to asserting that this is a critical issue in man’s survival as argued by Hawken (Hawken 1993).

Economic analysis of the human economy is still underpinned by the neo-classical economic paradigm. This paradigm seeks to get the prices right. Market prices measure the scarcity of individual resources relative to each other. These relative prices do not measure the absolute scarcity of resources in general. In a perfect market it is possible to get to a situation of Pareto optimality (Pearce & Turner 1990, p 11). A Paretian optimum exists when no one in a society can move into a preferable position without causing someone else to move into a position that that person prefers less
In Fig. 2 the circle is equal to natural capital. The square is equal to man-made capital.

Over time man-made capital increases as the scale of the economy grows. However, the containing ecosystem remains constant. All energy and matter used by humans is eventually returned to the environment as waste. This interchange between energy matter and waste in the earth’s ecosystem implies limits.

In Fig. 3 the circle is equal to natural capital. The square is equal to man-made capital.

The increase in scale of the human economy as shown in Fig. 3 highlights the limits imposed by the containing ecosystem.

Taken together, Figs. 2 and 3 illustrate the limits on the economy imposed by the constraining ecosystem.

However at a point of Pareto optimality economic activity can be at an unsustainable level. This is especially so with regard to environmental services due to the fact that many environmental services, especially in the short-run are zero-priced public goods (Sandler 1999). As might well be imagined zero-priced goods tend to suffer from excess demand and over-utilization. For Buhalis and Fletcher “[t]his over-utilization of the natural resources, especially during the peak periods of tourist activity as well as often ill planned tourism development, have provided a number of examples where tourism is in conflict with the environment…” (Buhalis and Fletcher 1995, 4).

**Optimal scale**

Markets single-mindedly aim to serve allocative efficiency. That is they are about optimal allocation given a set of prices. Markets do not serve ecological criteria of sustainability unless appropriate price signals are provided (Tietenberg 1993). This is important because the ecological system on earth of which human beings are a part imposes limits on the human economy (Pearce and Turner 1990; Daly 1996). The extent to which society is able to obtain useful services from the ecosystem depends on how economic activities are organized. The more efficiently human activities are organized with regard to the ecosystem the higher the probability that humans will be able to continue living in a desirable lifestyle (Daly 1996).

Humankind’s capability to extract useful services from the ecosystem can be extended through using what are called “cleaner technologies”. Cleaner technologies are technologies that allow production with little or no waste through total recycling of by-products (see Asolekar 1999; Rao 1995; United Nations Environment Program [UNEP]

At an industry wide, or clean cluster level, the use of cleaner production processes means a group of industries can be located in proximity so that they each are using waste from some of the processes in the cluster as input into other processes in the cluster. This is industrial symbiosis (Kane 2002). With the development of industrial symbiosis an industrial ecology or ecosystem is achieved. This is a state where “the waste produced by one company would be used as resources by another. No waste would leave the industrial system or negatively impact natural systems” (Garner and Keoledan 1998, 3). Thus technology and cooperation can expand resource availability. For this to happen organizations must have environmental management systems in place to guide use of cleaner technology and implementation of cleaner production.

The use of technology leads to the question of to what extent the unlimited growth paradigm can be saved by dematerializing the economy, that is decoupling it from material resources, and substituting ‘information’ for resources (Daly 1996). Again it has to be noted here that based on the second law of thermodynamics over the very long term the unlimited growth paradigm will come to an end (Daly 1991, 149). As used here the word ‘information’ captures production processes, management, training, systems, organization, as it is these activities that enable humans to get needed goods and services using less material resources, especially less virgin material resources. However, Daly illustrated this notion of the limits that are still imposed by the ecosystem, even in spite of human ingenuity, when he said, “We can surely eat lower on the food chain, but we cannot eat recipes!” (Daly 1996, 28).
There are also differing viewpoints on what are the limits to dematerialising the economy through the innovative use of technology. In the book *Beyond Growth* (Daly 1996), Daly seems to be too pessimistic about some of the resource enhancing possibilities of cleaner, more environmentally sound technologies. One of the reasons for coming to this conclusion about Daly is his assertion that “[t]here are compelling reasons to expect natural resources to become more expensive” (Daly 1996, 43). The data does not support this viewpoint (Leon and Soto 1995; Lomborg 2001).

Working against the long-run increase in prices of natural resources includes the fact that recycling and renewable energy sources for example, can be major factors in reducing gross needs for natural resources in production. Thus developments in the use of recycling and renewable energy lead this author to take a more optimistic view on the use of technology for dematerializing the economy. The World Bank (IBRD) supports this more optimistic view as well, asserting in its 1992 *World Development Report* that “the environmental debate has rightly shifted away from concern about physical limits to growth toward concern about incentives for human behavior and policies that can overcome market and policy failures” (World Bank 1992, 10). The question therefore is to what extent has human ingenuity, resulting in the development and diffusion of environmentally sound technologies, increased our ability to obtain useful services from the earth’s ecosystem. Lomborg (2001) is an important advocate of the human ability to continue to extract environmental services from the earth, without humans needing to significantly alter current lifestyles and growth paradigms.
Sustainable development

The relevance of the use of cleaner technology is analyzed in the context of sustainable development as operationalized in sustainable tourism. Defining sustainable development is even more vexing than defining ‘development’. In various nation states around the world activities are being carried out with the aim of raising the standard of living of the persons who live in those political units. It is recognised by more and more people and organisations that while conscious efforts are being made to improve the standard of living of people the integrity of the environment (ecosystem) also has to be maintained. This is known as the process of sustainable development. As put by Goodland and Daly “sustainable development is development without growth in throughput of matter and energy beyond regenerative and absorptive capacities” (Goodland and Daly 1996, 1002). The literature confirms a growing awareness of the need for sustainable development (World Commission on Environment & Development 1987; Pearce & Turner 1990; Daly 1994; Goodland and Daly 1996; Pezzoli 1997; Kahn 1998; Desta 1999).

All these authors demonstrate why the concept of sustainable development is linked to the survival of the human species. The perspective which these authors bring to the link between human activity and the environment illustrates that whatever is done to pursue the goals of development must be placed within the context of the ecosystem in which the human species has to survive. These authors argue that if we do not take into consideration the parameters set by the ecosystem there is the risk of causing irreparable damage to the system, thereby endangering our chances of survival, of raising the
standard of living of the poorest, and more importantly, the chances of survival of future
generations.

Thus one way to start to think of the concept is to see sustainable development as
a process “aimed at protecting and enhancing the environment, meeting basic human
needs, promoting current and intergenerational equity, and improving the quality of life
of all peoples” (Tourism Stream Action Strategy Committee 1990).

Sustainable development is one of those important concepts that cannot be
precisely defined for the purposes of analysis because of its dialectical nature. It is
important to bear in mind that the concept of sustainable development is not a static
position to which we strive. In fact, how sustainable development is made concrete
depends on the participation of citizens in the process. This leads to the conceptualization
of sustainability as “a moving beacon drawing us onward, not a predefined goal whose
achievement marks the end of the journey” (Prugh et al. 2000, xv).

Sustainable development is thus a holistic process leading to the goal of
sustainability. Social scientists have aptly separated ‘sustainability’ into social,
environmental, and economic components (Cox and Embree 1990; Desta 1999; Dobson
1991; Smith 2000). This dissection further illustrates the multi-faceted nature of the
process of sustainable development. It also provides some insight into the differing
approaches to operationalizing sustainable development.

There is a free market approach that theorizes that functional markets are the best
protectors of the environment, especially because these markets lead to the development
of technology to counteract negative externalities of development (Vos 1997). Another
approach to sustainable development is the ecological-science model that accepts that
there are limits to human activity. “This approach argues that while technological
development is essential, it cannot produce sustainability by itself” (Vos 1997, 15).

As an operational concept Berke and Conroy define sustainable development as
“a dynamic process in which communities anticipate and accommodate the needs of
current and future generations in ways that reproduce and balance local social, economic,
and ecological systems, and link local actions to global concerns” (Berke and Conroy
2000, 23). This systems approach for achieving integrated environmental and business
decisions has also being emphasized by Singh (2000).

Another implication of the view that sustainable development is a part of a
process in which people are involved as conscious citizens is that “[s]ustainability will be
achieved, if at all, not by engineers, agronomists, economists, and biotechnicians but by
citizens” (Prugh et al. 2000, 5). Thus the people in their deliberate judgment of the facts
available to them would fashion sustainable businesses, communities, nations, and by
summation, a sustainable earth.

A useful perspective on sustainable development when applied to the daily
activities of citizens and businesses can be gleaned from the fifteen principles of the
Council on Sustainable Development of the President of the United States of America
These principles are:
1. We must preserve and, where possible, restore the integrity of natural systems-soils,
   water, air, and biological diversity-which sustain both economic prosperity and life
   itself.
2. Economic growth, environmental protection, and social equity should be interdependent, mutually reinforcing national goals, and policies to achieve these goals should be integrated.

3. Along with appropriate protective measures, market strategies should be used to harness private energies and capital to protect and improve the environment.

4. Population must be stabilized at a level consistent with the capacity of the earth to support its inhabitants.

5. Protection of natural systems requires changed patterns of consumption consistent with a steady improvement in the efficiency with which society uses natural resources.

6. Progress toward elimination of poverty is essential for economic progress, equity, and environmental quality.

7. All segments of society should equitably share environmental costs and benefits.

8. All economic and environmental decision-making should consider the well being of future generations, and preserve for them the widest possible range of choices.

9. Where public health may be adversely affected, or environmental damage may be serious or irreversible, prudent action is required in the face of scientific uncertainty.

10. Sustainable development requires fundamental changes in the conduct of government, private institutions, and individuals.

11. Environmental and economic concerns are central to our national and global security.

12. Sustainable development is best attained in a society in which free institutions flourish.
13. Decisions affecting sustainable development should be open and permit informed participation by affected and interested parties, that requires a knowledgeable public, a free flow of information, and fair and equitable opportunities for review and redress.

14. Advances in science and technology are beneficial, increasing both our understanding and range of choices about how humanity and the environment relate. We must seek constant improvements in both science and technology in order to achieve eco-efficiency, protect and restore natural systems, and change consumption patterns.

15. Sustainability in the United States is closely tied to global sustainability. Our policies for trade, economic development, aid, and environmental protection must be considered in the context of the international implications of these policies. (Daly 1996, 13-18).

The fifteen principles taken together reflect a precautionary approach to development. For practitioners that means that in cases where there is uncertainty about the impacts of a development activity there should be erring on the side of caution (Lomborg, 2001). This expresses the view that human activity does have an impact on the physical environment that in some cases is unknowable given the available information and technology.

Global perspective

In discussing the issue of sustainable development an important consideration is the need to take a global view. Such a perspective brings home the interconnectedness of the globalized world, and the associated global environmental threats. Such a vision makes it impossible to:
hold out the vision of development as a worldwide generalization of the U.S. standard of living. Rather it would start with the recognition that, due to the limits of the entropic flow, it is unrealistic to think that the standard of per capita resource use of that 5% of the world’s population in the United States could ever be generalized to 100% of the world’s 5.5 billion people. We must either admit that such development is only for a minority or else redefine development in a way that is generalizable to all. (Daly 1996, 196)

Since Daly wrote in 1996 the world’s population has risen to over six billion in 2003 (U.S. Census Bureau 2003).

The Caribbean

In the Caribbean, the area of focus of this study, sustainable development involves the reversal of five centuries of intensive human impact on the environment. That human impact eliminated most of the indigenous human populations, flora, and fauna, and saw the introduction of people, flora, and fauna from around the world. It also created economies that produced what they did not consume, and consumed what they did not produce (see Thomas 1974). Sustainable development in this context involves restoring depleted resources, improving decision-making institutions, using resources more efficiently, modernizing the infrastructure, changing the incentive structures to facilitate better use of terrestrial and marine resources, and improved decisions about family size, employment choice, and migration patterns (Beller et al. 1990; McElroy et al. 1990).

In Caribbean countries migration cannot be ignored as a vital part of the process of optimizing economies for sustainability. This is because the vast majority of the
population of the Caribbean is comprised of people brought to the region to function in an economic structure that has been changed drastically. In the current economic structure it is not absolute population size that is critical to development, but rather the quality of that population as measured in terms of human capital, and the state of the fragile ecosystems of these island states. This fragile ecosystem and its impact on developmental considerations are captured in this excerpt:

In the case of island destinations, factors such as biophysical, economic, and political insularity and smallness, escalating global demand for marine and coastal tourism, exceptional fragility of marine and coastal resources, primary dependence of island tourism on marine and coastal resources, and the detrimental effects of global climate change and sea-level rise on marine and coastal resources have further intensified the pursuit of sustainable development by the tourism sector.

(Apostolopoulos and Gayle 2002, 105)

Implementing cleaner technology

The operationalization of sustainable development in the Caribbean requires changing the parameters within which economic activities are currently organized in the region (Schnitzer 1995). In other words operationalizing sustainable development requires new technology (here read cleaner technology) as well as fundamental social, political, and economic transformation.
Brown et al. (1999) illustrate how an economy that is developing sustainably would evolve:

In a sustainable economy, the fish catch does not exceed the sustainable yield of fisheries, the amount of water pumped from underground aquifers does not exceed aquifer recharge, soil erosion does not exceed the natural rate of new soil formation, tree cutting does not exceed tree planting, carbon emissions do not exceed the capacity of nature to fix atmospheric CO$_2$, and plant and animal species are not destroyed faster than new ones evolve. (Brown et al. 1999, 15-16)

Given the paragraph above the sustainable economy is one that shifts from the one-time depletion of natural resources to one that is based on renewable energy and that continually reuses and recycles materials. It is a solar-powered, bicycle/rail centered, reuse/recycle economy, one that uses energy, water, land, and materials, much more efficiently and wisely than we generally do today. In summary the sustainable economy is one that is based on the use of cleaner technology.

The thesis is that cleaner technologies contribute to the closure of the production-process life cycle (Irwin and Hooper 1992). This is an element of what is involved in the operationalizing of the concept of sustainable development. Following Rendan (1994) and Clayton (1999) the author sees the use of cleaner technology as a conceptual and procedural approach to the development, purchase, and use of processes and products that prevents and reduces internal and external environmental problems throughout a product’s life cycle. The use of cleaner technology would lead to results such as:
minimization of the volumes and hazards of gaseous, liquid and solid wastes;
- minimization of the risk of accidents involving chemicals and processes;
- minimization of the consumption of raw materials, water, and energy; and
- use of substitute chemicals and processes less hazardous to human and ecological health (see Clayton et al. 1999, 14).

These results come about because the underlying tenet of the use of cleaner technology is improved overall energy and resource-use efficiency by minimizing or eliminating wastes at source or by using them as inputs into other processes (Clayton et al. 1999, 12). Thus cleaner technology seeks to reduce the environmental impact of human economic activities by eliminating rather than minimizing or cleaning up waste streams. The approach to economic activity that incorporates cleaner technology reduces the human footprint on the earth’s ecosystem. In this view the use of cleaner technology is one of the criteria for a sustainable economy. This is so given that it is accepted that there are limits to the capacity of the earth to act as a sink for the output from human activity. This is the position that, for example, is taken by those who hold that human use of fossil fuels is contributing to global warming (see for example the United Nations Framework Convention on Climate Change website).

In addition by reducing or eliminating waste streams, another powerful effect of utilizing cleaner technology is that it reduces costs. An example of this is the use of solar power for heating water. After the initial investment for the components of the solar water heating system heating of water does not have the energy component that is present
when water is heated by electricity or gas (Headley and Moseley 2002; P. Melby, pers. comm.).

The adoption of cleaner technology also can enable firms to generate revenues from what were previously classified as waste streams, by diverting these ‘waste’ streams to other firms/sectors, where the supplying sector’s ‘waste’ is the receiving firm/sector’s input. This scenario, which reduces environmental impact of economic activities system wide, can be regarded as win-win, and has been concretely argued by Porter and van der Linde (1995a,b), Arnst et al. (1997), Boyle (1999), Reinhardt (1999), Deutsch (2001), and El-Kholy (2002).

The win-win situation referred here is linked to the fact that companies can adjust their processes to become more environmentally friendly, or in some cases meet legally mandated environmental standards. In so doing they may also reduces costs or make money where what were previously seen as waste streams “could be effectively marketed to surrounding companies rather than being discarded” (Boyle 1999, 84). This win-win scenario is linked to the innovation issues discussed in this study. As expressed by Porter and van der Linde “[b]y stimulating innovation, strict environmental regulations can actually enhance competitiveness” (Porter and van der Linde 1995b, 98).

**Diffusion of cleaner technology**

*Technology* as a concept is usefully defined as the application of science to meeting human industrial and commercial objectives. The body of knowledge or “information required to design, build and put to use artifacts for solving human problems” (Ndongko and Vivekananda 1988, 142).
Rogers (1995) postulated that “[a] technology usually has two components: (1) a hardware aspect, consisting of the tool that embodies the technology as a material or physical object, and (2) a software aspect, consisting of the information base for the tool” (Rogers 1995, 12). The use of solar panels for heating water and energy is a good example of technology in the context of this discussion. Cleaner technology in tourism involves “sustainable resource use, which includes increasing efficiency of resource use, minimization of waste and reduction of over consumption, the substitution of environmentally-benign inputs and equipment wherever possible, and the safe disposal of waste where the latter is unavoidable…” (Goodall 1995, 31).

The adoption of cleaner technology depends on the factors influencing the rate of diffusion. Diffusion in relation to cleaner technology involves “the process by which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication, in that the messages are concerned with new ideas” (Rogers 1995, 5).

Government policies, which can affect the rate of diffusion of technology, reflect the power structure that in turn affects who controls the information flow. Government policies also speak to the social construction of technology and links to the point that the pursuit of sustainable development is not a process that will progress only because of its logic, but also by the socio-political strength of the key decision-makers within any given society. Mowforth and Hunt expressed this by observing that “we believe there to be no absolutely true nature of sustainability and, as the last section has illustrated, it is not definable except in terms of the context, control and position of those who are defining it” (Mowforth and Hunt 1998, 105).
Public policy is important and directly impacts on the diffusion of technology because it is public policy that establishes the climate in which businesses operate, signalling by executive orders, tax policies, research and development policies, industrial policies, education policies, policies on infrastructure, on accounting rules and incentive regimes what is seen by the government concerned as the desired direction (Hjalager 1994). In this case the desired direction with regard to the use of cleaner technology. The foregoing implies that there is a dialectic tension within government decision making here, as on the one hand the government desires to facilitate economic development. On the other hand the government has the role of guarding the environment from the possible excesses of the economic development process.

Hjalager (1994) and Stoneman & Diederen (1994) discussed the necessity for detailed analysis of the role of government in the diffusion of cleaner technology. The latter authors aptly observed:

that diffusion policy merits as much emphasis as R&D policy (if not more), but that diffusion policy should not proceed upon a presumption that faster is always better nor that only an information providing policy is required. The tapestry of the economic and social environment within which technological change takes place is rich and varied and it is necessary that any policy adequately reflects the diversity and heterogeneity of markets, environments, and objectives. (Stoneman and Diederen 1994, 929)

Gold (1981) looked more closely at the diffusion of technology from the perspective of business, viewing rates of diffusion of technology as being determined
essentially by managerial decisions at the level of individual firms. The framework for these decisions is termed “the pre-decision environment” (Gold 1981, 254). Irwin and Hooper (1992) also argued that the business environment was critical to the diffusion of technology, highlighting the importance of corporate culture and availability of capital as determinants of innovation.

This ‘pre-decision environment’ for firms in the tourism sector, especially in relation to how the issues of sustainable development are ranked, would impact significantly on the diffusion of cleaner technology (Forsyth 1995). Elements of this ‘pre-decision environment’ within which cleaner technology would be diffused “include: the specific nature and the relative urgency of the major needs to be dealt with over the period covered by the firm’s capital planning horizon; the availability and relative advantages of non-technological as well as technological means of meeting such needs; and the extent of technical, managerial and financial resources available for allocation to such efforts” (Gold 1981, 255).

Managerial evaluation also includes some other important elements that speak directly to a firm’s position in its industry, the nature of its clients and so forth. E.g. Gold (1981) observed that technical decisions would also involve “the firm’s market prospects, its effective capacity and the modernity of its facilities, which would jointly determine whether the adoption decision involved expanding capacity or replacing already depreciated equipment, or displacing more recent and only partly depreciated capital goods” (Gold 1981, 255).
Industrial clusters

Another factor that potentially can influence the decision-making within firms in the Caribbean tourism sector with regard to the adoption or non-adoption of cleaner technology is the factor of industrial clusters. These clusters consist of a geographically close group of companies that “have a strong emphasis on research, learning and development and high levels of inter-company information exchange” (Clayton 2001, 16). An industrial cluster as an area of analysis was first used in Europe, but has been applied to scenarios in developing countries with useful results. Schmitz reported that with regard to small and medium-sized firms from developing countries breaking into international markets “[e]xplanations of the success stories have emphasized in particular the importance of co-operation amongst the clustering enterprises” (Schmitz 2000).

Looking at the possible impact of cluster analysis on the decision-making of firms in the Caribbean tourism sector is appropriate because clustering is seen by those who champion this approach as a means for firms to increase their individual competitiveness through co-operation with each other. This cooperation can lead to benefits such as optimisation of infrastructure investment, scale economies for training programs, and a stronger platform for lobbying for incentives (see Miller 2000).

Currently in the Caribbean tourism industry there is embedded cooperation among the operators, ranging from joint marketing, to membership of trade groups that provide technical support services to members. In this regard see the operations of the Caribbean Hotel Association (www.caribbeanhotels.org) and the Caribbean Tourism Organisation (www.doitcaribbean.com). This working together may well influence the decision-making in hotels/resorts with regard to the use of cleaner technology. It has been
suggested that a sustainable Caribbean tourism product depends on a combined (or clustered) regional force to create a competitive edge in the tourism market (see Holder 1998; USAID/Jamaica Caribbean Regional Program 2001).

Competitors working together in clusters might seem counter-intuitive to the competition that spurs the capitalist economy. However the literature on the theory of industrial clusters implies that competitors do not have to co-operate with each other all of the time. It is only necessary for them to cooperate with each other so as to respond successfully to significant opportunities and crises (Porter 1990; Hill and Brennan 2000; Schmitz 2000). In fact in successful clusters “there is usually both competition and cooperation” (Clayton 2001, 20). With regard to sustainable Caribbean tourism development that implies a process of balance with nature: “Close cooperation between tourism enterprises at the destination level is regarded as essential for harmonic development” (Buhalis and Fletcher 1995, 17).

Adoption of cleaner technology depends also on financial and technical resources. Of special relevance to the highly competitive tourism sector is firm level “assessment of the potential advantages and disadvantages of adoption at this time as over against delaying such action-considering the possibilities of further improvements in the innovation and the costs of lagging behind pioneering competitors, as well as expected changes in the availability to the firm of needed resources” (Gold 1981, 255-256). These factors influencing firm level decisions about the use of cleaner technology are “consistent with the three categories of stimuli behind corporate environmental responsiveness distilled from the World Resources Institute’s major study. Their
categories are: public pressure, economic concerns, and corporate values” (Cummings 1997, 95).

Technological innovation in the Caribbean tourism sector

The economic factor of profitability shapes the technological innovations that are diffused to consumers, in this case, managers of tourism enterprises. In the Caribbean these managers do innovate. As observed by Poon “[t]he record of innovation in the Caribbean hotel sector is excellent. However this record is by no means consistent or inclusive” (Poon 1993a, 139). One example of innovation by Caribbean tourism enterprise managers is the all-inclusive concept (Jayawardena 2002, 10). The development of this concept illustrates that Caribbean tourism managers can control their own destiny, if they are willing to be innovative.

Innovation activity by managers of tourism enterprises is captured within the framework of endogenous technological change. This factor in the diffusion of technology was explored by Romer (1990). He developed a model for technological change that saw new technologies being deployed because profit-maximizing firms saw the possibilities of higher revenues through obtaining quasi-rents, or prices above marginal cost for products using new technologies.

In the framework advanced by Romer the goods produced incorporating the new technologies only had to be non-rival and partially excludable in consumption for the quasi-rents to be earned which justified their diffusion in the market. This follows because of how nonrival and excludable goods are defined. A non-rival good “has the property that its use by one firm or person in no way limits its use by another.
Excludability is a function of both the technology and the legal system. A good is excludable if the owner can prevent others from using it” (Romer 1990, S74). This model therefore allows for intentional private investment in research and development. Porter and van der Linde (1995a,b) also discussed the ability to earn rents for green products.

As referred to earlier consumer demand for environmentally sound vacation experiences is one of the drivers of the use of cleaner technology in the Caribbean tourism sector. Hjalager (1996) also sees the dynamic innovation that use of cleaner technology represents as being a response to environmental disequilibrium and policy regulations. However in looking at technological innovation in the tourism industry one of the challenges is “that regular innovations may be almost invisible, yet they have a dramatic cumulative effect on product costs and performance” (Hjalager 1994, 209).

Another driver of the use of cleaner technology in the tourism sector are tour operators. The importance of these operators stems from the fact that in some cases they are responsible for getting significant numbers of tourists to visit specified vacation locations. As tour operators respond to the needs of their clients for environmentally sound vacations they will pressure hotels and resorts “to avoid production of unnecessary waste, to stop using excessive energy and water and to ensure cleaner waste-water disposal” (de Haan 1995, 46)

Sustainable tourism and cleaner technology

In countries such as those found in the Caribbean, where tourism is a major contributor to the economy, and is heavily dependent on the fragile ecosystem,
sustainable development efforts, it would seem, should focus on tourism (Gayle and Goodrich 1993; Government of Jamaica 2001; Sharpley 2000). Sustainable tourism can be seen as the model that will ensure that Caribbean development is sustainable by integrating sustainability into this critical economic activity. From a systems approach the process of sustainable tourism can be seen as the operation of the economic system and the ecological system to produce a tourism product within the wider Caribbean economic and ecological system (see van den Bergh 1992). All this is with the understanding that if the systems are not in balance then there will be breakdown, manifested in lower employment, environmental degradation, lower quality of life, etc. This is captured by the WTO’s definition of sustainable tourism development as:

- a process that meets the needs of present tourists and host regions while protecting and enhancing opportunity for the future. It is envisaged as leading to management of all resources in such a way that economic, social, and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems.(Inskeep 1998, 21)

Sustainability inherently, concerns the way in which humans utilize the physical environment. However defined, it suggests a ‘duty of care’, in this case, at least, for the physical environment. In order to use the natural resources sustainably tourism must operate within the natural resources capacities for regeneration and future productivity of primary resources, that is maintain the stock of renewable natural resources, as well as seeking to enhance the quality of life (UNEP Industry and Environment 1995). Tourism and tourists as used here are defined following Elliott (1997) [see Definition of Terms,
above, 6-7]. The tourism industry, one of the largest industries in the world, can be operated in a sustainable or unsustainable manner (Henry and Jackson 1996; WTTC et al. 1996)

*The international tourism industry*

In economic terms, international tourism receipts are classified as exports and international tourism expenditure as imports. For many Caribbean countries, international tourism is an indispensable source of foreign-currency earnings. According to the analysis presented in WTO’s *Tourism Economic Report, 1st edition - 1998*, tourism is one of the five top export categories for 83 per cent of countries and the main source of foreign currency for at least 38 per cent of them. Table 2 illustrates the economic importance of tourism on a global scale, while Table 1 shows some of the economic impact of tourism in the Caribbean.

### Table 2
Worldwide Export Earnings 1998

<table>
<thead>
<tr>
<th>Total worldwide export of services and goods</th>
<th>US$ billion</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>among which:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Tourism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Tourism Receipts</td>
<td>532</td>
<td>7.9</td>
</tr>
<tr>
<td>International Fare Receipts</td>
<td>91</td>
<td>1.3</td>
</tr>
<tr>
<td>2 Automotive products</td>
<td>525</td>
<td>7.8</td>
</tr>
<tr>
<td>3 Chemicals</td>
<td>503</td>
<td>7.5</td>
</tr>
<tr>
<td>4 Food</td>
<td>443</td>
<td>6.6</td>
</tr>
<tr>
<td>5 Fuels</td>
<td>344</td>
<td>5.1</td>
</tr>
<tr>
<td>6 Computer and office equipment</td>
<td>399</td>
<td>5.9</td>
</tr>
<tr>
<td>7 Textiles and clothing</td>
<td>331</td>
<td>4.9</td>
</tr>
<tr>
<td>8 Telecommunications equipment</td>
<td>283</td>
<td>4.2</td>
</tr>
<tr>
<td>9 Mining products other than fuels</td>
<td>158</td>
<td>2.3</td>
</tr>
<tr>
<td>10 Iron and steel</td>
<td>141</td>
<td>2.1</td>
</tr>
</tbody>
</table>

In looking at the international tourism industry this study will focus on how it is manifested in the Caribbean. In this region tourism has been based on the sun, sand, and sea model, capitalizing on the natural attributes of the region. These include salubrious climate, good environment, wonderful beaches, and interesting marine and terrestrial scenery.

Tourism is a service industry depending on linkages between various service providers to offer an experience to visitors. In the Caribbean because of the historical development of the region the lack of linkages between economic sectors have led to high foreign exchange leakages out of the region (Thomas 1974; Curry 1992). Regional foreign exchange earnings have had to be used for the purchase of goods and services such as airlift of visitors, cruise ships for cruise passengers, reservation services, food imports, construction materials, energy (Thomas 1974; Karagiannis and Salvaris 2002; Jayawardena 2002).

The Caribbean caters to tourists from around the world, though the USA is the major market (Karagiannis and Salvaris 2002). The sector comprises both stopover visitors as well as cruise passengers. In a wider discussion of sustainable tourism in the Caribbean the impact of the cruise sector must be analysed.

Caribbean tourism competes with other tourism destinations worldwide. The region has been competitive but it is relatively more expensive than most competing destinations (Karagiannis and Salvaris 2002, 46). The region does benefit from relative proximity to its most important market, the USA. The major players in the Caribbean tourism industry have also innovated and improved their product so as to better compete with other destinations (Poon 1993a).
Operating costs in the Caribbean are relatively high compared to the US mainland, a major competing market, and other tourist destinations (Karagiannis and Salvaris 2002; Jayawardena 2002). Thus even with high revenues margins are thin. The industry benefits from direct and indirect support by regional governments in the form of tax incentives, government guarantees, and cheap loans (McDavid 2002). This is because regional governments recognize the importance of the sector as a generator of foreign exchange, and a provider of employment.

Among the challenges facing managers of Caribbean tourism enterprise is the increased competition for the core USA visitors. In the USA this increased competition takes the form of aggressive marketing by US states, often involving private/public cooperation, increased investment in man-made and natural attractions, and improved service (Hall et al. 2002). Caribbean hoteliers are meeting these challenges by investing more in marketing, at a regional level, nationally, and in advertising campaigns run by major hotel chains or individual properties, using private sector/public sector partnerships, investing more in training, refurbishing and retrofitting properties, and building new hotels/resorts (Pearson and Williams 2002).

A sustainable tourism product, in the context of the delimitations of this work, maximizes the use of clean technologies. In this context sustainable tourism enterprises would:

- promote renewable energy
- encourage solid waste approaches that promote reuse, recycling, and reduction
and generally operate in a framework of understanding the global impact of local actions, including impacts on global environmental and trade treaties and protocols.

Since the mid-1980s sustainability has become an increasingly important aspect in planning tourism (World Commission on Environment and Development 1987; Briassoulis and van der Straaten 1992; Eber 1992; Blommestein 1995; Burns and Holden 1995; Hunter 1995; Hall and Lew 1998; Gooden 2002). Today, there is much justifiable concern expressed about development of any type, including tourism, being sustainable. The right type of planning can ensure that the natural and cultural resources for tourism are indefinitely maintained and not destroyed or degraded in the process of development. The author agrees with Hjalager that the “growing concern for environmental sustainability is an issue which should be studied more carefully within the conceptual framework of innovation theory. Only in this way will it be possible not only to observe the threats posed to the tourism industry, but also to identify the opportunities and innovations provoked by environmental awareness” (Hjalager 1994, 221). In other words the need for environmental sustainability should lead to innovations in the industry to enable the industry to be profitable while not destroying the environmental base it needs for survival.

The opportunities and innovations that are linked to environmental awareness have an impact on the life cycle of the tourism product itself. This can be illustrated by examining the normal life cycle of tourism destinations. In this generalized scenario adapted from Blommestein (1995) there is firstly a steady rise in visitor arrivals. This is followed by gradual decline in the rate of growth of arrivals with the causes not being
immediately clear. However tourist arrivals continue to rise and the existence of a
problem is not discussed. However decline of the tourism product reaches a point where
tourist arrivals start to decrease, and at this stage there may be acknowledgement of a
problem that needs to be addressed (see Fig. 4).

*Figure 4: Number of Tourists as a Function of Environmental Quality*

*Source: Blommestein 1995, 200*

In decline the tourism product begins to look like low value for money to tourists
due to dilapidated physical plant and deteriorating attractions. It is at this point that
remedial measures may be implemented. In the competitive tourism industry these
measures may be too little, too late.

In more and more Caribbean countries where tourism is an important economic
activity, people understand that for the long-term survival of the tourism industry
maximum linear growth in terms of rooms and attractions without any consideration of
environmental impacts will not hold (Williams 1992). This is a reflection of the dialectic tension between preserving the assets that make for a quality tourism product over the long term and uncontrolled expansion which maximizes short-term returns, with the result of a deteriorated product and declining returns in the medium to long term. Blommestein (1995) concludes that global competition will force the region to become more environmentally conscious or find itself marginalized in the global tourism market (León and González 1995; Henderson 2000). Some already refer to the region as a “tired destination” (see Percival 2002, 73).

Cleaner technology and waste management

One of the consequences of modern economic activities, and improved standards of living is the generation of increasing quantities of waste from household, tourism, industrial, agricultural and other activities. Waste generation patterns are linked to standards of living and production systems. Management of waste reflects concerns about the ecosystem and ranges along a continuum from unconcern, to proactive measures to reduce/eliminate waste. It is now understood that the environmentally sound management of the disposal of wastes is an important generator of demand for the adoption of cleaner technology. This is especially so for the tourism industry where perceptions of visitors play a major role in the marketing of tourist destinations (Yaw 1997).

This argument echoes the earlier conclusions of the Tourism Stream Action Committee of the Globe ‘90 conference on sustainable development held in Vancouver, Canada, where the management of solid wastes was included as one of the action areas for ensuring that tourism contributes to a sustainable development process (Tourism
A strategically planned tourism sector will not only be environmentally sound, but also possess a competitive advantage in the marketplace, as increasingly tourists are becoming more discriminating in their choices (Poon 1993b; Swarbrooke and Horner 1999).

In an increasingly competitive tourism world the most successful tourist destinations would be those where tourism development is planned from the standpoints of both achieving high tourist satisfaction levels and bringing substantial benefits, with minimal disruptions, to the local economy, environment, and society (see Inskeep 1991). Coccosis (1996) supports this point and argues that the overall quality of environmental assets and resources at tourist destinations has become key determinants of holiday choices (Coccosis 1996, 6). In the Caribbean there is a regional approach to environmentally sound policies with regard to development of the tourism sector. It is known as the Green Globe program (see http://www.caribbeanhotels.org; http://www.greenglobe21.com).

This program is an international certification system in which hotels and resorts comply with a set of specific environmental standards in their operations. The Green Globe program combines the environmental management system requirements of the International Standards Organization 14001 standard with the United Nations Conference on Environment and Development Agenda 21 Principles of Sustainable Tourism.

Green Globe evaluates hotels and resorts in order for them to obtain the prestigious Green Globe certification. Hotels certified by Green Globe 21 guarantee their clientele that they take into consideration the environment in their daily operations, are not abusive of nature and its resources, without sacrificing the quality of their product
and their services. The Green Globe 21 system improves the quality of the customer experience by putting into place a culture that embraces economical, environmental and socio-cultural sustainability. This assertion is based on the fact that tourism consumers are increasingly concerned about the environment (Best 2002; Cresser 2000). This program has had an impact on the use of cleaner technology in the Caribbean tourism sector. The Caribbean is the region of the world with the greatest number of Green Globe certified hotels (see www.cha-cast.com; www.greenglobe21.com).

Another similar environmental management program that is currently being implemented in Jamaica is the Environmental Audits for Sustainable Tourism (EAST) project. The project was launched in 1997 to assist Jamaica’s tourism industry implement effective environmental management practices and improve its environmental performance. The EAST project, now in its fourth phase, is funded by USAID and implemented in collaboration with the Jamaica Hotel and Tourist Association (JHTA) (H. Cresser, pers. comm.). There is synergy between the work of the EAST project and the Green Globe program. EAST was partly responsible for introducing the Green Globe program to the region. Under the project, the Negril Cabins property in Jamaica in 1988 became the first hotel in the world to meet the requirements for Green Globe certification (PA Consulting Group June 2001).

The EAST program is being replicated in the Eastern Caribbean under a program called the Caribbean Hotel Environmental Management Initiative (CHEMI) (J. Blanchard, pers. comm.). The program works with hotels in the Eastern Caribbean that have a maximum of 75 rooms. It seeks to build on what was learnt from the EAST
project and extend the success of that program to the Eastern Caribbean where tourism is an increasingly important part of economic activity in those territories.

The importance of environmentally sound waste management, based on the use of cleaner technology, as a component of sustainable tourism is related to the fact that many tourists are interested in seeing exotic sights in a familiar context. Although this fact has been changing as more tourists opt for the environmentally conscious (eco-tourist) experience, it remains the case that the familiar context for most tourists is the high consumption, throwaway culture of the industrialized countries, and the middle classes and elites of the developing countries. An important point to note in considering sustainable tourism is the importance of business travel. As more destinations promote themselves as venues for conferences and conventions they need to provide the material comforts which business travellers are accustomed to, and this would also reflect the high material consumption standards of the industrialized countries where the majority of the business travellers originate.

Cleaner Technology, Sustainable Tourism, and Sustainable Development

In examining the relationship between cleaner technology, sustainable tourism, and the process of sustainable development there are many issues to be explored. These include the diffusion of cleaner technology, green certification, government policy, expectations of tourists, and so on. In this study, these issues were explored in relation to the Caribbean region through case studies of selected hotel/resorts in Antigua, Barbados, The Dominican Republic, Jamaica, and St. Lucia (see Fig. 5). These are all
countries where the tourism sector is a major contributor to economic activity. See Table 1 for a statistical profile of the sample area.

Rationale for Study

In the Caribbean tourism is the major force driving economic activity (Jayawardena 2002; Karagiannis and Salvaris 2002). There are other regions of the world of course where the tourism industry is very important to the development prospects of
those regions, but not as important as the industry is in the Caribbean. The Caribbean region "has the largest proportion of people employed in (25%) and GDP gained from (29.6%) this sector compared to any other region in the world" (CTO 1999, 1). This study examined the tourism industry as it relates to sustainable development, attempting to formally demonstrate the link between cleaner technology and sustainable tourism by examining to what extent Caribbean hotels/resorts have implemented cleaner technologies.

In small island states such as those in the Caribbean the issue of sustainability is particularly important given the fragility of their ecosystems and the fact that the tourism sector is highly dependent on the natural environment (ECLAC 2000). The small size of the islands means that unsuitable environmental practices have severe impacts that are difficult to reverse. For example, because the islands generally have high volcanic ranges, with steep slopes that are cultivated by small farmers, often with inappropriate techniques, this leads to erosion of topsoil. The topsoil then washes into the sea and damages the coral reefs that surround these islands, leading to destruction of the coral reefs. When these reefs are damaged it affects beach protection, thus leading to potentially, destruction of the very features that tourists go to those islands to experience (UNEP 1999). These reefs are also damaged by untreated sewage pumped into the sea from some of the same properties in which tourists stay. This happens due to the use of inadequate and environmentally unsound technology (Yaw 1997). Extreme weather events such as hurricanes, and over-fishing also contribute to reef damage (UNEP 1999).

The extant literature indicates that the insular countries in which research will be conducted have chronic challenges in achieving sustainable development (see McGregor
et al. 1998; Thomas 1974; Curry 1992). The challenges the islands face are linked to lack of human resources, small resource bases, size, extreme weather events, and economic structure. Thus any approach, which leads to more efficient utilization of the resources of these islands, will serve to make it more feasible for these states to survive in the globalizing world economy. One possible approach is by means of the extension of mankind’s capability to extract useful services from the ecosystem through using cleaner technologies.

The case studies conducted demonstrated that adoption of cleaner technologies will involve reengineering of production and consumption systems to minimize resource use, maximize recycling and reuse, and minimize waste generation. Adoption of cleaner technologies will involve partnerships, and the sharing of ideas/information between countries that are not at the same income level, but which have similar climate patterns some of the time, and thus have the potential to utilize similar clean techniques/technologies.

Possible approaches could involve linking sustainable waste management solutions for Jamaica to best practices in geographically similar areas in the tropical/subtropical regions of the USA as one example. Another application would be environmentally sound building design concepts developed in the deep south of the USA, and elsewhere, being modified for use in the insular Caribbean (see Romm and Browning 1998; Melby and Cathcart 2002).

The author establishes factors that explain the diffusion of cleaner technologies in the hotels/resorts on the selected Caribbean islands. Questions asked in the case studies addressed what facilitates the communication of ideas about cleaner technologies. Causal
factors included individual motivation, government policies, and the basic profit motive. Given the links postulated between cleaner technology and sustainable tourism and the desire “to assess and unlock the potential of cleaner technology…one key task was to identify the social and economic factors that might encourage or obstruct the development and uptake of cleaner technologies” (Clayton et al. 1999, 19).

This dissertation explored the social and economic factors encouraging or obstructing the development and adoption of cleaner technologies. These factors explained the diffusion of cleaner technologies in the hotel/resort sector of the selected Caribbean islands.

This study examined systematic differences and similarities in firm behaviour with regard to the implementation of cleaner technologies within the hotel/resort sector of the tourism industry in the Caribbean region. By doing case studies of firms from the tourism sector in Antigua, Barbados, The Dominican Republic, Jamaica, and St. Lucia, two of the major language groups in the region (English and Spanish) were encompassed. Thus this research project allowed for contrasting “the culture, strategies, attitudes and responses of otherwise similar firms in different…settings, and examine the effects of these factors on the process of decision-making in the firm” (Clayton et al. 1999, 19).

The assessment of hotel/resort behaviour in the tourism sector with regard to the adoption of cleaner technology enabled:

- The assessment of different types of environmental response and cleaner technology innovation and their contribution to waste minimization and resource efficiency
- Improvement of understanding of business decision-making and of the behavior of hotels/resorts in relation to cleaner technologies, focusing both on environmental responses and strategies of hotels/resorts and their selection/development/adopt of particular industrial technologies, processes and practices.

- Identification of the socio-economic factors affecting the adoption and dissemination of cleaner technologies, including the internal culture and strategy of the hotels/resorts, their products and markets, financial and technical resources and the regional, national and global context, including competitive and regulatory pressures and public concerns.

- Exploration of the policy measures best able to promote the adoption of cleaner responses by identifying the barriers to and drivers of particular kinds of change.

In examining the use of cleaner technology in the tourism sector in the Caribbean a major area of focus was the approaches taken to waste management. Clean technologies in waste management systems seek to:

1. use materials currently classified as waste for production of useful commodities
2. use tertiary treated sewerage for irrigation
3. recover metals, glass and plastics from the solid waste stream for reuse and recycling
4. produce compost from organic solid waste.
CHAPTER III
RESEARCH METHODOLOGY

This study falls within the tradition of social science research in which three objective factors guide the choice of research strategy as follows:

- the type of research question posed
- the extent of control an investigator has over actual behavioral events and
- the degree of focus on contemporary as opposed to historical events (Yin 1994, 4)

The impact of cleaner technologies practiced/undertaken by lodging companies on the tourism sector in the Caribbean was analysed through case studies of selected hotels/resorts in the five Caribbean countries referred to earlier in this study, that is Antigua, Barbados, the Dominican Republic, Jamaica, and St. Lucia.

These five island countries were chosen because taken together they provide a good cross-section of the Caribbean tourism landscape. The islands exhibit contrasting topographies. On all the islands tourism is an important industry, but the impacts of the industry vary because of the differing population size, and landmass. The ownership status of the hotels/resorts on the various islands also varies, as does the average size of the properties. Table 1 provides an indication of the differing impacts of the tourism industry on the five islands. In addition by including the Dominican Republic a cross-cultural element was introduced to the study, as the other four islands in the study are all English-speaking countries.

The field research for this dissertation comprised collection of questionnaires distributed by email, fax, and regular mail, plus in depth interviews at selected properties.
The support provided by CAST in the form of an introductory letter (see Appendix A) would have helped to increase the level of cooperation from the selected hotels and resorts due to the status of CAST in the Caribbean tourism industry. The questionnaire did not have a question that asked about the impact of the support letter from CAST.

The research methodology used in this study followed the recommendations of Alreck and Settle (1985) who noted that:

> because non-response is likely to be very high and the effects quite severe for mail surveys, some survey projects use a mail survey to obtain a sufficient number of respondents within the budget or resource constraints, but also do a limited number of interviews. (Alreck & Settle 1985, 78)

Case studies

The case study method is the preferred research strategy when one wants to learn the details about how something happened and why it may have happened, in a context where one cannot manipulate the relevant behaviours. This is the classic post hoc design where the phenomenon being studied has already occurred and the aim of the research is to analyze the situation retrospectively (Wilson 1979; Eisenhardt 1989; Yin 1994).

This was clearly the case in the present situation as this study demonstrated how cleaner technology had being operationalized in the tourism sector and why. This will permit the reader to get a better appreciation of the way in which utilization of cleaner technology in the selected countries is affecting the terrestrial and marine environments of the islands. The impact of the use of cleaner technologies will be indicated by the data
collected from the completed questionnaires returned by the hotels/resorts contacted in this study.

There clearly is an economic bias to the sustainable development process given that it is first about satisfying man’s physical and social needs. In this regard it is important to note “[c]ase studies are even found in economics, in which the structure of a given industry, or the economy of a city or a region, may be investigated by using a case study design. In all of these situations, the distinctive need for case studies arises out of the desire to understand complex social phenomena. In brief, the case study allows an investigation to retain the holistic and meaningful characteristics of real-life events…” (Yin 1994, 3).

As Wilson puts it case studies “provide a sufficiently comprehensive amount of outcome and how-to information that someone interested in undertaking a similar project can make the decision wisely and even get specific help in how to go about it” (Wilson 1979, 446). Following Wilson the aim of this dissertation is to define best practices for a sustainable tourism product, and consequently sustainable development.

One of the challenges of dealing with the variable to be defined as ‘cleaner technology’ was choosing a proxy measure to be used to measure the variable quantitatively for comparison across cases. This study examined the question of implementing cleaner technology. Due to the nuances of the concept of ‘implementation’ use of the case study methodology facilitated going in-depth into this particular research question, especially where quantitative data was limited or not available.

As noted in Rainey (1993) for scientific validity social science research must meet the tests of generalizability, transferability, and replicability. Generalizability refers to the
possibility of theory building from the research process or analytic generalization. This
study meets the generalizability test, following Eisenhardt, especially because the
methodology is replicable, and hence meets the reliability test. To quote Eisenhardt:

Sometimes the case evidence confirms a relationship, while
other times it is revised, disconfirmed, or thrown out for
insufficient evidence. This verification process is similar to that
in traditional hypothesis testing research. The key difference is
that each hypothesis is examined for each case, not for the
aggregate cases. Thus the underlying logic is replication, that is
the logic of treating a series of cases as a series of experiments
with each case serving to confirm or disconfirm the hypotheses….

(Eisenhardt 1989, 542)

Transferable means that the findings of the research process can be applied to
other similar situations. Reliability refers to the ability of the same investigator or others
been able to replicate the findings of any study by applying the same process to a
different set of data. When properly conducted the case study meets these tests.

Properly conducted social science research must also meet the tests of construct
validity. Internal validity, external validity, and reliability constitute construct validity
(Cook and Campbell 1979). Internal validity speaks to whether the data gathered shows
that the specified independent variable caused a change in an observed dependent
variable (see O'Sullivan & Rassel 1999, 56). Internal validity was heightened by all
efforts being made to minimize threats to internal validity such as history, statistical
regression and selection. External validity was achieved by replication of the case studies,
which is a major test of scientific methodology. Confidence in the findings is enhanced when the investigator or others replicate the results. The case studies should be replicable if the research designs and protocols are followed. Protocols will be followed to reduce problems of external validity.

Standard field procedures were used including specific case-study questions. These were used to show what was being done re cleaner technology, legal frameworks re environmental protection, etc. in the Caribbean countries where field research was conducted.

The specific case-study questions were put into a semi-structured format following Clayton et al. (1999). The semi-structured format meant that in the interview process the researcher had the scope to follow relevant leads which arose out of the dialogue with the respondent to get additional material to inform the case studies (see Appendices B1 and B2).

**Questionnaire Design**

In the design of the questionnaires care was taken to follow widely accepted procedures used in social science research (Suskie 1992; Dillman 2000; Peterson 2000). For example, one of the good design practices in questionnaire design noted by experts is about the need for pre-testing (Peterson 2000, 115).

The English language version of the questionnaire was pre-tested in Barbados. For the Spanish language version there was not a pre-test as such, but a native Spanish speaker was asked to compare the Spanish translation to the original English language version to ensure that the context of the Spanish translation was the same as the English language version.
Reliability of case study data

The reliability of the case studies will be considered by analyzing data biases, errors, and data availability. A majority of the data collected for the case studies was obtained directly from senior executives in the hospitality sector of the tourism industry, and relevant managers in the public sector. Initially representative samples of qualified hotels/resorts in the selected islands were sent questionnaires by email or fax. Respondents were asked to submit their responses by email attachment or fax. Given the pool from which responses were desired these information and communication technology tools were considered to be appropriate (Schonland and Williams 1996). Tindigarukayo (2001) has noted the general limitations of using the Internet for conducting sample surveys in the Caribbean given the small population within the region with access to computers.

However our sample frame that comprised management in the hotel/tourism sector was assumed, correctly, to have a much higher than average access to information technology resources. In addition by sending the questionnaire in electronic form the pool from which responses were desired would have found this very convenient as they work with computers on a daily basis. Willimack et al. support this viewpoint, noting that “[a]utomating the questionnaire appears to be a logical step in terms of reducing burden and, hopefully, increasing response” (Willimack et al. 2002, 221).

The entire process of distributing the questionnaires, and obtaining responses followed the concept of tailored design. This meant developing and using survey procedures that tried to get respondents to be willing participants, in a context where account was taken of unique characteristics of the survey situation, with the overall goal
of reducing survey error (see Dillman 2000). Dillman’s suggested approaches that were utilised in this study fall within the “principles of social exchange theory regarding why people do or do not respond to surveys” (Dillman 2000, 4).

In the context of social exchange theory one of the issues taken into consideration in an attempt to maximize response was the timing of the distribution of the questionnaires. In this regard the researcher consulted with colleagues at CAST as to when was the best time to send out the questionnaires. It was suggested that after the peak period of the Winter Tourist season would be a good time. In the Caribbean tourism industry this would be sometime after February (D. Shurland, *pers comm.*).

The questionnaires provided initial data for the case studies. Follow-up fieldwork at some of the properties provided additional data for the case studies. The fieldwork also provided an opportunity to attempt to get responses to the questionnaires in cases where those were not returned.

Individuals were selected for data collection interviews based on consultation with tourism industry and government leaders in the various islands with regard to the sample frame and sample selection. The author also used his judgment based on the responses received. These tourism leaders provided some help in generating lists of the appropriate properties in the various islands where the surveys were conducted.

The factors that went into inclusion of properties on the lists for potential contact in this study were that (i) at the time of the development of the list the property was in operation, (ii) that it had a minimum of 15 guest rooms\(^2\), and (iii) the property had an email address. After lists of the properties to be included in the sample frame had been

\(^2\) This cut-off point follows standard used for example by EAST project, Jamaica
completed stratified random sampling was used to select hotels/resorts to be included in the study.

Properties had to be in operation to be surveyed because the study examined current practical applications of cleaner technologies in the lodgings sector of the tourism industry. The minimum room size was selected because as found, for example in the EAST project, below a certain size lodging properties do not have the professionalization and organization, including record-keeping procedures, to have made investigating them a very useful endeavour for this study. The requirement for the property to have an email address was essential because in this study contact with the lodging industry was going to be primarily by the internet.

The stratified random sample methodology used to identify hotels to be included in the survey reduced coverage error because every unit in the survey population had a known, non-zero chance of being included in the sample. There was of course sampling error in some cases because data was only collected from a subset, rather than all of the members of the sample frame.

Questionnaires were distributed in the five islands where surveys were conducted based on the absolute number of hotels/resorts that fit the criteria for inclusion, as well as on the mode of distribution of the questionnaires. The questionnaires were distributed across the five territories in the study as follows:
Table 3

<table>
<thead>
<tr>
<th>Territory</th>
<th>Distribution</th>
<th>Expected Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>Barbados</td>
<td>74</td>
<td>25</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>32</td>
<td>15</td>
</tr>
<tr>
<td>Jamaica</td>
<td>58</td>
<td>35</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>208</td>
<td>105</td>
</tr>
</tbody>
</table>

Source: Author

The actual response levels achieved are discussed in Chapter IV. In summary it can be stated here that a 10 percent response rate was achieved. Given an expected response rate of approximately 56 percent it was projected that there would be non-response errors from the 44 percent of the sample who would not respond. The author had hoped for a response rate of higher than 56 percent. It was also expected that there would be measurement error arising from questions that were misunderstood or incorrectly answered.

The Use of Geographic Information Systems (GIS)

In the context of the case studies for this project GIS is defined as computerized systems capable of assembling, storing, manipulating, and displaying geographically referenced information (Campbell 1994; Harvey and Chrisman 1998; Wright et al. 1997). Simple techniques were used for processing the responses so as to get digital output that was manipulated to highlight aspects of the use of cleaner technology that served best for illustrating the particular issues discussed in this study.

Basic GIS tools facilitated creating and obtaining digital images, manipulation of data, and will enhance future collaboration with other researchers, and dissemination of results. With regard to these uses of GIS Sheppard has emphasized the huge capabilities of GIS for data manipulation and elegant output (see Sheppard 1995).
Treatment of data

The survey inquired about methods of sewage treatment and discharge and of solid waste disposal, extent of any efforts to recycle and/or re-use materials and wastes, and any efforts to reduce energy consumption. In addition, the level of investment in each of these areas over the past five years was measured. These measures, taken together, would indicate each hotel's use of clean technology, and would be the dependent variable.

The independent variables, or factors hypothesized to influence decisions to use clean technology in the hotel/tourism sectors include the following:

1. Economic factors: the size of each hotel/resort (number of rooms and number of employees); capacity utilization rate during peak and off-peak seasons; market share, profitability (rates of return), and geographic distribution of guests (North America, Europe, Japan, and Rest of the World).

2. Managerial attitudes and perceptions: opinions about the appropriate extent of government regulation and industry cooperation in the adoption of clean technology; perceptions of the impact of tourism on the environment, and of the effect of clean technology on tourism demand.

3. Other factors in the decision-making environment: the form of business organization (franchise, wholly-owned subsidiary, local proprietorship, etc.); where in the firm decisions about clean technology are taken; and membership in tourist organizations.

4. Public policy and public attitudes: environmental laws and regulations and their enforcement; and attitudes of the local population.
These independent variables were selected based on discussions with professionals and managers in the tourism industry. Discussion in the literature of the factors influencing innovation also had a role in the selection of the independent variables specific to the tourism industry (Gold 1981; Hjalager 1994; Rogers 1995).

In order to facilitate the use of the data collected in the case study analysis some tables were created to illustrate numerically responses to the questionnaire. Portions of the data were necessarily in narrative form for some variables, for example the data on what cleaner technologies were utilized and the legal frameworks with regard to environmental protection.

The author expected that the independent variables would have trended positively with the dependent variable. The independent variable “Number of Rooms” intuitively was expected to indicate use of cleaner technology in the form that the bigger the hotel/resort property measured by rooms the more likely that the property will be using cleaner technology. This is because the larger the property the greater is the expectation that there will be the ability to fund investments in cleaner technology.

With regard to the independent variable “Region of Origin” the premise was that the higher the percentage of visitors from Europe the more likely it would have been that a property was using cleaner technology. This is because European visitors tend to make environmental considerations a more important part of their destination choice matrix than visitors from North America [Canada, Mexico, USA] (Best 2002). Conversely the higher the percentage of visitors from North America the less likely it is that a property will be using cleaner technology.
Confounding factors

There were no possibilities for controlling the variables in this study thus the context in which the data was collected was a concern. However, the preparation of questions and the identification of data sources were completed before attempting to meet with respondents and this served to ensure that the data collected was reliable and useful for the research process. This research involved studying phenomena across sites. A semi-structured questionnaire was utilised, as flexibility was important. To ensure reliability full documentation was an integral aspect of the fieldwork.

Data collection challenges

A major challenge with getting the data for this type of study was the question of confidentiality. As observed by Porter and van der Linde (Porter 1990; Porter and van der Linde 1995a,b) the use of cleaner technologies can lead to improvements in both the environmental and profitability areas of a firm’s operations. However the decision-making with regard to the adoption or not of cleaner technology, the timing of actions, and so forth all have implications for competitors. Thus in soliciting information from respondents at the hotels/resorts that were surveyed assurances of confidentiality were given with regard to divulging of information to competitors and official bodies. Apart from the professional approach to security of the data that was adopted by the investigator, a written assurance of confidentiality was provided to the respondents (see Appendix C).
Field work/Logistics

The field research component of the study had three major components. These were: a) Creation of the lists of applicable hotels in the various territories and selection of samples to fit the sample size desired as illustrated in Table 3. b) Distribution of the questionnaires and follow up based on the tailored design method (see Dillman 2000). c) Visits to three of the five selected Caribbean countries, namely Barbados, Jamaica, and St. Lucia. The field trip facilitated firsthand examination and discussion of cutting edge clean technology options for the tourism sector, barriers/drivers to the use of these clean technologies, competitive questions surrounding the use of clean technologies in the tourism sector based on the diffusion of technology and tourism management literature, as well as government regulations and operations which also impact on firms’ adoption of clean technology. An important component of the field trip as well was to push for a higher response rate from those properties that were not being contacted for in-depth or follow-up interviews.

In the effort to maximize data collection for this study the author, in October 2002, visited the Barbados based headquarters of the Caribbean Tourism Organization (CTO), one of the lead regional bodies with regards to tourism matters. In addition the researcher received support from The Sir Arthur Lewis Institute for Social and Economic Studies (SALISES) at the University of the West Indies, Mona, Jamaica. CAST provided the cover letter used to introduce the researcher to the hotel industry in the five territories covered in this study. CEHI facilitated the researcher’s fieldwork in St. Lucia.

The author’s background in Caribbean environment and development issues has led to the development of a range of contacts within the tourism sector. This network of
contacts was utilised for facilitating the data gathering process. In consultation with resource persons in the Caribbean the researcher arranged an itinerary that allowed for visiting three of the five territories in the study over the period April 23 to May 4, 2003 (see Appendix D).

a. selection of hotels/resorts.

In order to be included in this study hotels/resorts in the selected territories had to have at least fifteen guest rooms. The original list of applicable hotels was obtained from the 2002 Handbook of the Caribbean Hotel Association (CHA). The data in that handbook was current as of November 30, 2001. All of the selected territories had Hotel and Tourism Associations that were contacted for input on updating and correcting the information obtained from the CHA Handbook.

The lists of properties that the researcher compiled included information on personnel, especially General Managers. Distribution of the questionnaires led to feedback that enabled the researcher to update this contact information. The update to the contact information included in many cases getting the name of the Administrative Assistants to the General Managers, and in other cases information was provided on the specific person who needed to be contacted with regard to environmental matters at the various properties.

It was necessary to contact the right persons at the hotels/resorts because in these businesses the provision of information to outsiders was subject to various rules depending on the particular property. In the case of stand-alone properties this depended on the philosophy of the management at the property. At properties that were part of a chain the group standard operating procedures dictated how managers at individual
properties approached answering questionnaires. In addition even though initial contact
was to general managers, the assumption was that they would pass the questionnaire to
the relevant person at their property. In follow-up queries and site visits questions were
asked to ensure that the questionnaires were directed to the relevant personnel. This issue
of the correct choice of respondent is captured well by Willimack et al. who noted:

…organizational hierarchies often distinguish staff with authority to
release data from those having direct knowledge of the data and, thus
the capacity to respond. In addition, divisions of labor and decentralized
data require that dispersed knowledge may need to be assembled
to satisfy survey requests. This further complicates respondent selec-
tion. In addition, businesses’ major goal, i.e. to generate profits, may
cause them to view some parts of their external environment as
“hostile,” which frames their motivation for considering outside
requests for information, such as surveys….(Willimack et al.

The questionnaire was pretested with managers currently operating in the tourism
industry. The questionnaire also benefited from comments by professionals in the tourism
industry not directly involved in hotel management.

i. Antigua.

The Antigua Hotel & Tourist Association sent the researcher their List of Hotel
Members as well as the Hotel Information Guide published by the Ministry of Tourism
and Environment of Antigua & Barbuda. Using those lists and the CHA Handbook the
author came up with a total of 22 hotels that fit the criterion of having at least fifteen
guest rooms. The original plan had been to distribute questionnaires to 20 hotels in Antigua & Barbuda. Given that after eliminating the smaller properties there were only a total of 22 hotels/resorts to be sampled, questionnaires were sent to all the applicable hotels. This meant that there was no coverage error for Antigua & Barbuda.

**ii. Barbados.**

In the case of Barbados it was planned to distribute questionnaires to 35 hotels/resorts that met the threshold of at least fifteen guest rooms. Using the CHA 2002 Handbook as the base the author compiled a list of 59 Barbadian hotels that met the rooms’ criterion. However the researcher did not get to the point of selecting the planned sample of 35 hotels/resorts because when the Barbados Hotel & Tourist Association (BHTA) was contacted with regard to their input into updating the Barbados list the author was informed of the policy of the BHTA of not providing their membership lists to non-members free of cost.

On further enquiring the researcher was advised that if a copy of the membership list of the BHTA were desired the fee would be two hundred and fifty dollars. This sum was out of the reach of the researcher. After further discussion with the BHTA and explanation of the purpose of the research the BHTA offered to distribute the questionnaire through their membership network. Thus after the author had obtained the approval of the Institutional Review Board of the University of Southern Mississippi to proceed with this study the questionnaire and other relevant documents were sent to the BHTA for distribution through their network.

The BHTA sent out the questionnaire to all 74 members on their list. This number is only eleven more than that for the number of hotels/resorts with fifteen or more rooms
that is found under Barbados in the *CHA 2002 Handbook*. There is a specific question on the number of guest rooms on the questionnaire. The answer to that question enabled the researcher to eliminate from the analysis responses from hotels below the threshold number of rooms.

**iii. Dominican Republic.**

With regard to the Dominican Republic the major challenge was the fact that it is a Spanish speaking country. This fact however was the reasoning behind the inclusion of this country in the sample of countries studied for this project.

The *2002 Handbook* of the CHA was used to compile a list of hotels in the Dominican Republic with 15 or more guest rooms. Contact was made with the Hotel and Tourism Association in that country but no feedback was received in time to update the list compiled from the CHA handbook. After deleting hotels that did not have email addresses the researcher ended up with a listing of 64 properties. Thirty-two properties were selected from that list to be contacted for participation in the survey.

The properties selected were chosen based on the probability sampling method called *systematic random sampling*. This procedure was followed based on the discussion found in Agresti and Finlay (1997). As discussed by these authors in order to get a systematic random sample you select “a subject near the beginning of the sampling frame list, skips several manes and selects another subject, skips several more names and selects the next subject, and so forth. The number of names skipped at each stage depends on the desired sample size” (Agresti and Finlay 1997, 25). Formally we can denote the sample size by \( n \) and the population size by \( N \). We can then let \( k = N/n \). “A **systematic random sample** (1) selects a subject at random from the first \( k \) names in the sampling frame, and
(2) selects every \( k \)th subject listed after that one. The number \( k \) is called the skip number” (Agresti and Finlay 1997, 25).

In the case of the Dominican Republic \( k \) was equal to 63/32, which gives an approximate value of 2. The hotels were selected starting with the first property on the list, and subsequent selection of the next 31 properties following this systematic random sampling procedure with \( k \) equal 2.

There is one potential disadvantage with systematic random sampling. It is that “[b]ias may occur in studying a variable if there is regular cyclical fluctuation in the values throughout the sampling frame, with the period of the cycle equal to the skip number \( k \)” (Agresti and Finlay 1997, 26). However in this case this potential bias does not exist as in the list of properties, values of the variables fluctuate randomly through the list. As Agresti and Finlay noted “systematic random samples from a sampling frame with alphabetically ordered sampling units are usually acceptable” (Agresti and Finlay 1997, 26).

\textit{iv. Jamaica.}

In the case of Jamaica the basis of the list of properties was the 2002 CHA Handbook. Once again properties with less than 15 guest rooms were eliminated. The Jamaica Hotel and Tourist Association (JHTA) provided the researcher with two of their lists of properties. Using those lists along with the CHA handbook a list of 117 properties was compiled. A sample size of 58 was desired. Using the same systemic random sampling procedure discussed in the foregoing section on the Dominican Republic the result was \( N = 117, n = 58 \), and \( k \) therefore equal to 117/58 or approximately 2. The Ritz Carlton property was added to the sample because the author thought that response from
that property would add to the research findings given it was part of a well-known international chain and was relatively new, at the time of the survey, being in operation for just under two years.

In the case of Jamaica properties without email were also eliminated when the population of hotels from which to choose a systematic random sample was being created. Here the researcher started with the second property on the list, then applied $k = 2$ to go through the list and choose the properties to be included in the Jamaican sample.

v. St. Lucia.

In compiling the list of relevant properties for St. Lucia reliance was once again placed on the 2002 Handbook of the CHA. It was interesting that using that handbook the researcher arrived at the same number of properties to be surveyed (22), as was the case for Antigua. However in the case of St. Lucia the list was not vetted with The St. Lucia Hotel and Tourist Association (SLHTA).

Contact was made with the SLHTA and there was dialogue with staff at the offices of the Association. However by the time the researcher was ready to distribute the questionnaires in St. Lucia no information was forthcoming thus the researcher went forward using the list that had been compiled based on the CHA Handbook.

Using this methodology a total of 22 hotels were therefore listed that fit the criterion of having at least fifteen guest rooms. The researcher had originally planned to distribute questionnaires to 20 hotels in St. Lucia. Given that after eliminating the smaller properties there were only a total of 22 hotels/resorts to be sampled questionnaires were sent to all the applicable hotels. This means that as is the case with Antigua, there was no coverage error.
b. distribution of the questionnaires.

The questionnaires were distributed using the ‘tailored design method’ discussed in Dillman (2000). The key to this methodology is the use of several structured initial and follow-up communications with potential respondents to maximize response. See Appendix E for samples of these communications. There are five potential communication levels, with the fifth level being determined based on response to the first four communications.

The initial communication for four of the five territories was sent by surface mail. The exception was Barbados because of the way that the BHTA offered to support the research project. When the BHTA was contacted by this researcher for help in compiling the list of hotels to be surveyed in Barbados the association suggested that they distribute the questionnaire through their network. The researcher therefore sent to the BHTA the questionnaire, the support letter that had been obtained from CAST, and samples of the communications that were to be sent to the hotels in Barbados as per the tailored design method.

As noted above the initial communication to the selected hotels/resorts was by surface mail, except in the case of Barbados. The questionnaire itself was sent to the selected properties by email in all of the territories. The author used a standard cover letter for distribution of the questionnaires. This comprised the second level of contact in the tailored design method.

After the initial distribution of the questionnaires follow-up was based on initial responses. The method of follow-up varied as this is where issues like invalid email addresses, full inboxes, attachments not opening, and other similar issues came up. These
challenges to questionnaire distribution were met based on the individual circumstances. In some cases replacement questionnaires were sent by surface mail. In other cases alternate email addresses were used. In yet other cases faxes were sent.

The Dominican Republic was another special case with regard to the distribution of the questionnaires. There was a delay in getting the Spanish translation of the questionnaire proof read by a native speaker of Spanish. It was necessary to get this done because of the need to ensure that the context of the Spanish translation was the same as the English original. This was to ensure that in comparing the responses from the hotels in the Dominican Republic to those from the other four territories one would be comparing like with like.

With regard to compiling a list of hotels to be contacted in the Dominican Republic there was communication with the National Association of Hotels and Restaurants of that country but no information and support came forth. As was the case with the other territories the questionnaires sent to The Dominican Republic were initially distributed by email.

As with the English speaking countries in the distribution of the questionnaires by email to hotels in the Dominican Republic some emails were returned because of issues such as invalid email addresses, full inboxes, attachments not opening, and other similar circumstances. Also, as with the English speaking countries various approaches were employed to ensure that all the selected properties at least got copies of the questionnaire, thus eliminating non-receipt of a questionnaire as a reason for non response.
c. visits to Barbados, Jamaica, and St. Lucia.

In order to maximize response to the questionnaire, obtain data on the ground with regard to the use of cleaner technology, interview stakeholders, get copies of relevant documents like enabling legislation and so forth the researcher visited St. Lucia, Barbados, and Jamaica over the period April 23 to May 4, 2003, as indicated in Appendix D.

i. St. Lucia.

The researcher did field work in St. Lucia over the period April 23 to 27, 2003. While on the island the researcher met with the SLHTA, and managers of several of the properties from which responses were desired. The researcher also contacted some other persons by telephone.

The meetings with hotel managers, in person, or by telephone gave the researcher the impression that a key aspect of getting a response to questionnaires is aggressive follow-up (Lynn et al. 2002). Managers had a variety of tasks related to the direct operation of their properties. These management responsibilities reduced the time that they had available for attending to the numerous questionnaires that they received. This fact in survey nonresponse was reported by Willimack et al. (2002).

An essential aspect of follow-up was developing a relationship with the Assistants to the General Managers, and other managers at properties of interest. The assistants were the filters who had a great influence on what questionnaires actually made it to the attention of General Managers.

While in St. Lucia the researcher made contact by telephone with all 22 hotels from which responses were desired. In addition the researcher physically visited 6 properties. These contacts on the ground in conjunction with the prior contacts by surface
mail, email and fax led to receipt of responses from 4 properties. This represents a response rate of 18 percent. This is well below what was expected.

The researcher also met with the Executive Vice President of the SLHTA. This meeting provided some important insights relevant to the research project. With more time available contact with the SLHTA would have been even more productive in terms of material to feed into this study. The researcher tried to meet with the relevant personnel in efforts to get an input from the St. Lucia Tourist Board. When the researcher contacted the Tourist Board he was advised that the best person to speak with was no longer with the Board, but was with the Ministry of Finance of the Government of St. Lucia. The researcher was not able to set up a meeting in the time available.

In St. Lucia the fieldwork was greatly facilitated by the cooperation the researcher received from CEHI. The Institute made office space available to the author, and telephone and computer facilities. This allowed the researcher to contact the relevant properties and officials, and send them copies of the questionnaire by email when this was requested.

ii. Barbados.

The researcher completed fieldwork in Barbados over the period April 27 – 30, 2003. In Barbados as in St. Lucia one of the lessons that was taught was that time on the ground was critical to survey response, and that persons contacted for information have to be pressured to keep their promises. The researcher found it very disappointing that persons made solemn promises to provide data, both in the hotel sector, and in other areas of the tourism industry, but did not follow through. This could possibly be a means to deter investigators by lullling them into feeling that offers of cooperation were genuine.
As noted earlier in this chapter the initial contact with hotels in Barbados had been made by the BHTA on behalf of this researcher. Just prior to leaving for the Caribbean on April 23 the researcher had contacted some hotels in Barbados using his list of 59 hotels compiled from the CHA 2002 Handbook. While in Barbados the researcher made follow-up contact with some of these properties by telephone. The researcher also visited 7 of these properties personally. One of the things that the fieldwork revealed was the interlinked ownership structure of the hotels in the Barbados tourism industry for the properties with 15 or more rooms that were the concern of this research project.

These contacts on the ground in conjunction with the prior contacts by surface mail, email and fax led to receipt of responses from 8 properties. This represents a response rate of 14 percent. This again was well below what the researcher expected, but in line with what the BHTA staff advised the researcher to expect.

iii. Jamaica.

Fieldwork was completed in Jamaica over the April 30 to May 4, 2003. Here one of the important elements was an opportunity to meet with colleagues at the University of the West Indies (UWI), Mona Campus. One of the major aspects of those meetings was the pessimism they expressed with regard to the level of cooperation to be expected from hoteliers. The response rate for this project did turn out to be low. However from the experiences of the author in the field the key factor in determining response was the amount of time that can be spent on the ground trying to encourage hoteliers to respond to the questionnaires.

Questionnaires were sent to 58 hotels in Jamaica. While in Jamaica the researcher made contact by telephone with 18 hotels from which responses were desired. In addition
the researcher physically visited 10 properties. These contacts on the ground in conjunction with the prior contacts by surface mail, email and fax led to receipt of responses from 3 properties. This represents a response rate of 5 percent. This was well below what was expected.

In addition in Jamaica the researcher met with an officer of the USAID mission in that country. The researcher also discussed the project with Mr. Hugh Cresser, Project Coordinator of the EAST project. Mr. Cresser provided the names of useful contacts at some of the properties on the list of Jamaican hotels that were in the study. Meeting with Mr. Cresser amounted to meeting with the JHTA as the EAST project operates out of the offices of the JHTA. When the researcher spoke with a representative of the Jamaican Ministry of Tourism about the project he was also referred to the EAST project.
CHAPTER IV

PRESENTATION OF FINDINGS

Response Levels/Field Work observations

One of the most critical findings of the fieldwork exercise was the disconnect between the public utterances of hoteliers about the value of the environment to their business model in the Caribbean and their attitude towards efforts to document what is being done to preserve or negatively impact the environment. A common theme among hoteliers was the view that they did not have time to complete questionnaires. This reluctance by hoteliers to provide information to bona fide researchers has been documented elsewhere (see Jackson n.d.).

The low response rate to the questionnaire used in this study would support the view that the hoteliers do not have time to respond to questionnaires. However the researcher’s experience in the field suggests that time to complete questionnaires is not really the chief underlying issue. The issue is to finds way to get hoteliers to understand that prioritising documentation of their environmental activities is part of the foundation for ensuring the long-term survival of the sector. Thus a big part of obtaining high levels of response in studies such as this one is to persuade hoteliers that the research project would have some direct positive impact on their operations.

Given the need to persuade hoteliers to complete any particular questionnaire time on the ground in the field to make the case proved to be a critical variable. *A priori* this researcher was of the view that an introduction to the project by surface mail, followed by email contact, fax and further surface mail communication based on response would have led to fifty percent or more of the questionnaires being completed and returned. It was
expected that the fieldwork would boost response rates. The response percentage was approximately ten percent, even with in-person contact in three of the five territories in the study.

The fieldwork conducted between April 23 and May 4 (see Appendix D) was not enough to push the level of response to fifty percent or higher. The researcher was able to determine that more time on the ground would have been very useful. An extended stay in the field would have led to more time being available to follow-up with hoteliers in person. It is important to note that the intensive fieldwork in April/May 2003 followed several prior trips to the region, in Summer and Fall 2002. The trips during 2002 helped to get several regional organizations sensitised to the relevance of this study.

Fieldwork was conducted in Barbados, Jamaica and St. Lucia. While in these territories the author contacted a total of 86 properties in person or by telephone. It should be noted that in that number were persons that the researcher had met or known previously based on prior contacts in the region. These in person or telephone contacts were less than the total number of hotels/resorts that were included in the stratified random sample of hotels/resorts contacted in the territories covered by this study. In Barbados initial contact with 74 properties was made by the BHTA, while in Antigua & Barbuda and St. Lucia questionnaires were sent to all the hotels on the lists of properties produced by the author for the latter two countries.

Specific fieldwork experiences

The efficiency of contacts with the hotels in the five sample territories depended on feedback obtained from hotel and tourism associations in the territories. The first fact
to note is that in all five territories there were functioning hotel and tourism associations. The support the researcher received from these bodies varied greatly.

In the case of Barbados the BHTA made the initial contact with the hotels on behalf of the researcher. In the case of Antigua the researcher was able to get the list of hotels vetted, contact information updated, and questionnaires were even returned to the researcher through the AHTA. Hotels sent their responses to the AHTA, which in turn faxed those responses to the researcher. In the case of Jamaica the researcher was supplied with the JHTA’s list of hotels broken down by region and size.

In terms of attitude toward the study, and response to the communications by the researcher, it was interesting to observe that there were no surface mail nor email acknowledgements in any of the territories to the first communication sent out by surface mail. Barbados is not included in this observation because of the special approach to distribution of the questionnaires on that island.

When the questionnaires were distributed there was bounced email in those cases where the email addresses were incorrect, or where inboxes were full. Email bounced because of an incorrect email address or full inbox was relatively low, only accounting for 16.8 percent of the total (see Table 4).
Table 4

Bounced Email

<table>
<thead>
<tr>
<th>Territory</th>
<th>Number of Questionnaires Distributed</th>
<th>Number of Questionnaires Bounced</th>
<th>Percentage that Bounced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua</td>
<td>22</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>Barbados</td>
<td>74</td>
<td>5</td>
<td>6.8</td>
</tr>
<tr>
<td>Dom. Republic</td>
<td>32</td>
<td>10</td>
<td>31.2</td>
</tr>
<tr>
<td>Jamaica</td>
<td>58</td>
<td>19</td>
<td>32.8</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>22</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Totals</td>
<td>208</td>
<td>35</td>
<td>16.8</td>
</tr>
</tbody>
</table>

Source: author

Initial contacts with regard to this research project were addressed to General Managers in the expectation that these persons would forward the communication to the relevant officers at their properties. From the fieldwork it was clear that many of the hotels had persons whose responsibilities included environmental matters. The smaller hotels in the sample generally did not have a dedicated Environmental Manager, but there were persons who carried on the functions of environmental management in addition to their other roles in the hotel management structures.

Except for Antigua there was not much support from the hotel and tourism associations in the study territories with regard to the operational status of the hotels that the researcher hoped to contact. It is accepted that the hotel and tourism associations have a lot of work to do, apart from assisting the many researchers who contact them for assistance. However the associations can reasonably be expected to have up to date lists of their members so that they can easily advise interested parties of the current status of the properties that are members of the associations.

In the field, part of what the researcher found was that some of the properties contacted were closed for refurbishment, or closed because the properties were for sale.
However even though this was a problem, it was not thought that this was a major contributory factor to the generally low response to the questionnaire.

Another important finding was the interrelated management and ownership structures in the tourism sector. This was significant given that this research project only covered five territories in the Caribbean. This also relates to the discussion on cluster theory in the literature review. Some of these interconnected management structures are very well known, for example, the Sandal Resorts International (SRI) group and the Superclubs group.

In Barbados alone there were at least three hotel groups identified by the researcher. These included Almond Resorts (two properties); Fairmont Hotels (two properties); and Elegant Hotels Group (five properties). One of the properties in the study that was located in St. Lucia did not complete a questionnaire because the management there reported that they had to obtain permission from their officers in Antigua.

In St. Lucia two jointly owned properties were just across the road from each other. The importance of groups in the tourism sector and the use of cleaner technology of course is that it would be expected that there would be some similarity in approaches across a group. Thus approaches to cleaner technology would be more easily replicated, across a group, in one direction or the other. Discussions with hotel management officials during the fieldwork exercise confirmed this viewpoint.footnote{Names of Hotel Managers interviewed are withheld because of confidentiality assurances.}

Due to standardized management practices, in some cases group ownership of hotel properties meant that environmentally friendly (cleaner) approaches to operations at several hotels/resorts could be covered by one visit with the relevant group official. With
caveats also, a response from one property in a group can provide insight into the issue at hand for several properties. This meant in practice that the researcher was therefore able to glean information about some properties, even though they did not respond to the questionnaires.

For this reason during the field trip the researcher tried to get into contact with the Group Director, Environment (SRI). However because of that individual’s busy travel schedule, and the limited time in Jamaica for fieldwork the author was only able to leave several messages with assistants and voice mail. In this study hotels/resorts from the SRI group were located in three of the five territories in the study, namely: Antigua, Jamaica, and St. Lucia. The SANDALS/BEACHES resorts located in Jamaica that were in the sample are:

1. Beaches Grande Sport
2. Beaches Royal Plantation
3. Sandals Inn
4. Sandals Negril
5. Sandals Royal Caribbean.

In St. Lucia the SRI properties were:
1. Sandals Grande St. Lucian Spa & Beach Resort
2. Sandals Halcyon Beach St. Lucia
3. Sandals St. Lucia Golf Resort & Spa

In Antigua the SRI property included in the study was the Sandals Antigua Resort & Spa.

The researcher also tried to get a group response for the Superclubs group of
properties. Resorts from this group in the study included: Hedonism III, Superclubs Breezes-Montego Bay and Sans Souci Lido

*Discussion on level of response*

The researcher had anticipated a response rate to the questionnaire of approximately 56%, however only a 10 percent response rate was achieved. The distribution of the returned questionnaires is as illustrated in Table 5.

**Table 5**

<table>
<thead>
<tr>
<th>Territory</th>
<th>Number</th>
<th>Percent of total completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Barbados</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Dom. Republic</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Jamaica</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Author

As illustrated in Table 5 the highest response rate in absolute terms was found in Barbados where eight completed questionnaires were obtained. The response rates in Antigua and St. Lucia were exactly the same. The interesting point here is that the researcher was on the ground in St. Lucia but not in Antigua. Another interesting observation with regard to the responses from St. Lucia was that the four properties involved were all in joint ownership situations. Two of the properties were part of an international chain while the other two were part of a local group.

The response level in the case of Jamaica was especially disappointing to this researcher. The researcher discussed the low response rates in Jamaica with several professionals in the tourism sector in that country, and they all expressed strongly
negative perceptions of the pattern of response by Caribbean hoteliers to surveys (R. Brown-Thompson; A. Clayton; H. Cresser; C. Hayle, *pers. comm.*). Why this perception exists, and the apparent reality is possibly the subject of another research project.

While in Jamaica the researcher contacted eighteen of the hotels that were on the Jamaican list of properties to be surveyed. From the contacts made the view of this researcher is that response levels in Jamaica would have been significantly improved if more time could have been spent on the ground lobbying hoteliers to complete the questionnaires. The general situation with regard to hotel managers in the islands studied can be summarized as one of prioritising the day to day running of business over a study that may impact the long-term survival of the industry.

The Dominican Republic is a special case because it is a Spanish speaking country. The survey instrument was translated from English to Spanish and the researcher was able to contact each of the properties on the Dominican Republic list at least four times as planned in the tailored design method utilized for obtaining responses in the other four territories in the study. The researcher also exhibited flexibility in this case as well, faxing the survey instrument when requested, and sending copies of the questionnaire by email when that was most appropriate. Here again the specific factors responsible for the low response rate is an area for further research. Given the response rate with regard to the English speaking countries, it can be surmised that language, if even it was a barrier, was not the only, or even the major factor in the low response rate from the Dominican Republic.

One of the factors in the low response rate could be linked to the fact that this study was looking at business decisions and there might be an element of the businesses
wanting to protect confidential information from competitors. Thus not getting certain 
information could reflect a policy decision on the part of the hotels/resorts (Dillman et al. 
2002; Willimack et al. 2002).

In the literature on survey non-response it is now accepted that culture may be 
playing a role in survey non-response (Goyder 1985; de Heer 1999). The persons to 
whom these questionnaires were distributed were managers who would have in most 
cases been exposed to tertiary level training. Even in cases where managers had not been 
exposed to tertiary education the nature of the business would expose managers over time 
to cultural influences from their guests. Given the existence of some typology of an 
island culture or tourism culture (Crick 2002) the “cross-national literature and the U.S. 
studies of subcultural differences suggest that some unspecified qualities of respondent 
culture are probably influencing survey nonresponse” (Johnson et al. 2002, 61).

Another factor that could be influencing the low response rate is the fact that this 
research was being conducted as an academic exercise. Some managers indicated to this 
researcher that they suffered from what they considered to be an excess of questionnaires. 
This reflected both official questionnaires and other university research. In this regard 
Willimack et al. had observed “university survey researchers appear to suffer from 
substantially higher nonresponse rates in business surveys than do government agencies” 
(Willimack et al., 2002, 215).

Impact of low response rate

As was observed in Chapter III, the low response rates to the mailed survey 
increased the importance of interviews conducted during the fieldwork phase (Alreck and 
Settle 1985). Fieldwork was conducted in Barbados, Jamaica and St. Lucia. The focus in
all three territories was placed on getting hotels to respond to get a critical mass of completed questionnaires. Many of the promises of senior hotel managers to respond to the questionnaires did not materialize. From discussions in the Caribbean with professionals working within the tourism industry the low response rate is a systemic problem (see Appendix L). The reasons for this low response to research questionnaires is worthy of further study as reliable data on the tourism industry is very useful for planning purposes.

In Chapter III there is extensive discussion of the usefulness of case studies. Given the methodological strength of the case study approach the interviews conducted and questionnaires returned provided material for useful generalizations and snapshots on approaches to cleaner technology, mainly from the perspective of managers in the hotel sector. The researcher was also able to get some input from other actors in the tourism industry that were not involved in hotel management.

Care always has to be taken when one is generalizing. However the properties from which responses were received were all in operation for profit. Thus at the very least it can be said that what they were doing in relation to the utilization of cleaner technology can be perceived to be rational by others who are also involved in the tourism industry for profit.

Six of the 20 returned questionnaires had data on Gross Profit Margins (GPM). GPM was computed as the percent value of Gross Profit divided by Net Sales. All six of the properties that reported data on GPM were utilizing cleaner technology in their operations. The GPM ranged from a low of 2 percent to a high of 56 percent averaged over the peak and off-peak data for the hotels.
Case studies

In this section the empirical results from the interviews conducted, and questionnaires returned from St. Lucia, Barbados, Jamaica, Antigua and the Dominican Republic are presented. There will be a general discussion of all the issues raised from the responses in all the questionnaires returned from the countries in the study, and other material gathered by the researcher.

Case studies reports

a. St. Lucia.

Four questionnaires were gathered from St. Lucia. These responses came from two groups. One was a St. Lucia group that managed two properties on that island. The other two responses came from properties that are part of a major regional chain. In terms of size, the number of rooms on the properties ranged from 20 to 327, while the number of employees on the properties ranged from 16 to 600.

With regard to the origin of guests there was almost an inverse distribution between the larger properties (more than 75 rooms) and the smaller properties (15 to 75 rooms) in relation to the origin of their guests\textsuperscript{4}. This is illustrated in Figs. 6 and 7. In these figures ‘Europe’ represents guests who are mainly from the United Kingdom. The ‘Rest of the World’ category comprises guests mainly from the Caribbean.

\textsuperscript{4} Classification of hotel as large or small based on number of rooms follows CHEMI standards.
Based on the definition of cleaner technology used in the questionnaire the two smaller properties reported that they were not using cleaner technology in their operations. On the other hand the two larger properties reported that they were using cleaner technology in their operations. Cleaner technology measures taken included: the use of energy saving bulbs; the treatment and reuse of waste water for irrigation of lawns and golf courses; composting of organic waste from the kitchen and gardening.
operations; and recycling old bed sheets to make laundry bags for the guest rooms and scarves and aprons for the kitchen staff.

Cleaner or environmentally friendly technology speaks to a specific conceptualisation and organisation of operations. For example, one of the hotels in St. Lucia reported that as part of its environmentally friendly operations, the hotel controlled access to control panels for large air conditioning units. This meant that there was less random up and down adjustment of the thermostats thus leading to more efficient operation of the units. Also all team members were educated as stakeholders in the environmentally friendly operations of the property. Rooms were also designed with the opening of windows as an option for guests. In addition relative to reducing waste all the scrap food from the hotel is sent to local pig farmers while excess food fit for human consumption is sent to two local charities.

One of the St. Lucian properties that reported the use of cleaner technology has an Environmental Management System Manual that speaks to educating guests on the environmentally friendly measures taken by the property and the part guests play in making the operations of the hotel more environmentally friendly. This indicates that for the use of cleaner technology in hotel operations to be really effective the staff of the hotel must of course have a major role, but the guests of the hotel have to be included as well.

In terms of motivation for using cleaner technology in their operations the hotels reported that all of the following reasons applied:

- To attract “green consumers.”
- To reduce costs.
• To comply with International Protocols.
• To comply with national policies.
• To do our part in maintaining environmental integrity.

It is noteworthy that ‘Pressure from local Non-governmental Organizations’ was not noted as a factor in the decision to use cleaner technology in hotel operations. This indicates that there was not effective public pressure placed on hotels to have environmentally friendly operations. The following reasons were reported as important in the non-use of cleaner technology in hotels:

• Too expensive.
• No requests from guests.
• No government sanctions.
• Lack of skilled, professional staff.

The use of cleaner technology at the hotels where it was reported that clean technology was being used formed part of a management philosophy. An example of such a management philosophy can be gathered from an Environmental Policy Statement (see Appendix F).

In terms of impact on costs one hotel reported having to hire one additional staff member to work on its cleaner technology facilities as a result of implementing the use of cleaner technologies in its operations while another reported no change in staff numbers as a result of implementing the use of cleaner technologies in its operations.

With regard to business networking, hotels using cleaner technology reported that they share ideas/information on the use of cleaner technology with other hotel/resort operators. The means by which this was done included:

• By attending conferences/workshops
• One-on-one contacts
• Visiting other properties
• Property being part of a hotel/resort chain.

One property also reported that it hosted visits by schools to share with students what it was doing in the area of cleaner technology.

Membership of organizations that encourage the use of cleaner technology seems to play a role in encouraging the use of cleaner technology. Hotels reported that membership of CAST; CHA; Green Globe 21; the St. Lucia National Trust; and the St. Lucia Solid Waste Authority all had roles in encouraging the use of cleaner technology in hotels. These organizations carry out a cheerleading role as well as provide tools and expertise for hotels. Green Globe 21 also certifies hotels as meeting certain environmental management standards that involve the use of cleaner technology. By meeting the Green Globe standards hotels save money and get a marketing tool. Hotels that have been certified as having met Green Globe standards are subject to annual audits to ensure that they continue to meet the Green Globe standards (www.greenglobe21.com).

Government polices potentially could play a role in encouraging the use of cleaner technology. However the lack of enforcement of existing statutes was noted as an issue. In terms of compliance with applicable environmental laws and regulations the annual audits by Green Globe 21 were seen as important. Both the larger hotels that responded in St. Lucia have been Green Globe 21 certified.

For the larger properties the use of cleaner technology by competitors was seen as a factor influencing their use of cleaner technology. This is expected from cluster theory. Funding and the availability of technical /managerial resources was not reported as a
factor in one case, while in another it was suggested that funding and the availability of human resources as a factor influencing the use of cleaner technology varied from case to case. For the smaller properties funds and the availability of human resources were noted as factors affecting the use of cleaner technology.

During discussions with the Executive Vice President of the SLHTA the point was made that, overall, participation by hotels in ‘green’ (environmentally friendly) activities was poor. In the view of this respondent SRI was leading the way in terms of ‘green’ activities, and this was stimulating more action by the other hotels in St. Lucia (R. Soomer, pers. comm.). With regard to encouragement of the use of cleaner technology by the government he noted that there were tax incentives in place to encourage the use of solar water heaters.

Open suggestions and comments from respondents indicated an understanding that the implementation of cleaner technology was important for effective competition in the tourism industry. The use of cleaner technology also had a positive impact on utility bills. One hotel reported that without water recycling the monthly water bill would increase by approximately 50 percent. It was also reported by a hotel manager that more could be done nationally in the use of cleaner technology, for example in harnessing wind power for electricity generation.

The reference to wind power was interesting as St. Lucia has set itself the explicit target of becoming self-sufficient in energy using renewable energy sources (see Appendix I). Activities carried out in St. Lucia with regard to implementing clean technology in the energy sector include:

1. The removal by the government of all taxes on renewable energy technologies.
2. Conduct of geothermal explorations on the island.

3. Implementation of a solar lighting demonstration project.

4. Permitting the purchase of solar water heaters as an allowance against taxable income. (Government of St. Lucia 2001; Jensen n.d.)

b. Barbados.

Eight completed questionnaires were gathered from Barbados. Of these eight responses two were from a group with properties in Barbados while one was from a group that had properties in two other locations in the Caribbean. The number of rooms on the properties ranged from 21 to 330, while the number of employees on the properties ranged from 5 to 450. Six of the 8 properties reporting from Barbados had 75 or more rooms.

All but one of the properties was a member of at least one organization that encouraged the use of cleaner technology. In terms of the distribution of guests by region there was remarkable consistency between the seven properties that were members of some industry group as against the property that was not a member of any industry group. Size was not a factor in the distribution of guests as the properties that were members all had over 100 guest rooms except for one, and the distribution of guests on that smaller property was right at the average for properties that were members of some industry group. The distribution of guests at hotels in the Barbados sample is illustrated in Figs. 8 and 9. As was the case in St. Lucia the ‘Rest of the World’ category comprised mainly tourists from the Caribbean.
Figure 8
Source: Author

Figure 9
Source: Author

Based on the definition of cleaner technology used in the questionnaire all the properties reported that they were using cleaner technology in their operations. Cleaner technology measures taken at the properties included:

- Use of fans as primary cooling method
- Use of fluorescent lighting
- Separation of solid waste for glass and plastics recycling
- Use of air-conditioning units with energy sensors or keys
• Use of environmentally friendly cleaning products
• Composting of organic solid waste
• Use of photocells on garden and corridor lights
• Use of low sodium pressure lights on beach to reduce energy use and protect nesting turtles
• Use of solar water heaters
• After use on both sides shredded paper sent to chicken farmers
• Elimination of Styrofoam containers
• Elimination of plastic plates
• Water collected from roofs to be used for on property irrigation
• Treated sewage used for irrigation

As noted with regard to St. Lucia the use of cleaner or environmentally friendly technology relates to a conceptualisation and organisation of operations that understands the importance of environmentally friendly business operations. The researcher was not able to peruse any Environmental Management System manuals for any of the properties reporting in Barbados. However from the cleaner technology usage steps taken, as was found in St. Lucia, both staff and guests have to be involved.

The management philosophy that informs the use of cleaner technology can be gleaned from the Environmental Policy Statements obtained from hotels in Barbados (see Appendices G and H). These policy documents show that apart from the philosophy of the hotel management, a driver of a green environmental policy was compliance with international environmental criteria set by organizations such as Green Globe 21. Of the eight hotels responding in Barbados five have written policies on environmental issues,
incorporating ideas on sustainable, or green tourism. In addition four of the eight hotels have been Green Globe 21 certified.

The hotels in Barbados reported that the following reasons motivated them to use cleaner technology in their operations:

- To attract “green consumers.”
- To reduce costs.
- To comply with International Protocols.
- To comply with national policies.
- To do our part in maintaining environmental integrity.

As in St. Lucia ‘Pressure from local Non-governmental Organizations’ was not noted as a factor in the decision to use cleaner technology in hotel operations in Barbados.

In terms of the impact of the usage of cleaner technology, all the hotels reported at least a 10 to 20 percent reduction in energy consumption with the use of cleaner technology. One property reported a reduction in energy consumption of between 41 to 60 percent. Apart from the positive impact on the environment the use of cleaner technology to reduce utility bills is important for cost containment at Caribbean hotels/resorts because of the relatively high price of utilities in the region (see Table 6).
Table 6
High Cost of Utilities in the Caribbean

<table>
<thead>
<tr>
<th>Country</th>
<th>Water Prices ($/m$^3$)</th>
<th>Electricity Prices ($/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbados</td>
<td>2.1</td>
<td>0.15</td>
</tr>
<tr>
<td>Jamaica</td>
<td>2.0</td>
<td>0.13</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>2.9</td>
<td>0.21</td>
</tr>
<tr>
<td>U.S. Average</td>
<td>0.36</td>
<td>0.08</td>
</tr>
<tr>
<td>OECD Average</td>
<td>0.86</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Source: Cresser 2002

Investment in cleaner technology varied widely across the properties reporting from Barbados. Investments ranged from a low of $7000 over the period 1997-2001 to $250,000. The biggest line item in terms of investment in cleaner technology was for solar heating. All the hotels reported that there were no changes in staff numbers as a result of implementing the use of cleaner technologies in their operations.

In terms of business networking the seven hotels that were members of industry organizations all reported that they share ideas/information on the use of cleaner technology with other hotel/resort operators. The means by which this was done included:

- By attending conferences/workshops
- One-on-one contacts
- Visiting other properties

Like in St. Lucia, one property also reported that it hosted visits from schools and other hotels to demonstrate the use of cleaner technology on the property.

As was reported for St. Lucia membership of organizations that encourage the use of clean technology seems to play a role in encouraging the use of cleaner technology in Barbados. However profitability is also a factor as one of the hotels that reported usage of
cleaner technology was not a member of any industry organization. Organizations to which hotels reported membership that encouraged the use of cleaner technology included:

- Barbados Marine Trust
- BHTA
- CAST
- CHEMI
- Green Globe 21
- Green Hotels Association
- Tourism Development Corporation.

Respondents noted that government policies potentially could play a role in encouraging the use of cleaner technology. The Barbados Tourism Development Act (2002) offers tax incentives for the use of environmentally friendly technologies and the implementation of certain environmental initiatives (see Govt. of Barbados 2002).

One of the respondents suggested that there should be direct subventions by the government as is the case in some other countries (Germany, Sweden) so that comparatively cheaper pricing of cleaner technologies could influence purchasing decisions by consumers.

Concern was also expressed about the lack of enforcement of existing legislation by the Government of Barbados, especially concerning illegal dumping and garbage disposal. It was suggested that a recycling campaign should be driven by the government and collection containers should be made available and positioned in strategic points on the island for recyclable items such as glass, metal, paper etc. All the recycling initiatives
in Barbados are privately driven at present (Best 2002). As an alternative private recycling companies could be given more help.

It was reported that the lack of government support made it very difficult to recycle items, because each person or business had to find persons or businesses who will collect the items and who will dispose of them or recycle them as promised. A company called “Duraplast” makes roofing shingles from recycled polyethylene terephthalate plastic (PET) thus there is a market for recycled PET containers.

The lack of a proactive stance by the Government of Barbados thus far in relation to solid waste management is balanced by its much more focussed and proactive approach to the issue of renewable energy, an important aspect of clean technology used in the tourism sector. In fact the policy of the Government of Barbados is to have renewable energy comprise 40 percent of the island’s primary energy supply by 2010 (Gov’t of Barbados 2001, 96).

A major use of renewable energy in Barbados is for water heating. This is significant for the tourism sector as guests expect to have the choice of hot water. Government policy measures that encouraged and supported widespread diffusion of solar water heating in Barbados include: -

- Waiving of taxes on raw materials for solar water heater manufacture.
- High taxes on non-solar water heaters (60 percent or higher).
- 100 percent rebate on the cost of solar water heaters from their income taxes to householders who purchase solar water heaters.
- Hotels that borrowed from the government run development bank had to carry out energy audits. These audits usually suggested the use of solar water heaters (Gov’t of Barbados 2001, 97-98).

The total penetration by solar water heaters in the Barbados market is an illustration that “in an environment where technology and other barriers are removed, government policy can play a significant role in the viability of renewable energy technologies” (Gov’t of Barbados 2001, 110).

For most of the sample properties in Barbados, the use of cleaner technology by competitors was not seen as a factor influencing the use of cleaner technology, nor was the availability of funding or technical/managerial resources a factor in the decision-making on the use of cleaner technology. Two of the properties with over 100 rooms and one with fewer than 25 rooms reported that funding was a factor in their decision to use or not use cleaner technology.

In response to the open suggestions and comments section of the questionnaire from the respondents in Barbados one of the points made was that there was a law that all buildings had to have a cistern for collecting rainwater. However the government seems not to want to act on changing the law so that appropriately collected and treated rainwater could be used for toilets, laundry, and even potable purposes. Another hotelier also highlighted this legal challenge to wider and more efficient use of collected rainwater.

The role of CHEMI in supporting the use of cleaner technology in the Barbados hotel sector was noted by one of the respondents. This project caters to the small hotel sector, which is defined by CHEMI as hotels with 75 or less guest rooms. Tour operators
were also noted as influencing the use of cleaner technology in hotels as representatives of tour operators who come to ensure that the hotel meets their standards, including environmental standards for hotel operations, continually visit some hotels.

The hoteliers felt that the most important aspect of implementing environmentally friendly (cleaner) operations was in-house training of staff, and guests, (as implementers). The processes, they believe should start with reduction, then reuse, then recycling. Also implementation should be phased in by first seeking to save on use of resources with existing technologies (efficient use of current technology). This involves, for example, stopping water leaks. After doing this then hoteliers could seek to add new technology. An interesting comment from one of the respondents was the concept of “Green and Blue”, meaning that hoteliers should try to link cleaner technology to the need to protect the seas. The marketing value to hotels of pursuing green initiatives was also noted.

c. Jamaica.

Three questionnaires were returned from Jamaica. One questionnaire was from a large hotel (over 300 rooms) that was part of an international chain, one was from a medium sized hotel (over 75 rooms), and the other was from a small hotel (under 50 rooms). Thus even though the response from Jamaica was way below expectations the responses that were obtained provide a perspective on the use of cleaner technology in hotels in Jamaica from three different categories of hotel as measured by guest rooms. The number of employees on the properties ranged from 20 to 286.

With regard to the origin of guests the largest and smallest property sampled had a similar distribution in relation to the origin of their guests while the medium sized property had a very divergent pattern. The large and small properties were located in the
Negril area of Jamaica’s tourism locations, while the medium sized property was located in the Ocho Rios area (see Fig. 10).

*Figure 10: Map of Jamaica showing Negril and Ocho Rios*


The distribution of guests by region of origin in Jamaica is shown in Figs. 11 and 12.

*Figure 11*

Source: Author
Based on the definition of cleaner technology used in the questionnaire the small and medium sized properties reported that they were using cleaner technology in their operations. Although the large property indicated ‘no’ as the answer to the question as to whether cleaner technology was being used in the hotel, in answering the question about what areas has the hotel been using cleaner technology some illustrations were provided. Further review of the questionnaire based on this inconsistency in response led the researcher to the view that what the respondent really was trying to get across was that the hotel could be doing more in terms of using cleaner technology in its operations.

Cleaner technology measures taken at the hotels include:

- Use of fluorescent lights
- Use of non-toxic, non-corrosive, non-flammable, bio-degradable chemicals
- Reusable plastic cups in bars
- Use of Harp 22 refrigerant in air-conditioning units
In implementing cleaner technology strategies staff and guests are stakeholders. Items such as environmental policy statements indicate the philosophy of the management of a hotel with regard to impacts on the environment. Of the three hotels that responded only one indicated that it has a written environmental policy statement. The hotel with a written environmental policy statement happened to be the smallest of the three.

The hotels reported that all of the following reasons are the chief motivating factors for the use of cleaner technology:

- To attract “green consumers”.
- To reduce costs
- To comply with International Protocols
- To comply with national policies
- To do our part in maintaining environmental integrity

‘Pressure from local Non-governmental Organizations’ was not noted as a factor in the decision to use cleaner technology in hotel operations. This illustrates the disconnect between private sector businesses and local environmental NGOs. From the response of the large property it can be surmised that that property was making minimal efforts with regard to the use of cleaner technology because of the following reasons:

- Too expensive
- No requests from guests
- No government sanctions

In relation to the factor ‘no requests from guests’ the majority of the guests to this property were from North America.
All the hotels reported a reduction in energy usage as a result of the use of cleaner technology, at the higher end one property reporting a yearly reduction in energy consumption of between 21-40 percent. Two of the hotels reported that they did not hire additional staff as a result of implementing the use of cleaner technology in their operations while one reported hiring one additional staff member. The hotels reported total investment of up to $40,000 at one property for implementing cleaner technology solutions.

Two of the hotels reported that they share ideas/information on the use of cleaner technology with other hotel/resort operators. The means by which this was done included:

- By attending conferences/workshops
- One-on-one contacts
- Visiting other properties
- Property is part of a hotel/resort chain.

Only the large hotel reported being a member of an organization that encouraged the use of cleaner technology at hotels/resorts. That property was a member of the JHTA and the Negril Chamber of Commerce. The small property did indicate an interest in joining an organization that encouraged the use of cleaner technology at hotels/resorts.

It is unclear what role government policies potentially could play or are playing in encouraging the use of cleaner technology in hotels/resorts in Jamaica. As was the case for St. Lucia government action is mainly related to inspections to monitor food handling and other sanitary concerns. In other words government regulatory and monitoring action was mainly geared towards addressing health concerns of staff and guests.
Two of the properties reported that the use of cleaner technology by competitors was not a factor influencing their decision to use cleaner technology. The response to the question as to what impact funding and the availability of technical/managerial resources had on the use of cleaner technology drew a mixed response. The larger property reported that funding and the availability of technical/managerial resources was a constraint on expansion of the use of cleaner technology. The smaller property gave the opposite response.

Open comments from respondents indicated an understanding that the implementation of cleaner technology was important for effective competition in the tourism industry. Quoting one Jamaican hotel manager: “Cleaner technology is way forward and if we are to survive in this Industry, we must utilize environmentally friendly products in our hotel.”

d. Antigua.

Four questionnaires were returned from Antigua. The properties that responded all had fewer than 75 rooms. Two properties were part of regional hotel groups. The number of rooms at the four hotels from which responses were received ranged from a low of 26 to a high of 72 rooms. The number of employees on the properties ranged from 20 to 175.

Only two of the four completed questionnaires had numbers on the region of origin of their guests. These two properties who reported on the origin of their guests had a similar number of rooms: 64 and 72 respectively. However the distribution of the regional composition of their guests was almost polar opposites. For one property 75 percent of guests were from North America while 25 percent were from Europe. For the
other property 10 percent of the guests were from North America while 90 percent were from Europe.

Based on the definition of cleaner technology used in the questionnaire three of the sampled properties in Antigua indicated that they were using cleaner technology in their operations. Cleaner technology measures that are implemented include:

- No air conditioners in guest rooms
- Minimal use of chemicals
- Hand washing of laundry
- Collection of rainwater to augment the mains supply
- Composting of organic solid waste

The three hotels using cleaner technology indicated they were using cleaner technology because of the following motivational factors:

- To reduce costs
- To comply with International Protocols
- To do our part in maintaining environmental integrity

For Antigua attracting green consumers and complying with national policies were not given as a reason by any of the hotels as reasons for using cleaner technology. ‘Pressure from local Non-governmental Organizations’ was also not a factor in the decision to use cleaner technology in hotel operations.

The hotel that reported that it was not using cleaner technology in its operations said that this was because there were no government sanctions. However the respondent indicated that at the hotel air-conditioners were not used in the guest rooms because the rooms were large, and due to the geographical position of the hotel on the island there
was a cooling effect from the prevailing winds. The respondent also reported that by September/October of 2003 the two kitchens in the hotel would be completely refurbished, and that cleaner technologies will be incorporated into the refurbishment plans.

One of the four properties has a written environmental policy. With regard to the impact on costs, two of the hotels reported that as result of the use of cleaner technology they were able to reduce energy consumption at their resorts. None of the three hotels that reported that they were using cleaner technologies in their operations had any change in staff numbers as a result of implementing the use of cleaner technologies in their operations.

In terms of business networking one hotel reported that it shared ideas/information on the use of cleaner technology because it was a part of a hotel/resort chain. Another property reported that it did not share ideas/information on the use of cleaner technology because other hotels/resorts do not share ideas/information on the use of cleaner technology.

Two hotels are members of organizations that encourage the use of cleaner technology at hotels. The organizations mentioned were the AHTA and the CHA. One hotel reported that there were government polices/regulations that demand/encourage firms in the hotel sector to use cleaner technologies. It was also suggested that the government should organize annual workshops on good environmental policies.

The hotel that was not using cleaner technology indicates that this was because of competitors implementing cleaner technology. Although the hotel reported that currently it is not using cleaner technology there were plans to implement some cleaner technology
methods in a major refurbishment scheduled for September/October 2003. All the hotels noted that funding and the availability of technical/managerial resources was not a factor in the decision to use or not use cleaner technology.

In open comments respondents noted that use of cleaner technology would make for a better tourism destination. Lack of enforcement of current law was also seen as mitigating against wider use of cleaner technologies in Caribbean resorts.

The Government of Antigua plans to introduce a Tourism Development Corporation Amendment Act granting duty free and income tax concessions to new tourism projects (Antigua Sun March 31, 2003) and to allow deductible interest on loans before taxes, for the construction of new hotels. In July 2003 the act was being drafted. Hopefully when it is available for consultation and review by stakeholders provisions will be made to allow for explicit benefits for hotels that invest in cleaner technology.

e. The Dominican Republic.

The Dominican Republic is the only Spanish speaking country in the study. A response came from only one property. The manager responsible for the completion of the questionnaire is a Vice Chairperson of CAST. The property is a large one (418 rooms) with a full time staff of 351 persons. It is one of the hotels/resorts located on the eastern tip of Hispaniola.

It was reported that 40 percent of the guests at the property were from North America. Fifty-five percent of the hotel’s guest came from Europe while 5 percent were classified as coming from the Rest of the World. Included in the ‘Rest of the World’ figure were guests from Latin America and locals.
The hotel reported that cleaner technology was being used in its operations. Cleaner technology measures taken include:

- Use of low energy consumption lights
- Air conditioning system with auto turn off thermostats
- Solar water heaters
- Use of treated sewage for irrigation
- Use of biodegradable cleaning products
- Reuse/recycling of glass
- Composting of grass cuttings
- Open air design

Cleaner technologies are used at the resort for the following reasons:

- To attract “green consumers”
- To reduce costs
- To comply with national policies
- To do our part in maintaining environmental integrity

‘Pressure from local Non-governmental Organizations’ was not a factor in the decision to use cleaner technology in the operations of the hotel. This was consistent across all the hotels in the study.

The philosophy of the hotel on environmental issues is outlined in a written environmental policy. The property gets useful by-products from the use of cleaner technology. Treated wastewater is used for irrigation of the hotel’s golf course and green areas of the hotel grounds. Grass and tree cuttings are also transformed into organic fertilizer by means of composting. This fertilizer is used on the grounds of the hotel.
The hotel reports a reduction in energy consumption as a result of the use of cleaner technologies. It was also noted that there was no change in staff numbers as a result of implementing the use of cleaner technology in its operations.

In terms of business networking the hotel reported that ideas/information on cleaner technology were shared with other hotel/resort operators by attending conferences/workshops. The hotel was also a member of Green Hotels, an organization that encourages the use of cleaner technology (www.greenhotels.com).

This property is impacted by government polices that demand/encourage firms in the hotel/resort sector to use cleaner technologies. It was noted that for two years the Dominican Republic has had a Secretary for the Environment and a statute on the Environment that regulates all the activities of the country. All companies must operate according to the norms of the Environmental Law. The hotel also has its own measures in place to keep track of variables like energy consumption.

The decision to use cleaner technology in the operations of the hotel was not based on decisions by competitors. Funding and the availability of technical/managerial resources reportedly affect decisions on whether to use or not use cleaner technology. In terms of its competitors the respondent noted that at the resort the majority of their investments have been in macro infrastructure for cleaner technology. Among these for example, are wastewater treatment systems and open air design. It was however noted that other hotels in the Dominican Republic have made significant investments in in-room devices to reduce their consumption of resources. This includes technologies such as in-room sensors, contact switches, fluorescent lighting, and so forth.
Summary

This study of the adoption of cleaner technology in the lodgings/facilities sector of the tourism industry in the Caribbean sought to answer the questions of to what extent, and for what reasons have Caribbean hotels/resorts in five selected countries implemented cleaner technologies. This is important because the use of cleaner technology in the tourism sector can conserve resources, and is therefore linked to sustainable tourism development.

In generalizing about the results from the case studies of 20 hotels in five Caribbean territories it is important to note that 11 of the 20 responses came from hotels with more than 75 rooms. What these hotels were doing with regard to using cleaner technology was important. In areas like treatment of sewage, and the use of treated water for irrigation it was found that the larger properties generally have the resources to fund such activities.

The findings indicate that the primary geographic region of origin of a hotel’s guests did not play a significant role in decisions about whether to use or not use cleaner technology. Decisions to use these technologies are based primarily on economic considerations. Nevertheless the geographic origin of guests did create pressure on some properties to use more environmentally friendly technologies. Hotels that had significant numbers of guest coming though tour operators face regular visits by inspectors from the tour companies who wanted to ensure that the hotels maintained certain environmental standards that were more easily met if cleaner technologies were used in their operations.

Attracting environmentally aware (green) consumers was signalled by the majority of the respondents as a reason for using cleaner technology in their operations.
Again this points to the business logic that is driving the use of cleaner technology in hotel operations. This is apart from the rationality of the use of cleaner technology in terms of protection of the environment on which the tourism industry depends.

Most of the hotels that reported that they were using cleaner technologies (65%) shared ideas/information on the use of cleaner technology with other hotel/resort operators in the rest of the region and further afield. This indicates a high level of networking. This high level of networking can positively impact on the sustainability of the Caribbean tourism sector by facilitating the technology diffusion process that would lead to a cluster of environmentally sound properties. Most of the hotels also reported that they were members of organizations that encouraged their members to utilize cleaner technologies in their operations.

The networking reported from the case studies had as an important component the existence of a number of hotel chains, or groups of hotels in the five countries covered by this study. These hotel groups ranged in scope from two jointly owned properties across the street from each other on one island to chains with properties in three of the five countries included in this study. Group ownership led to a consistent policy over several hotels with regard to the adoption of cleaner technology. For the technology diffusion process what this meant was that if the use of cleaner technology was accepted as policy by the head office of a hotel group then there was pressure and support for the deployment of these technologies on all the properties within the group.

From the observations this researcher made with regard to SRI this was clearly demonstrated. SRI has taken a position that it needs to care for the environment as summarized in its corporate environmental policy (see Appendix J). The adoption of this
policy at headquarters has moved beyond public relations to a program of implementation. Part of the implementation process is the employment of environmental managers at each property with the aim of ensuring that the environmental program of the chain is implemented. The environmental program includes elements of cleaner technology. This process meant, for example that the SRI properties in St. Lucia follow a methodological approach to implementation of this policy, which includes obtaining Green Globe certification. At present all three of the SRI properties in St. Lucia are Green Globe certified.

Overall, government policies are not seen as very important currently, mainly because the governments were behind the curve in terms of their capacity to implement and enforce environmental laws. This has also been noted by d’Auvergne et al. (2001). The private sector was leading the use of cleaner technology because there were direct positive impacts on the bottom line. This concurs with the findings of Cresser (2000) who discussed the lack of supportive services and facilities, noting:

It was felt that once we had hotels doing the correct things like recycling, garbage separation, compliance with laws and regulations, water and energy conservation etc. there was insufficient outside support for recycling plastics and glass and disposing of the solid waste properly. In addition, it was also felt that there was little or no effective enforcement of laws pertaining to environmental issues, and, the lack of incentives to encourage properties, when upgrading to use environmentally correct equipment. (Cresser 2000, 18)
Antigua is currently debating a new set of incentives for the tourism sector. It will be seen whether that new legislation gives explicit support to hotels/resorts that want to use cleaner technology in their operations.

Monitoring by government was also not a critical factor in the adoption of cleaner technology except where this impacted on health issues, for example the quality of effluent from sewage treatment plants. Some aspects of cleaner technology in hotel operations like energy use, recycling, composting was out of the purview of government regulations. The lack of a monitoring role by the government with regard to the encouragement of the use of cleaner technology partly reflects a flawed understanding by some in government of how the Caribbean tourism industry should develop in the post Agenda 21 era. Too much of the focus is still on an absolute increase in visitor arrivals.

One issue that reflects how the governments approach some of these matters surrounds the question of interconnection to national sewage systems. Where policy exists that requires that properties hook up to national sewage systems or face penalties it can force large hotels to tie into these networks. However the reuse of recycled water for irrigation makes it more rational for large properties to operate their own wastewater plants to treat sewage to generate water that can be used for irrigation of golf courses and other green areas. Smaller properties find it more cost-effective to tie into national sewage networks.
CHAPTER V
DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussion of Major Findings

The case studies analysed in Chapter IV of this study yielded the following findings:

(a) The use of cleaner technology is integrally linked to sustainable tourism development in the minds of decision-makers at hotels/resorts. Hoteliers recognized that their activities impacted on the environment and that if they did not take steps to protect that environment it would impact negatively on their profits and the long-term existence of the industry.

(b) The use of cleaner technology in the lodging sector of the tourism industry can be cost-effective. The case studies revealed that hoteliers acknowledged cost reduction benefits from investing in cleaner technologies. Hoteliers reported direct cost savings from reduced utility bills, waste handling charges and so forth. There were indirect benefits as well from the marketing value of being able to demonstrate the use of environmentally friendly technologies in their operations to guests, tour operators, and other interested parties.

(c) The study found that the use of cleaner technology in the lodgings/facilities sector of the tourism industry could conserve resources. The most significant evidence of which was the use of treated wastewater for irrigation of golf courses and green areas on some hotel properties. In islands like St. Lucia, Antigua and Barbados that are designated as being at risk from desertification by the UN (R. Burke, pers.)
comm.) this is an important element in promoting the sustainability of the Caribbean tourism industry.

In short, from the case studies the use of cleaner technology is impacting positively on the Caribbean tourism industry. From their activities in recycling, energy conservation, wastewater treatment, and so on the hotels/resorts in the study are reducing their footprints on the environment, contributing to the sustainability of the industry and very importantly for organizations that exist for profit, helping to enhance the profitability of their operations. Hotel profitability is enhanced through the use of cleaner technology because of cost reductions, and retention and attraction of environmentally conscious guests.

This study was guided by the following hypotheses:

H$_1$: The use of cleaner technologies impacts positively on maintaining a sustainable tourism industry.

H$_2$: The use of cleaner technologies impacts negatively on maintaining a sustainable tourism industry.

From the findings yielded by the case studies H$_1$ can be accepted that the use of cleaner technologies by lodgings facilities impacts positively on maintaining a sustainable tourism industry. What was found as suggested by Goodall (1995), Porter and van der Linde (1995a,b), Inskeep (1998), Boyle (1999), Clayton et al. (1999), Reinhardt (1999), and El-Kholy (2002) was that implementation of cleaner technology by hotels/resorts led to a win-win situation where hotel managers get cost savings, as well as a reduction of the environmental footprint of their operations. The cost
reductions are easily measurable. Additionally the positive environmental impacts had marketing value in the highly competitive tourism industry (Jayawardena 2002).

In assessing the use of cleaner technology in the lodging/facilities sector of the tourism industry in the Caribbean a major area of focus was the approaches taken to waste management. Clean technologies in waste management systems seek to:

1. use materials currently classified as waste for production of useful commodities
2. use tertiary treated sewerage for irrigation
3. recover metals, glass and plastics from the solid waste stream for reuse and recycling
4. produce compost from organic solid waste.

The case studies revealed examples of all these aspects of the use of cleaner technology at the various hotels from which information was obtained. In some areas, for example, plastics recycling, hotels were doing this activity without any support from government. Also the hotels reported that they were not under any pressure from civil society in the islands where this research was conducted to implement cleaner technology solutions in their operations.

This leads on to discussion of what was motivating hotels to use clean technology in their operations. Profit enhancement was an important motive. This reflects an enhanced understanding by business that making their operations ‘clean’ was good for the bottom line, good for the environment, and good for all the stakeholders in the tourism industry in the Caribbean (Porter and van der Linde 1995a,b; Inskeep 1998; Boyle 1999; Clayton et al. 1999; Gooden 2002). This list of stakeholders includes guests who are explicitly targeted and sensitised by some of the properties as to how they can
act to make their stay more environmentally sound while still getting the vacation experience that they expected.

The issue of diffusion of technology was discussed in this study (Gold 1981; Rogers 1995). The findings indicate that the larger properties have taken the lead in the implementation of clean technologies. This is an example of where bigger is better for the physical environment.

The many group-owned properties in the Caribbean tourism industry help to enhance the diffusion of cleaner technologies throughout the region. Joint ownership makes it easier to share best practices, over several properties. For example SRI has a Corporate Environmental Program Guide that is used by all of the properties in the group.

The smaller properties generally do not have standardized environmental policies and are less proactive in implementing cleaner technologies in their operations. The smaller properties are being encouraged and helped to do more with regard to the use of cleaner technology by programs such as EAST and CHEMI.

In addition the researcher found that the majority of hotels indicated that they were members of organizations that encourage the use of cleaner technology. Peer pressure was also a factor in the use of cleaner technology in the hotel/resort sector of the tourism industry. To this end the larger hotels are taking the lead.

These elements point to the existence of a Caribbean tourism industry cluster that is moving in the direction of sustainability based on wider use of cleaner technologies. Institutional support is being given to the push toward sustainability based on the use of clean technologies by CAST. Resources for investing in clean technology are being
channelled to hotels in Jamaica through EAST and to hotels in the Eastern Caribbean through CHEMI.

The study found that investment by hotels in the use of cleaner technology could be relatively modest in comparison to overall capital investments. It was found that a hotel could make its operations more environmentally friendly by merely checking for leaks in the plumbing. It can go on to the stage of retrofitting the entire plumbing of a property to facilitate the use of solar heaters for the hot water supply.

The case studies also indicate that a major area to be exploited in the use of cleaner technology in the Caribbean hotel sector is the area of building design, even among the large chain hotels. For some groups that was a challenge because group management has a business model based on buying or leasing existing properties, then making them over to fit the marketing image of the group. This limits what can be done with regard to sustainable building design, as measures to use cleaner technologies have to be engineered into an existing structure. Further studies could examine the hotels that are being developed as green field ventures to see how elements of cleaner technologies are being incorporated into project design.

The study underscored the fact that governments had a role to play in the encouragement of the use of cleaner technology in the Caribbean tourism sector. The example of how government policy in Barbados led to the widespread adoption of solar water heaters is one example. Lack of an environmentally sound approach to solid waste management, water use, and building design standards illustrate lacuna that need to be filled to ensure the survival of the region’s tourism industry. Effective enforcement of
current statutes can also have a positive impact on the utilization of cleaner technologies in the hotel sector.

Conclusions

In concluding it is important to reiterate that apart from environmental factors, there are other elements to the sustainability of the Caribbean tourism industry, especially those that can be categorised as economic and socio-cultural factors. These include, but are not limited to the issues of airlift to the region, security of visitors, attitudes of the local population, and price competitiveness.

The tourism system, as classically defined by Gunn comprises the following: the demand side representing the different types of tourist segments that exist in the market, and the supply side which consists of the following: attractions, information/promotion, facilities/services, and transportation (Gunn, 1988). This dissertation examined the lodgings sector that pertains to facilities/services in the tourism system, and its contribution to environmental sustainability of Caribbean tourism destinations. This dissertation did not explore the contribution of other sectors such as attractions and transportation to the sustainability of the Caribbean tourism industry. It also needs to be reiterated that the case studies discussed in this dissertation did not deal with the important cruise ship segment of the Caribbean tourism industry.

From the findings of this study this researcher concludes that there is a high level of awareness of the impact of cleaner technologies on the hotel/resort sector of the Caribbean tourism industry. Implementation levels vary by size of property. Larger properties are taking a more proactive approach. The smaller properties are less proactive
but are increasingly doing more, especially because of the existence of programs that assist them to implement these clean technologies.

With regard to Caribbean governments encouraging the uptake of cleaner technologies in the tourism industry, just monitoring and enforcing the environmental statues already on the books would be a good first step. The Caribbean tourism industry is too important to the sustainability of the economies of Caribbean countries for its existence to be left totally to chance and the vagaries of the market. Governments should take the lead in encouraging hotels to use more clean technologies in their operations. The Government of Barbados put legislation in place in 2002 that is a good start. However, more needs to be done. For example in Barbados because of exiting legislation hotels collect rain water but cannot use it effectively in their operations to reduce their dependence on potable water from the national network.

The study also leads to the conclusion that there is a Caribbean tourism cluster that is contributing to the diffusion of cleaner technology. This sustainable tourism cluster is based on the existence of strong regional tourism organizations as exemplified by the CHA and the CTO. Regional institutions like CEHI also assist the diffusion of cleaner technology. The interlinked management structure in the regional tourism industry also facilitates the diffusion process. SRI is an example of this phenomenon. The diffusion of cleaner technology in the Caribbean tourism industry is also facilitated by research that is being carried out at regional educational institutions, for example, the *Knowledge Construction in Latin American and the Caribbean Project* (Maerck and Boxill 2000; Boxill et al., 2002).
Cleaner technologies are helping to sustain the Caribbean tourism industry. The use of these technologies by themselves will not guarantee the survival of the industry, as it does not exist in a vacuum. Nevertheless, given the right macro environment, the use of cleaner technologies in the Caribbean tourism industry can ensure that the Caribbean remains a world-class vacation destination.

The people living in the Caribbean have to work with the resources available to earn a living. One of the resources is a very pleasant environment that even contributed to the description of the Garden of Eden found in the King James Version of the Bible (The Economist April 19\textsuperscript{th}-25\textsuperscript{th}, 2003, 68). Keeping this environment an attractive destination for tourists is essential. The use of cleaner technologies clearly has a major role to play in that effort.

Recommendations for further research

The first recommendation is that this study needs to be replicated with the researcher spending more time in the region to get a higher response rate, nearer to the 50 percent response rate that this researcher had projected. Such a response rate would lead to the ability to do some econometrics tests to add a different dimension to the analysis. Replication of this research in other regions where tourism is a dominant economic activity or even just another economic sector would also be useful to provide a global view of the use of cleaner technology in the tourism sector.

More research also needs to be done on building design for sustainability in the Caribbean. More use needs to be made of wind energy and solar power in building designs in the region. Energy for cooling is a major part of the utility bills of hotel
operators in the region. The territories that are major tourist destinations are all major importers of fossil fuels for meeting their energy needs. Any effort to reduce the demand for these fuels adds to the sustainability of the region from the point of view of less leakage of foreign exchange to pay for imported energy. Also the use of more renewable energy reduces the impact of the tourism industry on global warming. The Caribbean tourism industry can suffer significantly under certain scenarios of sea level rise based on the effects of global warming as documented in various national communications submitted to the United Nations Framework Convention on Climate Change (http://unfccc.int/resource/natcom/nctable.html).

The research on the impact of cleaner technology in the tourism industry leads to asking the question of what is, or can be the impact of the wider use of cleaner technologies in other areas of Caribbean economy. The results from investigating the lodgings sector of the tourism industry suggests that there is great potential for making other economic sectors of the Caribbean economy more sustainable by wider use of cleaner technology. Future research could also be applied to the practices of other sectors of the tourism industry, e.g. attractions, transportation from the tourism supply side, and their impacts on the sustainability of the tourism industry. Work along these lines is being planned by CEHI.

Recommendations for use of this research

The researcher hopes that this study will be used to illustrate the current status of, and the importance of wider adoption of cleaner technology in the Caribbean tourism industry in particular, and in the global tourism industry. Greater use of cleaner
technology in the wider tourism industry can potentially have a significant impact on the sustainability of global economic activity.

The researcher also suggests that this study can be used as a resource for managers in the tourism industry. The specific purpose would be with regard to illustrating utilization of cleaner technology in the tourism industry, providing illustrations of best practices, and alternative approaches to diffusion of cleaner technology.

This study also serves to demonstrate that although the Caribbean tourism industry is based on the natural environment, there does not necessarily need to be a conflict between a sustainable tourism industry and the maintenance of the environmental assets that make the Caribbean a premier travel destination. The study also shows that the use of cleaner technology in the Caribbean tourism industry calls for a proactive approach, both from Caribbean governments and managers in the tourism industry.
January 12, 2003

Dear Industry Colleague:

By way of this letter, we introduce you to Mr. Fitzgerald Yaw Jr., a Caribbean national and OAS Fellow who is currently pursuing a Ph.D. degree in Environmentally Cleaner Technologies at the University of Southern Mississippi, U.S.A. His PhD dissertation will expound on the cost-effectiveness of and potential links between the use of cleaner technology and sustainable tourism development.

Mr. Yaw will be undertaking a questionnaire survey of selected hotel/resort managers in the islands of Antigua, Barbados, the Dominican Republic, Jamaica and St. Lucia during the months of February and March 2003. His research will undoubtedly be of immense value and assistance to the Caribbean tourism industry, as we all continue to strive towards continuous improvement and high added value.

To this end, we encourage you to extend your fullest cooperation and kindest courtesies to him, as he seeks your participation in this questionnaire survey. We assure you that your efforts in this regard would not be futile, as Mr. Yaw has graciously offered to make the results of his findings available to us here at CAST. In turn, they will be disseminated to the industry, as and when available.

Your usual Caribbean warmth and hospitality will be appreciated in this effort.

Sincerely,

[Signature]

ALEX TITCOMBE
Executive Director (Ag.)
CARIBBEAN ALLIANCE FOR SUSTAINABLE TOURISM

Encl.

1000 Ave. Ponce de Leon, 5th Floor, San Juan, Puerto Rico 00907
Tel: 787-725-9139/Fax: 787-725-9108 Email: cast@caribbeanhotels.org
Website: www.cha-cast.com
29 de enero de 2003

Estimado Colega de la Industria Hotelera:

Por medio de esta carta le presento al señor Fitzgerald Yaw Jr., nacional caribeño y miembro de la OAS (Organización de Estados Americanos, por sus siglas en inglés), quien actualmente se encuentra cumpliendo su grado doctorado en Tecnología Ambientalmente Sana en la Universidad del Sur de Mississippi, EU. Su disertación tratará sobre los costos efectivos de el desarrollo sustentable y los posibles enlaces entre los usos de los mismos.

El señor Yaw estará efectuando una encuesta y cuestionario a gerentes seleccionados de la industria hotelera en las islas de Antigua, Barbados, la República Dominicana, Jamaica y Sta. Lucía durante los meses de febrero y marzo de 2003. Su investigación será de valor y apoyo a la industria turística del Caribe mientras continuamos nuestro camino hacia mayor competitividad global y valor en nuestra industria.

Le exhortamos a participar en este ejercicio y le pedimos que le extienda su cooperación y cortesía al señor Yaw, ya que busca su participación en esta encuesta. Le aseguramos que sus esfuerzos no serán inútiles, ya que él ha ofrecido compartir los resultados de su investigación a CAST. CAST, a su vez, distribuirá los resultados de la misma a sus socios y a la industria.

Su hospitalidad y amabilidad caribeña serán apreciada en este esfuerzo.

Cordialmente,

[Signature]

Alex Titcombe
Director Ejecutivo (Act.)

Alianza Caribeña para el Turismo Sostenible (CAST)
Appendix B1

QUESTIONNAIRE

USE OF ENVIRONMENTALLY FRIENDLY TECHNOLOGIES (CLEANER TECHNOLOGIES) IN THE CARIBBEAN TOURISM INDUSTRY

THE UNIVERSITY OF SOUTHERN MISSISSIPPI
COLLEGE OF INTERNATIONAL AND CONTINUING EDUCATION
International Development Program

March 2003

Please return your completed questionnaire by email to:
gerryaw@hotmail.com
or by fax to: 662.325.6699
SECTION 1

INDUSTRY STRUCTURE

1. How many guest rooms are on this property?

2. How many full time employees do you have on this property?
   Peak (            ); Off-Peak (           )

3. Over the period 1997-2001 what was your occupancy rate (per cent of guest rooms occupied by guests)?
   Please insert relevant numbers in table below: -

<table>
<thead>
<tr>
<th>Year</th>
<th>Occupancy Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak</td>
</tr>
<tr>
<td>1997</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Region of Origin</th>
<th>Percentage of Total Guests</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America (Canada, Mexico, USA)</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
</tr>
<tr>
<td>Rest of the World</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 2

USAGE OF ENVIRONMENTALLY FRIENDLY (CLEANER) TECHNOLOGY

DEFINITION: Environmentally friendly (cleaner) technologies are technologies that lead to you reducing your waste streams, using energy more efficiently, and generally reducing the impact of your operations on the environment.

5a. Based on ‘environmentally friendly’ or ‘cleaner technology’ as defined above would you say that you have been using cleaner technologies in your hotel/resort?

Yes □ No □

If your answer to Question 5a was Yes, please continue with Question 5b.
If your answer to Question 5a was No please answer Question 5d, then go to Section 5.

5b. In what areas of your hotel/resort have you been using cleaner technologies?

<table>
<thead>
<tr>
<th>Area</th>
<th>Clean Technology Measure taken</th>
<th>In what Year?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy: Air Conditioning Lighting etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewage Treatment &amp; Disposal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleaning Products used by housekeeping/maintenance/laundry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-use/Recycling of Glass Metal Plastics Organic Solid waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5c. What is your motivation for using cleaner technology (ies) in your hotel(s) /resort(s)? Please check all that apply!
___ To attract “green consumers.”
___ To reduce costs.
___ To comply with International Protocols.
___ To comply with national policies.
___ Pressure from local Non-governmental Organizations.
___ To do our part in maintaining environmental integrity.

5d. If you answered No to Question 5a, why have you not been using cleaner technologies in your hotel(s)?
   Please check all that apply!

___ Too expensive.
___ Environmentally friendly hotel operations not important.
___ No requests from guests.
___ No government sanctions.

6. Does your hotel/resort have a written policy on environmental issues, for example incorporating ideas on sustainable tourism, or green tourism?

   Yes ☐ No ☐

7a. With the use of these cleaner technologies are you obtaining useful ‘by-products’ from the items you used to discard or consider to be waste?

   Yes ☐ No ☐

7b. If you answered Yes to Question 7a, please give some examples of the by-products.

_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

7c. If you answered No to Question 7a, what do you think might be the reason?

_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

8a. With the use of cleaner technologies have you reduced energy consumption at your hotel/resort?

   Yes ☐ No ☐
8b. If your answer to Question 8a was Yes, by how much did you reduce your energy consumption over the last 5 years? (Please tick the appropriate percentage)

<table>
<thead>
<tr>
<th>Year (1997-01)</th>
<th>&lt;10 %</th>
<th>10-20%</th>
<th>21-40 %</th>
<th>41-60 %</th>
<th>&gt;60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td></td>
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<td>1999</td>
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<td>2000</td>
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<tr>
<td>2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION 3

**INVESTMENT IN ENVIRONMENTALLY FRIENDLY (CLEANER) TECHNOLOGY**

9. How much money have you invested to implement these cleaner technologies in your hotel operations over the period 1997-2001?

<table>
<thead>
<tr>
<th>Area</th>
<th>Total Investment 1997 - 2001 $US</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy:</strong></td>
<td></td>
</tr>
<tr>
<td>Air Conditioning</td>
<td></td>
</tr>
<tr>
<td>Lighting etc.</td>
<td></td>
</tr>
<tr>
<td><strong>Sewage Treatment &amp; Disposal</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Re-use/Recycling of</strong></td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td></td>
</tr>
<tr>
<td>Metal</td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td></td>
</tr>
<tr>
<td>Organic Solid waste</td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
</tr>
</tbody>
</table>
10. Staff to implement environmentally friendly (cleaner) technology. Please check what applies to you. Have you had to:

____ Hire additional staff to work on your cleaner technology facilities as a result of implementing the use of cleaner technologies in your operations?

____ Decrease staff numbers as a result of implementing the use of cleaner technologies in your operations?

____ No change in staff numbers as a result of implementing the use of cleaner technologies in your operations?

SECTION 4

BUSINESS NETWORKING

11a. Do you share ideas/information on the use of cleaner technology with other hotel/resort operators in the rest of the region or further afield?

Yes               No

11b. If you answered Yes to Question 11a, please tell us how you go about doing that? Please check all that apply.

------By attending conferences/workshops

------One-on-one contacts

------Visiting other properties

------Property is part of a hotel/resort chain

------Other (Please specify)________________________________________________

11c. If you answered No to Question 11a, why have you not shared ideas/information on the use of cleaner technology with other hotel/resort operators? Please check all that apply.

------Do not want to lose business secrets

------Sharing would increase competition

------Other hotels/resorts do not share ideas/information on the use of cleaner technology
-----Other (Please specify)_________________________________________________

12a. Are you a member of a hotel/tourism organization which encourages the use of cleaner technology at hotels/resorts?

Yes ☐ No ☐

12b. If your answer to Question 12a was Yes, what is the name(s) of the organization(s) and how does it (do they) encourage you to use cleaner technology?

<table>
<thead>
<tr>
<th>Organization</th>
<th>Policy on Cleaner Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12c. If your answer to Question 12a was No, are you interested in joining an organization?

Yes ☐ No ☐

SECTION 5

GOVERNMENT POLICIES

13a. Do you know if there are government policies/regulations on the island where this hotel/resort is located that demand/encourage firms in the hotel/resort sector to use cleaner technologies?

Yes ☐ No ☐

13b. Please tell us the reason for your answer to Question 13a, including how do you think these policies/regulations, if any, could be improved?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

14a. Is there active monitoring of your compliance with applicable environmental laws/regulations?

Yes ☐ No ☐
14b. If your answer to Question 14a was Yes, what form does the monitoring of your compliance with applicable environmental laws/regulations take?

________________________________________________________________________

________________________________________________________________________

SECTION 6

COMPETITION ISSUES

15. Is your decision to use or not use Cleaner Technology based on your competitors’ implementing Cleaner Technology?

Yes ☐ No ☐

16. Has the availability of funding affected your decision to use or not use Cleaner Technology?

Yes ☐ No ☐

17. Has the availability of technical/managerial resources affected your decision to use or not use Cleaner Technology?

Yes ☐ No ☐

18. Over the period 1997-2001 what was your Gross Profit Margin Percent [GPM %] (computed as Gross Profit / Net Sales)?

<table>
<thead>
<tr>
<th>Year</th>
<th>GPM %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak</td>
</tr>
<tr>
<td>1997</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td></td>
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<tr>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td></td>
</tr>
</tbody>
</table>
19. Do you have any comments/suggestions that you would like to add regarding the use of environmentally friendly (cleaner) technology in tourism?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

THANK YOU VERY MUCH FOR YOUR COOPERATION. YOUR TIME AND EFFORT IN FILLING OUT THIS SURVEY IS HIGHLY APPRECIATED.

PLEASE RETURN THE COMPLETED SURVEY BY EMAIL TO: 
gerryaw@hotmail.com or
Fax: 662.325.6699

IF YOU HAVE ANY QUESTIONS PLEASE CALL 662-325-6699
OR EMAIL gerryaw@hotmail.com

ALL RESPONSES ARE STRICTLY CONFIDENTIAL.

Date ___________________________
Questionnaire No.________________
Country_____ ___________________
Respondent ______________________
APPENDIX B2

CUESTIONARIO

USO DE TECNOLOGÍAS (LIMPIA) AMBIENTALMENTE AMISTOSAS EN LA INDUSTRIA TURÍSTICA DEL CARIBE

LA UNIVERSIDAD DEL SUR DE MISSISSIPPI
FACULTAD DE LA FORMACIÓN INTERNACIONAL Y CONTINUA DE EDUCATION
PROGRAMA DE DESARROLLO INTERNACIONAL

Abril 2003

Vuelva a por favor el cuestionario completado al email:
gerryaw@hotmail.com
o por el fax a: 662.325.6699
SECCIÓN 1

ESTRUCTURA DE LA INDUSTRIA

1. ¿Con cuántos cuartos de huésped cuenta su establecimiento?

2. ¿Cuántos empleados a tiempo completo tiene en esta establecimiento?
   Epoca alta (    ); Epoca baja (    )

3. ¿Durante el periodo 1997-2001 cuál fue el % ocupación (o %age de cuartos ocupados por huéspedes)? Por favor llene la tabla abajo con los percentages correspondientes: -

<table>
<thead>
<tr>
<th>Año</th>
<th>De Ocupación</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Epoca Alta</td>
</tr>
<tr>
<td>1997</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td></td>
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<tr>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td></td>
</tr>
</tbody>
</table>

4. Origen de las huéspedes durante el periodo 1993-2001

<table>
<thead>
<tr>
<th>Región del origen</th>
<th>Porcentaje de huéspedes totales</th>
</tr>
</thead>
<tbody>
<tr>
<td>América del Norte (Canada, Mexico, USA)</td>
<td></td>
</tr>
<tr>
<td>Europa</td>
<td></td>
</tr>
<tr>
<td>Japon</td>
<td></td>
</tr>
<tr>
<td>Resto del mundo</td>
<td></td>
</tr>
</tbody>
</table>
SECCIÓN 2

USO DE LAS TECNOLOGÍAS (LIMPIA) AMBIENTALMENTE AMISTOSAS

**DEFINICIÓN:** Tecnologías ambientalmente (limpias) amistosas son las tecnologías que conducen a la reducción desechos, y el uso de fuentes de energía más eficientemente, consecuentemente reduciendo el impacto de sus operaciones en el ambiente.

5a. ¿De acuerdo con ‘environmentally amistoso’ o ‘tecnología limpia’ según lo definido arriba diría usted que ha estado utilizando tecnologías limpias en su hotel/resort?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sí</td>
<td>No</td>
</tr>
</tbody>
</table>

Si su respuesta a la pregunta 5a es **Sí**, por favor continúe con la pregunta 5b.
Si su respuesta a la pregunta 5a es **No** por favor conteste a la pregunta 5d, después vaya a La Sección 5.

5b. ¿En qué áreas de su hotel/resort ha estado utilizando tecnologías limpias?

<table>
<thead>
<tr>
<th>Área</th>
<th>Medida de La Tecnología Limpia tomada</th>
<th>¿En qué año?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energía:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aire acondicionado</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iluminación</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Del Tratamiento &amp;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disposición de Las Aguas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residuales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productos de la limpieza</td>
<td></td>
<td></td>
</tr>
<tr>
<td>usados en el lavadería/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mantenimiento/la</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gobierno de casa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reciclaje/la reutilización</td>
<td></td>
<td></td>
</tr>
<tr>
<td>del</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cristal</td>
<td></td>
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<tr>
<td>Metal</td>
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<tr>
<td>Plásticos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basura sólida orgánica</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Otro</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5c. ¿Cuál es la motivación para usar tecnologías limpia (ies) en su hotel(s)/resort(s)?
   ¡Marque (✓) por favor los que aplican!
   ___ Para atraer "consumidores pro ambientales."
   ___ Para reducir costos.
   ___ Para cumplir con protocolos internacionales.
   ___ Para cumplir con policías nacionales.
   ___ Presión de organizaciones no gubernamentales locales.
   ___ Para contribuir por suporte en mantener integridad ambiental.

5d. ¿Si usted contestó No a La Pregunta 5a, por qué no ha utilizado tecnologías limpias en su hotel (s)?
   ¡Marque (✓) por favor los que aplican!
   ___ Demasiado costoso.
   ___ Operaciones ambientalmente amistosas no son importantes del hotel.
   ___ Ningunas peticiones de huéspedes.
   ___ Ningunas sanciones del gobierno.

6. ¿Tiene su hotel/resort policías escritas sobre aspectos ambientales, por ejemplo incorporando ideas en el turismo sostenible, o el turismo verde?

   Si  [ ] No  [ ]

7a. ¿Con el uso de estas tecnologías limpias está obteniendo "sub-productos" útiles, de los artículos que desechara o consideraba ser inútil o de ningún uso?

   Si  [ ] No  [ ]

7b. Si usted contestó Si a La Pregunta 7a, por favor dé algunos ejemplos de los subproductos.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

7c. ¿Si usted contestó No a La Pregunta 7a, qué piensa usted puede que sea la razón?

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
8a. ¿Con el uso de tecnologías limpias ha reducido el consumo de energía en su hotel/resort?  

<table>
<thead>
<tr>
<th></th>
<th>Si</th>
<th>No</th>
</tr>
</thead>
</table>

8b. ¿Si su respuesta a La Pregunta 8a fue Sí, por cuánto redujeron el consumo de energía durante los 5 años pasados? (Hace marque por favor el porcentaje apropiado)

Reducción anual en la consumo de energía

<table>
<thead>
<tr>
<th>Año (1997-01)</th>
<th>&lt;10 %</th>
<th>10-20%</th>
<th>21-40%</th>
<th>41-60%</th>
<th>&gt;60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
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<tr>
<td>1998</td>
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<td>2001</td>
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</table>

SECCIÓN 3

INVERSIÓN EN TECNOLOGÍA (LIMPIA) AMBIENTALMENTE AMISTOSA

9. ¿Cuánto dinero ha invertido en la ambientalmente amistosa en sus operaciones del hotel durante el periodo 1997-2001?

<table>
<thead>
<tr>
<th>Área</th>
<th>Inversión Total 1997 - 2001 $US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energía: Aire acondicionado, Iluminación etc.</td>
<td></td>
</tr>
<tr>
<td>Del Tratamiento &amp; Disposición de Las Aguas Residuales</td>
<td></td>
</tr>
<tr>
<td>Productos de la limpieza: lavadería/ mantenimiento gobierno de casa</td>
<td></td>
</tr>
<tr>
<td>Reciclaje/ reutilización del Vidrio, Metal, Plásticos, Basura sólida orgánica</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
10. Personal para la ejecución de tecnología ambientalmente amistosa.
   Por favor marque qué se aplica a usted.
   Tiene usted tuvo que:

   _____ ¿Emplea personal adicional en sus instalaciones para la implementación de tecnologías limpias en sus operaciones?

   _____ ¿Disminuya el número del personal como resultado de la implementación de tecnologías limpias en sus operaciones?

   _____ ¿Ningún cambio ha ocurrido en el número de personal como resultado de la implementación de tecnologías más limpias en sus operaciones?

   SECCIÓN 4

   ESTABLECIMIENTO DE UNA RED DE NEGOCIOS

   11a. ¿Comparte usted información/ideas sobre el uso de tecnología limpia con otros operadores de hotel/resort en el resto de la región o la fomenta a lo lejos?

       Sí ☐ No ☐

   11b. ¿Si usted contestó Sí a la pregunta 11a, por favor diganos cómo usted va sobre hacer eso?
       ¡Marque por favor lo que apliqué!

       ----- Atendiendo a los talleres y conferencias
       ----- Contactos uno-en-uno
       ----- Visitar otras hotels
       ----- La propiedad es parte de una cadena de hotel/resort
       ----- Otro (Especifique por favor)

   11c. ¿Si usted contestó No a La Pregunta 11a, por qué usted no ha compartido la información/ideas sobre el uso de una tecnología limpia con otros operadores de hotel/resort?
       ¡Marque por favor lo que apliqué!

       ----- No desee perder secretos de negocio
       ----- El compartir información aumentaría la competición
------- Otros hotels/resorts no comparten la información/ideas sobre el uso de una tecnología limpia con usted

------- Otro (Especifique por favor)

12a. ¿Es usted miembro de una organización de hotel/turismo que promueve el uso de una tecnología limpia en hotels/resorts?

    Si    No

12b. ¿Si su respuesta a La Pregunta 12a es Sí, cuál es el nombre de la organización y cómo lo ha motivado usted que utilice una tecnología limpia?

<table>
<thead>
<tr>
<th>La Organización</th>
<th>Política sobre tecnología más limpia</th>
</tr>
</thead>
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</table>

12c. ¿Si su respuesta a La Pregunta 12a fue No, está usted interesado en pertenecer a organización?

    Si    No

SECCIÓN 5

POLÍCICAS DEL GOBIERNO

13a. ¿Sabe usted si hay regulaciones/políticas del gobierno de la isla donde se localiza este resort y hotel, que exigen/motiven a las firmas del sector hotelero que utilicen tecnologías más limpias?

    Si    No

13b. ¿Por favor explique la razón para su respuesta de La pregunta 13a, incluyendo cómo piensan usted estas regulaciones/políticas, si las hay, podrían ser mejorada?
14a. ¿Hay supervisión activa de su conformidad con regulaciones/ leyes ambientales aplicables?

Sí  □  No  □

14b. ¿Si su respuesta a La Pregunta 14a fue Sí, qué forma de supervisión, de su conformidad con leyes/ regulaciones ambiental ha tomado?


SECCIÓN 6

EDICIONES DE LA COMPETENCIA

15. ¿Su decisión de utilizar o no una tecnología más limpia, está basada en si sus competidores usan tecnología más limpias?

Sí  □  No  □

16. ¿La disponibilidad del financiamiento ha afectado su decisión de utilizar o no utilizar tecnología más limpia?

Sí  □  No  □

17. ¿La disponibilidad de recursos manejo/técnicos ha afectado su decisión para utilizar o no tecnología más limpia?

Sí  □  No  □
18. ¿Durante el período 1997-2001 cuál era su por ciento margen del beneficio bruto (MBB %) (computado como beneficio bruto/ Ventas Netas)?

<table>
<thead>
<tr>
<th>Año</th>
<th>MBB %</th>
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<td>2001</td>
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</table>

19. ¿Tiene usted sugerencias/comentarios que quisiera agregar con respecto al uso de la tecnología (más limpia) ambientalmente amistosa en turismo?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

MUCHAS GRACIAS POR SU COOPERACIÓN. SU TIEMPO Y ESFUERZO EN LLENAR ESTE CUESTIONARIO SE APRECIARÁ ALTAMENTE.

VUELVA POR FAVOR EL CUESTIONARIO COMPLETADO AL EMAIL: gerryaw@hotmail.com o Fax: 662.325.6699

SI USTED TIENE CUALQUIER PREGUNTA POR FAVOR AL TELEFONO 662-325-6699
O EMAIL gerryaw@hotmail.com

TODAS LAS RESPUESTAS SON ESTRUCTAMENTE CONFIDENCIALES.

Fecha
Cuestionario No.
Respondedor

quesverSp.doc:04.13.03
APPENDIX C

The University of Southern Mississippi
Cleaner Technologies for Sustainable Tourism: Caribbean Case Studies
Disclosure and Informed Consent

To respondents:

The purpose of this project is to analyze the contribution of environmentally friendly (cleaner) technologies to the sustainability of the Caribbean tourism industry. This questionnaire is being distributed to general managers of hotels and resorts in the islands of Antigua, Barbados, the Dominican Republic, Jamaica, and St. Lucia. The research is being conducted by Fitzgerald Yaw jr., a student at The University of Southern Mississippi (USM), in partial fulfillment of the requirements for a dissertation in International Development. The Caribbean Alliance for Sustainable Tourism (CAST) support this research as the findings to be reported in the dissertation will help to inform the work they are doing in the region. Completion of the questionnaire should take approximately thirty minutes.

Informed Consent:

This research is being conducted according to the guidelines set forth by USM’s Institutional Review Board (see below). If you have any questions/concerns regarding participation in this project, please contact Fitzgerald Yaw jr. via email at fitzgerald.yaw@usm.edu, by telephone at 662.325.6699, or via mail at 27J Wallace Circle, Starkville, MS 39759 USA. Participation in this survey indicates that you have read and understand the information regarding informed consent. Your participation is voluntary. You may discontinue completing the questionnaire at any time without consequence.

Confidentiality of Responses:

The responses collected during the course of this research will remain confidential. Questionnaire responses will be reported at aggregate levels, not at the individual level. The completed questionnaires will be stored in a secure cabinet at the researcher’s home for one year following successful defense of the dissertation, and only the researcher will have access to individual responses. After a one-year period, the completed questionnaires will be deleted from the removable media on which they are stored. The completed questionnaires in paper format will be shredded and disposed of. If you would like to receive a copy of the Executive Summary of the completed dissertation, or the entire dissertation, please contact the researcher, Fitzgerald Yaw jr., using the contact information listed above.
Compliance with Human Subjects Protection:

This project has been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions about rights as a participant in a research project should be directed to the Coordinator of the Institutional Review Board, The University of Southern Mississippi, Box 5147, Hattiesburg, MS 39406, USA. TEL: (601) 266-6820,

Again, I thank you in advance for your participation. Please feel free to contact me if you have any questions or need further information.

Sincerely,

Fitzgerald (Gerry) Yaw jr
Fitzgerald.yaw@usm.edu
La Universidad del Sur de Mississippi  
Tecnologías limpias para el Turismo Sostenible: Estudios De Caso Del Caribe  
Acceso y Consentimiento Informado

A los respondedores:

El propósito de este proyecto es analizar la contribución de tecnologías (limpias) ambientalmente sostenibles de la industria turística del Caribe. Este cuestionario ha sido distribuido a los directores generales de hoteles y de áreas vacacionales en las islas de Antigua, Barbados, República Dominicana, Jamaica, y de St. Lucia. La investigación está siendo conducida por el Licenciado Fitzgerald Yaw jr, estudiante de la Universidad del Sur de Mississippi, en el cumplimiento parcial de los requisitos para su disertación en Desarrollo Internacional. La Alianza del Caribe Para la Ayuda Sostenible del Turismo, está apoyando esta investigación ya que se espera que los resultados de la disertación ayudarán a informar y divulgar el trabajo que la Alianza están haciendo en la región. El tiempo estimado para llenar el cuestionario, es de aproximadamente treinta minutos.

Consentimiento Informado:

Esta investigación se está conduciendo de acuerdo con las pautas dispuestas por la Junta Institutional Examinadora de la Universidad del Sur de Mississippi, (véase abajo). Si usted tiene preguntas o preocupaciones con respecto a la participación en este proyecto, por favor contacte a Fitzgerald Yaw jr al email fitzgerald.yaw@usm.edu, por teléfono al 662-325-6699, o vía correo a la dirección 27J Wallace Circle, Starkville, MS 39759 U.S.A. Su participación en esta encuesta indica que usted ha leído y entiende la información con respecto a consentimiento informado. Su participación es voluntaria. Usted puede descontinuar el llenado del cuestionario en cualquier momento sin ninguna consecuencia.

Secreto y Confidencialidad de las Respuestas:

Las respuestas colectadas durante el curso de esta investigación se mantendrán en forma confidencial. Las respuestas del cuestionario serán divulgadas en forma agregada, no individual. Los cuestionarios terminados serán almacenados en un gabinete seguro en el hogar del investigador por un periodo de año después de la defensa acertada de la disertación, y solamente el investigador tendrá acceso a las respuestas individuales. Después de este periodo de un año, los cuestionarios serán borrados o eliminados de los medios en los cuales están almacenados. Los cuestionarios en formato de papel serán destruados. Si usted desea recibir una copia del resumen ejecutivo de la disertación, o la disertación entera, por favor contacte al investigador, Fitzgerald Yaw jr, usando la información de contacto mencionada anteriormente.

Conformidad con la Protección de los Temas Humanos:

Este proyecto ha sido revisado por la Junta Institutional Examinadora de la Universidad del Sur de Mississippi, la cual asegura que los proyectos de investigación que involucran temas humanos sigan las regulaciones federales. Cualquier pregunta sobre los derechos como participante en un proyecto de investigación se debe dirigir al Coordinador de la Junta Institutional Examinadora de la Universidad del Sur de Mississippi, Box 5147, Hattiesburg, MS 39406, USA. TEL: (601) 266-6820,

Una vez más le agradezco de antemano por su participación. Siéntase con la libertad de contactarme si tiene cualquier pregunta o si necesita información adicional.

Sinceramente,

Fitzgerald (Gerry) Yaw jr
gerryaw@hotmail.com
Itinerary - Printable By Category

Itinerary
MR FITZGERALD YAW
Reservation code: INNYCW

FLIGHTS
Wed, Apr 23: AIR JAMAICA LTD, JM 2592
Operated by DELTA AIR LINES INC
From: MEMPHIS, TN (MEM)  
To: ATLANTA, GA (ATL)  
Class: Economy  
Status: Confirmed  
Meal:  
Aircraft: MCDONNELL DOUGLAS MD-80 JET  
Flight Time: 1 hours and 10 minutes  
Departs: 05:10  
Arrives: 07:20  
Seat: Check-In Required  
Confirmation:  
Smoking: No  
Mileage: 332  
Check-in Time: 02:40
Verify flight times prior to departure

Wed, Apr 23: AIR JAMAICA LTD, JM 0058
From: ATLANTA, GA (ATL)  
To: MONTEGO BAY, JAMAICA (MBJ)  
Class: Economy  
Status: Confirmed  
Meal: Breakfast  
Aircraft: AIRBUS INDUSTRIE 310 JET  
Flight Time: 2 hours and 45 minutes  
Departs: 08:50  
Arrives: 10:35  
Seat: Check-In Required  
Confirmation:  
Smoking: No  
Mileage: 1120  
Check-in Time: 06:20
Verify flight times prior to departure

Wed, Apr 23: AIR JAMAICA LTD, JM 0091
From: MONTEGO BAY, JAMAICA (MBJ)  
To: ST LUCIA UVF, ST LUCIA (UVF)  
Class: Economy  
Status: Confirmed  
Meal: Breakfast  
Aircraft: AIRBUS INDUSTRIE 320 JET  
Flight Time: 2 hours and 40 minutes  
Departs: 12:10  
Arrives: 15:50  
Seat: Check-In Required  
Confirmation:  
Smoking: No  
Mileage: 1169  
Check-in Time: 09:40
Verify flight times prior to departure

Sun, Apr 27: AIR JAMAICA LTD, JM 0091
From: ST LUCIA UVF, ST LUCIA (UVF)  
To: BARBADOS, BARBADOS (BGI)  
Class: Economy  
Status: Confirmed  
Meal: Breakfast  
Departs: 16:25  
Arrives: 17:00  
Seat: Check-In Required  
Confirmation:  
Smoking: No

146
Aircraft: AIRBUS INDUSTRIE 320 JET  
Flight Time: 35 minutes  
Mileage: 115  
Verify flight times prior to departure

Wed, Apr 30: AIR JAMAICA LTD, JM 0090
From: BARBADOS, BARBADOS (BGI)  
To: ST LUCIA UVF, ST LUCIA (UVF)  
Departs: 12:35  
Arrives: 13:15  
Confirmation:  
Seat: Check-In Required  
Mileage: 115  
Check-in Time: 10:05

Wed, Apr 30: AIR JAMAICA LTD, JM 0090
From: ST LUCIA UVF, ST LUCIA (UVF)  
To: MONTEGO BAY, JAMAICA (MBJ)  
Departs: 13:55  
Arrives: 15:45  
Confirmation:  
Seat: Check-In Required  
Mileage: 1169  
Check-in Time: 11:25

Wed, Apr 30: AIR JAMAICA LTD, JM 0062
From: MONTEGO BAY, JAMAICA (MBJ)  
To: KINGSTON MANLEY, JAMAICA (KIN)  
Departs: 17:10  
Arrives: 17:45  
Confirmation:  
Seat: Check-In Required  
Mileage: 83  
Check-in Time: 14:40

Sun, May 4: AIR JAMAICA LTD, JM 0038
From: KINGSTON MANLEY, JAMAICA (KIN)  
To: MONTEGO BAY, JAMAICA (MBJ)  
Departs: 09:15  
Arrives: 09:55  
Confirmation:  
Seat: Check-In Required  
Mileage: 83  
Check-in Time: 06:45

Sun, May 4: AIR JAMAICA LTD, JM 0081
From: MONTEGO BAY, JAMAICA (MBJ)  
To: ORLANDO INTL, FL (MCO)  
Departs: 11:00  
Arrives: 13:55  
Confirmation:  
Seat: Check-In Required  
Mileage: 727
APPENDIX E

First Contact - Sample
March 5, 2003

Mr.
General Manager
RESORT BEACH HOTEL
P.O. Box, Long Bay
Antigua

Dear Mr.:

A few days from now you will receive by e-mail a request to fill out a brief questionnaire for an important research project being conducted by Fitzgerald Yaw jr.

It concerns the use of environmentally friendly (clean) technology in hotels/resorts in the Caribbean tourism industry.

I am writing in advance because I have found many people like to know ahead of time that they will be contacted to participate in a study. The study is an important one that will help improve our understanding of the role of environmentally friendly (cleaner) technologies in the sustainability of the tourism industry. Completion of the questionnaire should take approximately thirty minutes.

Thank you for your time and consideration. It’s only with the generous help of people like you that this research project can be successful.

Sincerely,

Fitzgerald Yaw jr.
March 25, 2003

Sr.
Director General
CASA DEL MAR
PO Box
Dominican Republic

Estimado Sr. Lora:

Dentro de unos días usted recibirá por medio de correo electrónico una petición que la invita a tomar parte de un proyecto de investigación conducido por el Sr. Fitzgerald Yaw jr. La invitamos cordialmente a que complete un breve pero muy importante cuestionario. Con este cuestionario estamos tratando de analizar las contribuciones y el nivel de uso de la tecnología (limpia) ambientalmente amistosa en los hoteles/resorts en la industria del Caribe del turismo.

Estoy escribiendo por adelantado ya que he encontrado que mucha gente tienden a participar en el estudio si saben por adelantado que es y al mismo tiempo no pierda su valioso tiempo. Este estudio es importante porque ayudará a mejorar nuestra comprensión del papel que las tecnologías (más limpias) ambientalmente amistosas tienen en la sustentación de la industria del turismo. El breve cuestionario toma aproximadamente treinta minutos concluirlo.

Muchas gracias por su tiempo y consideración. Gente como usted nos ayudara a completar esta investigación.

Sinceramente,

Fitzgerald Yaw Jr.
Second Contact – Sample

Subject: Cleaner Technology Project

Dear

I am writing to ask your help in a study of environmentally friendly (cleaner) technology in the Caribbean tourism industry. This study is part of an effort to provide much needed baseline data on environmentally friendly (cleaner production) technology in the Caribbean tourism sector.

You were selected because you are a senior manager of a hotel/resort in the Caribbean tourism sector. We are contacting a sample of managers in the tourism industry at hotels/resorts with at least 15 guest rooms in the islands of Antigua, Barbados, The Dominican Republic, Jamaica and St. Lucia.

Results from the survey will be used to analyze the contribution of environmentally friendly (cleaner) technologies to the sustainability of the Caribbean tourism industry. The research is being conducted by Fitzgerald Yaw jr, a student at The University of Southern Mississippi, in partial fulfillment of the requirements for a dissertation in International Development. The Caribbean Alliance for Sustainable Tourism supports this research as the findings will help to inform the work they are doing in the region to help ensure the continued success of the region’s tourism industry.

Your answers to the attached questionnaire are completely confidential and will be released only as summaries in which no individual’s answers can be identified. This survey is voluntary. However, you can help us very much by taking a few minutes to share your experiences and opinions about the use of environmentally friendly (cleaner) technologies in the tourism industry. These are technologies that lead to you reducing your waste streams, using energy more efficiently, and generally reducing the impact of your operations on the environment. Completion of the questionnaire should take approximately thirty minutes. If for some reason you prefer not to respond, please let me know.

If you have any questions or comments about this study, I would be happy to talk with you at (662) 325-6699, or you can email me at: gerryaw@hotmail.com

Thank you very much for helping with this important study, and I appreciate your time and assistance.

Sincerely,
Sujeto: Proyecto De una Tecnología Más Limpia

Estimado (a) Name of manager:

Estoy escribiendo para pedir su ayuda en un estudio de la tecnología (más limpia) ambientalmente amistosa en la industria del Caribe del turismo. Este estudio es parte de un esfuerzo de proporcionar datos muy necesarios de la línea de fondo en tecnología ambientalmente amistosa (de una producción más limpia) en el sector del Caribe del turismo.

Le seleccionaron porque usted es encargado mayor de un hotel/resort en el sector del Caribe del turismo. Estamos entrando en contacto con una muestra poblacional de encargados en la industria del turismo en hotels/resorts con por lo menos 15 cuartos de la huésped en las islas de Antigua, de Barbados, de la República Dominicana, de Jamaica y de St. Lucia.

Los resultados del examen serán utilizados para analizar la contribución de tecnologías (más limpias) ambientalmente amistosas al sustainability de la industria del Caribe del turismo. La investigación está siendo conducida por Fitzgerald Yaw jr, estudiante en la Universidad del Sur de Mississippi, en el cumplimiento parcial de los requisitos para una disertación en el desarrollo internacional. La alianza del Caribe para el turismo sostenible apoya esta investigación pues los resultados ayudarán a informar al trabajo que están haciendo en la región para ayudar para asegurar el éxito continuado de la industria del turismo de la región.

Sus respuestas al cuestionario unido son totalmente confidenciales y serán lanzadas solamente pues los resúmenes en los cuales ningunos individual’s contestan pueden ser identificados. Este examen es voluntario. Sin embargo, usted puede ayudarnos mucho tomando algunos minutos para compartir sus experiencias y las opiniones sobre el uso de tecnologías (más limpias) ambientalmente amistosas en la industria del turismo. Éstas son las tecnologías que conducen a usted que reduce sus corrientes inútiles, usando energía más eficientemente, y reduciendo generalmente el impacto de sus operaciones en el ambiente. La terminación del cuestionario debe tomar aproximadamente treinta minutos. Si por una cierta razón usted prefiere no responder, satisfacer déjeme saber.

Si usted tiene cualesquiera preguntas o los comentarios sobre esto estudian, me plazcería hablar con usted en (662) 325-6699, o usted puede email yo en:

gerryaw@hotmail.com

Gracias mucho por ayudar con este estudio importante, y aprecio su tiempo y ayuda.

Sinceramente,
Third Contact - Sample

Subject: Cleaner (environmentally friendly) technology project

Dear Mr.

Recently a questionnaire seeking your opinions about the use of environmentally friendly (cleaner) technology in the tourism industry was sent to you by email. You were selected from a list of managers at hotels/resorts with at least 15 guest rooms in the islands of Antigua, Barbados, The Dominican Republic, Jamaica and St. Lucia.

If you have already completed the questionnaire please forward it to me and accept my sincere thanks. If not, please do so today. I am especially grateful for your help because it is only by asking people like you to share your experiences that we can understand the impact of environmentally friendly (cleaner) technology on the tourism industry.

If you did not receive a questionnaire, or if it was misplaced, please call or fax me at 662-325-6699 or email me at gerryaw@hotmail.com and I will get another one to you today.

Sincerely,
Sujeto: Proyecto De una Tecnología Más Limpia

Estimado (a)

Un cuestionario que buscaba sus opiniones sobre el uso de la tecnología (más limpia) ambientalmente amistosa en la industria del turismo le fue enviado recientemente por el email.

Le seleccionaron porque usted es encargado mayor de un hotel/resort en el sector del Caribe del turismo. Estamos entrando en contacto con una muestra poblacional de encargados en la industria del turismo en hotels/resorts con por lo menos 15 cuartos de la huésped en las islas de Antigua, de Barbados, de la República Dominicana, de Jamaica y de St. Lucia.

Si usted ha terminado hágase seguir del cuestionario el por favor, él a mí y acepta ya mis gracias sinceras. Si no, por favor tan hoy. Soy especialmente agradecido para su ayuda porque está solamente pidiendo que la gente como usted comparta sus experiencias que podemos entender el impacto de la tecnología (más limpia) ambientalmente amistosa en la industria del turismo.

Si usted no recibió un cuestionario, o si fue colocado mal, por favor llama o envía por telefax en (662) 325-6699 o usted puede email yo en: gerryaw@hotmail.com y mi le conseguirá otro hoy.

Sinceramente,
Fourth Contact – Sample

Subject: Cleaner Technology Project

Dear Mr. :

About three weeks ago I sent a questionnaire to you that asked about your experiences with environmentally friendly (cleaner) technology in your hotel/resort. To the best of my knowledge, it’s not yet been returned.

The comments of people who have already responded are very interesting. Many have described their experiences, both good and bad, in trying to implement environmentally friendly (cleaner) technology on their properties. I think the results are going to be very useful for my dissertation, and the work of the Caribbean Alliance for Sustainable Tourism, among others.

I am writing again because of the importance that your questionnaire has for helping to get accurate results. Although we sent questionnaires to managers in five islands, it’s only by hearing from nearly everyone in the sample that I can be sure that the results are truly representative.

We hope that you will fill out and return the attached questionnaire, but if for any reason you prefer not to answer it, please let us know by returning a note.

Sincerely,

P.S. If you have any questions, please feel free to contact me. The number where I can be reached is (662) 325-6699 (Telephone and Fax) or email: gerryyaw@hotmail.com or fitzgerald.yaw@usm.edu.
Sujeto: Proyecto De una Tecnología Más Limpia

Estimado (a)

Hace aproximadamente tres semanas le envié un cuestionario que preguntó por sus experiencias con tecnología (más limpia) ambientalmente amistosa en su hotel. Al mejor de mi conocimiento, todavía no se ha vuelto.

Los comentarios de la gente que ha respondido ya son muy interesantes. Muchos han descrito sus experiencias, buenas y malas, en intentar poner ambientalmente tecnología en ejecución (más limpia) amistosa en sus posesiones. Pienso los resultados voy a ser muy útil para mi disertación, y el trabajo de La Alianza del Caribe para el Turismo Sostenible, entre otros.

Estoy escribiendo otra vez debido a la importancia que su cuestionario tiene para que el ayudar consiga resultados exactos. Aunque enviamos cuestionarios a los encargados en cinco islas, es solamente oyendo de casi cada uno en la muestra que puedo ser seguro que los resultados son verdad representativos.

Esperamos que usted complete y vuelva el cuestionario unido, pero si por cualquier razón usted prefiere no contestarle, por favor sepamos volviendo una nota.

Si usted tiene cualesquiera preguntas o los comentarios sobre esto estudian, me placería hablar con usted en (662) 325-6699, o usted puede email yo en: gerryaw@hotmail.com

Sinceramente,
APPENDIX F

SANDALS ST. LUCIA GOLF RESORT & SPA
ENVIRONMENTAL POLICY

The management team of Sandals St. Lucia Golf Resort & Spa Resort has recognized that our business has an important role to play in protecting and enhancing the natural environment for our guests and for the residents of Castries, St. Lucia. This hotel was therefore designed with an environmental focus and our operational practices are equally inclined towards sustainable development such that our hotel is committed to taking action:

• To achieve and maintain sound environmental practices throughout our entire operation
• To comply fully with all national environmental legislation and regulations
• To minimize our use of energy, water and materials of scarce supply
• To minimize the amount of air emissions, wastewater effluent, solid wastes and hazardous materials associated with our operations (or pollution generated)
• To educate our guests and team members of the sensitive environmental conditions and acceptable activities within St. Lucia
• To invite our guests, suppliers and contractors to participate in our efforts to protect and enhance the environment
• To work with other bodies in the tourism industry, in public agencies, and the local community to achieve wider environmental goals
• To provide all team members with the training and resources required to meet our environmental objectives
• To openly communicate our policies and practices to our team members, guests and interested parties
• To monitor and record our environmental performance relative to our policies, objectives and targets
• To maintain a commitment to continuous improvement in our environmental practices throughout our operations
APPENDIX G

CASUARINA BEACH CLUB ENVIRONMENTAL MISSION STATEMENT
(revised as of May 2001 to comply with Green Globe 21 certification criteria)

Everyone at the Casuarina, regardless of the position they hold or the confines of their particular departments, is fully cognisant of the example we can set throughout the Tourism Industry to bring about changes to preserve and enhance our environment Barbados, whilst in full accordance with existing environmental legislation.

We can be proud of many achievements in the realms of environmental responsibility. These include:

- Sound environmental practices meeting Internationally Recognised Green Globe 21 criteria
- The forging of collaborative partnerships – Ministerial, Regional, NGO and Community – to ensure the longevity of the Tourism Product.
- Conservation of natural resources
- Environmental Awareness training for Staff, Fellow Hoteliers, Learning Institutes, Businesses and Associations
- Massive reductions in waste by composting and other re-use and recycling initiatives
- Limited chemical use in preference for natural alternatives
- Promotion of all that is local – Food, Art, History, Culture, Music, Furniture
- Protection of Turtle nesting habitat
- Mitigation of environmental impacts to precious Eco-systems
- Revegetation projects

We shall continue to maximise the opportunities to minimise environmental risks for the betterment of Barbados and for all those who live there-in.

"Love is the law of our being." Thomas Merton
ENIRONMENTAL POLICY

We at Coconut Court Beach Hotel are proud to be an environmentally caring hotel with particular emphasis on the marine environment. As leaders, we believe in the protection, preservation and enhancement of our total environment through sustainable management.

We are committed to continuously:

✓ Conserving our natural resources by minimizing our negative impacts through education, by example and sustainable management
✓ Protecting and enhancing all ecosystems wherever possible
✓ Minimizing pollution by reducing the use of harmful substances and practicing RRR, wherever possible
✓ Complying with relevant environmental legislation and regulations and, through lobbying and moral suasion, help ensure that current legislation is enforced throughout Barbados and that new, innovative laws are enacted
✓ Employing local people wherever possible
✓ Purchasing local products and services where possible and feasible in accordance with our Environmental Purchasing Policy

We will always seek to achieve a clean, healthy, safe and sustainable environment for our community, future generations our tourism development and ourselves.

General Manager
Dated: 14 07 01

Environmental Manager
APPENDIX I
PRESS RELEASE

St. Lucia Takes The Leadership In Becoming A Sustainable Energy Demonstration Country
- Challenges World Community To Make It Possible By 2008-2012.

Bonn, November 2, 1999 - In a historic statement, just an hour before the beginning of the High-Level Segment of the Fifth Meeting of the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC), St. Lucia, a Small Island State in the Caribbean, announced its intention to green its energy sector and become a Sustainable Energy Demonstration Country for the Small Island States and the rest of the world.

"By taking leadership, we want to send a positive message to the Conference of the Parties and urge the world community to work toward laying the groundwork for a sustainable energy future", said Mr. Bishnu Tulsie, the Head of the St. Lucian Delegation.

He mentioned the steps the St. Lucian Government is taking to diversify their energy sector and create a conducive policy environment for the commercialization of renewable energy and energy efficiency, such as elimination of duties and taxes on renewable energy systems and related infrastructure.

"We understand this is a very ambitious undertaking. We call on the developed countries to assist St. Lucia and other Small Island States in their energy transformation plans and show similar initiatives in their own countries", said Mr. Bishnu Tulsie.

"St. Lucia is dependent on expensive fossil fuel imports to meet its energy needs. In addition to reducing the greenhouse gas emissions, this initiative will also help reduce our fuel import bills and insulate the island from the impacts of the unpredictable increases in oil prices", Mr. Tulsie added.

Climate Institute, a Washington D.C. based organization is assisting the Government of St. Lucia in their efforts to green their energy sector. "Our role is that of a catalyst. To facilitate the development and implementation of a comprehensive sustainable energy plan for St. Lucia. This in turn, we hope, will catalyze a global green energy revolution," said Nasir Khattak of the Climate Institute.

John Topping, President, Climate Institute said "We believe this is a historic step that can help to jump start badly stalled climate negotiations." He invited the international community to take this as a challenge and show maximum progress by 2008 - 2012.

333 1/2 Pennsylvannia Ave, S.E., Washington, D.C. Ph: 202 547-0104, Fax: 202 527-0111,
web site: www.climate.org email: info@climate.org
Sandals Resort International
Corporate Environmental Policy

Sandals Resort International recognizes that our business has an important role to play in protecting and enhancing the environment for guests and the residents of the countries in which we operate.

To this end Sandals Resort International is committed to taking action:

- To achieve sound environmental practices across our entire operations
- To comply fully with all environmental laws and regulations in all the countries in which we operate
- To minimize our use of energy, water and materials of scarce supply
- To minimize the amount of air emissions, wastewater effluent, solid wastes and hazardous materials associated with our operations (or pollution generated)
- To educate our guests and staff of the sensitive environmental conditions and acceptable activities within our resorts.
- To invite our customers, suppliers and contractors to participate in our efforts to protect and enhance the environment
- To work with others in the tourism industry, in public agencies and the community to achieve wider environmental goals
- To provide all employees with the training and resources required to meet our environmental objectives
- To openly communicate our policies and practices to our employees, guests and interested parties
- To monitor and record our environmental performance relative to our policies, objectives and targets
- To maintain a continuous commitment to improved environmental practices in support of sustainable tourism development

_______________________________
Chairman, Sandals Resort International

Date: __________________

Source: Cresser, 2002
THE UNIVERSITY OF SOUTHERN MISSISSIPPI

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26.111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the “Adverse Event Report Form”.
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 23021002
PROJECT TITLE: Cleaner Technologies for Sustainable Tourism: Caribbean Case Studies
PROPOSED PROJECT DATES: 01/01/03 to 12/31/03
PROJECT TYPE: Dissertation or Thesis
PRINCIPAL INVESTIGATOR(S): Fitzgerald Yaw, Jr.
COLLEGE/DIVISION: International & Continuing Education
DEPARTMENT: International Development
FUNDING AGENCY/SPONSOR: N/A
HSPRC COMMITTEE ACTION: Exempt-Approval
PERIOD OF APPROVAL: 02/19/03 to 02/18/04

Gregory Esili, Ph.D.
HSPRC Co-Chair
The University of Southern Mississippi

INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
Box 5147 • Hattiesburg, MS • 39406-5147
Phone (601) 266-6520
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TO WHOM IT MAY CONCERN

This is to certify that in early May, 2003, FritzGerald Yaw, PhD. candidate at The University of Southern Mississippi came to visit with me to discuss matters related to tourism. In conversation he mentioned that he had sent questionnaires to several hoteliers in Jamaica but had received a very poor response. It is not uncommon in the Caribbean to receive a low response rate to questionnaires that are sent via the mail. Similarly, telephone interviews also receive low responses. These two techniques are not a normal part of doing business here. The preferred method is personal interviews.

I hope that this note helps to clarify matters with respect to possible contributing factors to the low response rate experienced by Mr. Yaw in his data collection process.

Yours sincerely

[Signature]
Cardyn R. Hayle
Senior Programme Officer

:cc
REFERENCES


Aquing, Patricia. Program Director, CEHI. Conversations with author. (June 2002 – May 2003)


*Association of Caribbean States* website, [www.acs-aec.org](http://www.acs-aec.org)


Brown-Thompson, Raquel. EAST Project. Conversations with Author. (May 2003).


Burke, Reggie. Programme and Research Officer, CEHI. Conversations with author. (June 2003)


Caribbean Alliance for Sustainable Tourism website: www.cha-cast.com

Caribbean Hotel Association Website. http://www.caribbeanhotels.org/


Caribbean Tourism Organization Website: http://www.doitcaribbean.com


Central Intelligence Agency. World Factbook.


Climate Institute. Press Release. *St. Lucia Takes The Leadership In Becoming A Sustainable Energy Demonstration Country – Challenges World Community To Make It Possible By 2008-2012*. Available:  
http://www.climate.org/topics/intaction/index.shtml#stl


Government of Jamaica. 2001. *Tourism Master Plan* (Draft) [mimeo.].


Green Hotels Association Website: www.greenhotels.com


Hayle, Carolyn. Senior Program Officer, School for Graduate Studies & Research, UWI. Conversations with author. (May 2003).


Melby, Pete. Professor of Landscape Architecture, Mississippi State University. Conversation with author (February 2003)

Southeastern Louisiana Regional Economic Summit, New Orleans.


Percival, Debra. 2002. Country reports: St Lucia; St Vincent and the Grenadines”.

*The Courier*. May-June, 71-100.


Sandals St. Lucia Golf Resort & Spa. n.d. *Environmental Policy*.


Soomer, Reginald. Executive Vice President, SLHTA. Conversation with author. (April 2003).


United Nations Framework Convention on Climate Change website.

http://unfccc.int/resource/natcom/nctable.html


