

**COASTAL TOURISM IN THE WIDER
CARIBBEAN REGION:
IMPACTS AND BEST MANAGEMENT PRACTICES**



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FOREWORD

In 1983 the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, the Cartagena Convention, was adopted and served as the legal framework for the Caribbean Environment Programme. It is the only comprehensive environmental umbrella treaty for the region. Two Protocols have been adopted on specific aspects of environmental management: the *Protocol Concerning Cooperation in Combating Oil Spills* and the *Protocol Concerning Specially Protected Areas and Wildlife*. A third Protocol Concerning Land-based Sources of Marine Pollution is under development for adoption in 1998.

The Regional Programme for Specially Protected Areas and Wildlife in the Wider Caribbean region (SPAW) was designed to implement the provisions and requirements of the SPAW Protocol.

In keeping with the objectives and spirit of the SPAW Programme, the CEP has embarked on new but integral component of the Programme – The Caribbean Environment Network (CEN) Project - aiming at improving environmental quality and the conservation of natural resources of the coastal and marine environment. The CEN Project focuses on reducing environmental impacts by tourism, given the importance and scope of the industry in the Wider Caribbean and the close linkages with various marine and coastal habitats in the region. It was designed as a response to the Regional Agenda for Action of the International Coral Reef Initiative (ICRI), with the input of relevant partner agencies in the region. This Project is a joint venture with the United States Agency for International Development (USAID) as main donor agency in Jamaica.

The present report was carried out as part of the baseline information needed to guide the implementation of the Project's activities. The report includes an overview of tourism and coastal resources degradation in the Wider Caribbean; costs and benefits of the use of coastal resources; best management practices in coastal tourism and initiatives for mitigation of coastal resources degradation.

A number of other regional and international organisations have embarked on programmes to improve environmental practices towards achieving sustainable tourism in the region. It is the goal of the USAID/UNEP CEN Project to contribute to these efforts in support of rational use and conservation of coastal zones and resources in the Wider Caribbean region.

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1. INTRODUCTION

The tourism product in the Wider Caribbean is largely dependent on the natural resource base; that is, on the physical environment. The traditional marketing approach of selling “sand, sea, and sun” has created a mind-set that has resulted in the concentration of tourist facilities in the coastal areas of the islands.

This concentration of tourist facilities and activities in the coastal area, and the increasing dependence of Caribbean economies on tourism earnings, means that the tourist industry, as a sector of the economy, makes the greatest use of coastal and marine resources. This dependency is not without cost, to both the economy and the industry. The tourism industry has undoubtedly contributed to the degradation of the coastal and marine environments, as well as to dislocations in the social fabric of the many communities. Additionally, investment decisions in infrastructure, in countries with large tourist industries, are usually largely influenced by the perceived needs of the industry.

Similarly, not only do the benefits of tourism impact on the entire economy, but the adverse impacts of tourism also impact on the entire economy through the investment decisions and the ecosystem linkages which adversely affect other resources and resource uses and users.

However, tourism is only one of many types of activities that use and impact the coastal zone. As such, any attempt to deal with tourism impacts on coastal resources has to operate within a wider framework of environmental planning. Such a framework, Integrated Coastal Zone Management (or Integrated Coastal Area Management), has been developed and articulated, and guidelines for the development of this framework are available (Pernetta and Elder 1993; UNEP, 1996). In a number of countries, coastal zone management plans/guidelines are being developed and implemented.

However, the development and implementation of comprehensive coastal area plans take place over long periods. Given the level of degradation being experienced in coastal areas, the preference of tourists for good environmental quality, the increasing awareness and articulation of concern among tourists about environmental quality, and the direct dependence of the tourism product on pristine environmental conditions, it has become accepted that the individual provider of goods and services in the tourist industry must make an immediate, direct, and active contribution to the maintenance of environmental quality. This initiative has so far been led by the Travel and Accommodation sectors of the industry, and has concentrated on the “greening” of hotels. However, it is recognized that best management practices (BMPs) for improvement of environmental quality goes beyond the scope of the operational phase of hotels. These BMPs are relevant also to the design and construction phases of all facilities, as well as to the provision of services to the industry.

This report summarizes the nature and causes of coastal resources degradation, the contribution of the tourist industry to that degradation, the role of system planning in addressing such impacts, and the possible best management practices which can be employed

by industry participants to reduce the impacts of tourism on coastal and marine resources. This report is therefore mainly written for use by national and tourism industry planners, by environmental management agencies, and by tourism industry participants.

Scope of the Report

This report has been prepared using a variety of sources. Two recent reports by the Island Resources Foundation (1996a,b) were used as the point of departure. A number of UNEP Technical Reports, as well as other writings and reports on coastal resources degradation in the Caribbean were reviewed. Information on best management practices was gleaned from a number of tourism publications on environmental guidelines and best management practices, and through discussions with a number of regional tourism organizations, as well as tourism and coastal zone planners and managers.

Due to time constraints, the input of site managers and services providers to this report has been limited. As such, the extent to which best management practices are actually practiced, the conditions under which they have been successful, and the degree of success achieved in the Wider Caribbean cannot be quantified at this time. Despite this limitation, the report indicates that there are many possibilities which can be adopted by the policy maker, environmental manager in a coastal zone permitting system, or designers of tourist facilities to reduce the adverse impact of tourism on coastal and marine resources. More importantly, the case studies demonstrate actions that can be taken at the level of the individual operator or facility manager.

2. TOURISM AND COASTAL RESOURCES DEGRADATION

The problems causing coastal resources degradation in the region have not changed significantly over the past two decades, though the scope of the problem appears to have increased (UNEP, 1989a; UNEP, 1992; UNEP, 1996; IRF, 1996a). The negative impacts of coastal resources utilization can be said to result from, or be exacerbated by, the following factors:

- a. Inadequate policy and/or legislative framework
- b. Inadequate/ineffective planning and/or monitoring systems
- c. Inadequate institutional capacity
- d. Low sensitivity and/or low level of awareness of resource users.

Additionally, it is widely recognized that many agents of coastal resources degradation arise from outside the coastal zone. This is particularly true of the islands of the Caribbean, many of which are characterized by mountainous terrain, high levels of deforestation, and swiftly flowing rivers with short distances to the coast. Among these external sources, UNEP, (1989a) identifies deforestation as the major factor.

It must therefore be reiterated that coastal resources degradation results from a mixture of public sector system inadequacies and the actions of industry, developers, groups and individuals. Island Resources Foundation (IRF), in 1996, compiled a bibliography of publications dealing with the matter of coastal resources degradation in the Wider Caribbean, which indicate the range of sources, impacts, and implications (Appendix 1).

2.1 Overview of Coastal Resources Degradation

A review of the literature on coastal resources degradation in the Wider Caribbean indicates that every country experiences some form of impact. While there has not been any comparative assessment of the degree of the problem among the states, in a few cases the problems are significant enough to warrant the implementation of major rehabilitation projects (Kingston Harbour, Jamaica, and Havana Bay, Cuba).

Following this review, the sources of coastal resources degradation fall into the following broad categories:

- a. Pollution
- b. Improper developments and development control, and
- c. Resource overuse and misuse.

However, this simple categorization is too broad to provide any meaningful start to the definition of solutions to the problem. Table 1 provides a much more detailed picture of the sources and nature of coastal resources degradation. Of significance also is the fact that some causes of resource degradation have several levels of impact (Box 1).

Box 1: Example of Multiple Levels of Impact from One Causal Factor

Factor: High sediment loading to marine environment from surface run-off on a fairly regular basis.

Direct (Primary) Impact: Smothering of adjacent coral reef.

Secondary Impact: Death of coral reef results in:
i. Reduced protection to the coastline
ii. Loss of habitat for fish.

Tertiary Impact: Decreased fish catch results in reduced earnings to fishermen

Table 1: Sources of Coastal Resources Degradation

Source	Activity	Type of Impact
Tourism	Waste generation Physical change Recreational Mechanical action/physical Change Resource over-use/ misuse Beach management Land speculation	Physical Ecological Hydrological Aesthetic Socio-economic Socio-cultural Human health
Industry	Waste generation Physical change	Physical Ecological Hydrological Aesthetic Socio-economic Human health
Solid Waste Disposal	Collection Dumping Burning	Physical Ecological Hydrological Aesthetic Human health
Shipping	Waste generation Mechanical action	Physical Ecological Aesthetic Socio-economic Human health
Non-Point Sources of Pollution	Waste	Physical Ecological Hydrological Aesthetic Socio-economic Human health
Commercial Activity	Waste generation Physical change	Physical Ecological Hydrological Aesthetic Socio-economic Human health
Housing	Waste generation Recreational Mechanical action/physical Change Land speculation	Physical Ecological Hydrological Aesthetic Socio-economic Human health

Overuse of Resources	Recreational Harvesting	Physical Ecological Socio-economic
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2.2 Tourism Impacts on the Coastal Zone

As mentioned previously, the environment is the primary basis for tourism in the Caribbean, and tourism development takes place mainly in the coastal area. This “new” growth industry is added to the traditional settlement and development activities which already exert major influences on the complex mixture of sensitive ecosystems which comprise the coastal zone.

The impacts of the tourist industry on coastal resources result from all the sub-sectors of the industry, primarily the construction and operation of facilities. The sources that are directly attributable to tourism activities can be categorized as follows:

a. Construction

- Landfills (wetlands and marine areas)
- Dredging
- Building on the shoreline and on steep slopes
- Drainage
- Sand mining
- Inappropriate design

b. Operational

- Sewage and solid waste disposal
- Boat maintenance
- Beach maintenance and/or restoration
- Facilities maintenance
- Guest consumption patterns

However, a third major source of impact is the non-construction element of the industry, that is, recreational activities. These are often linked with major facilities such as hotels or marinas, but may also be undertaken without the availability of fixed operational bases. The activities include:

- Scuba diving and snorkeling
- Yachting
- Motor boating, water skiing, and jet skiing
- Sport fishing
- (Mountain) biking

Simmons & Associates (1994) notes that though the impacts from marine tourism can be easily identified, it is difficult “to determine a direct cause-effect relationship in explaining

these impacts” . This results from the fact that other activities in the coastal area, as well as activities taking place outside the coastal area, also impact adversely on coastal resources.

The Caribbean Conservation Association (1991) provides a concise summation of the negative impacts of tourism in the Eastern Caribbean countries (Figure 1).

The detrimental practices directly attributable to the tourist industry, the impacts of those practices, and the relative importance of the causal factors will be discussed in more detail in Section 3.

Detrimental Impacts of Related Sectors

There are a number of sectors and activities that are indirectly linked to the tourist industry which also contribute to coastal resources degradation. These include the following:

- a. Over-fishing
- b. Harvesting of reef materials for curio items
- c. Over-harvesting of trees/plants (thatch, palm, *Lignum vitae*, etc.) for craft and construction purposes
- d. Speculative land development.

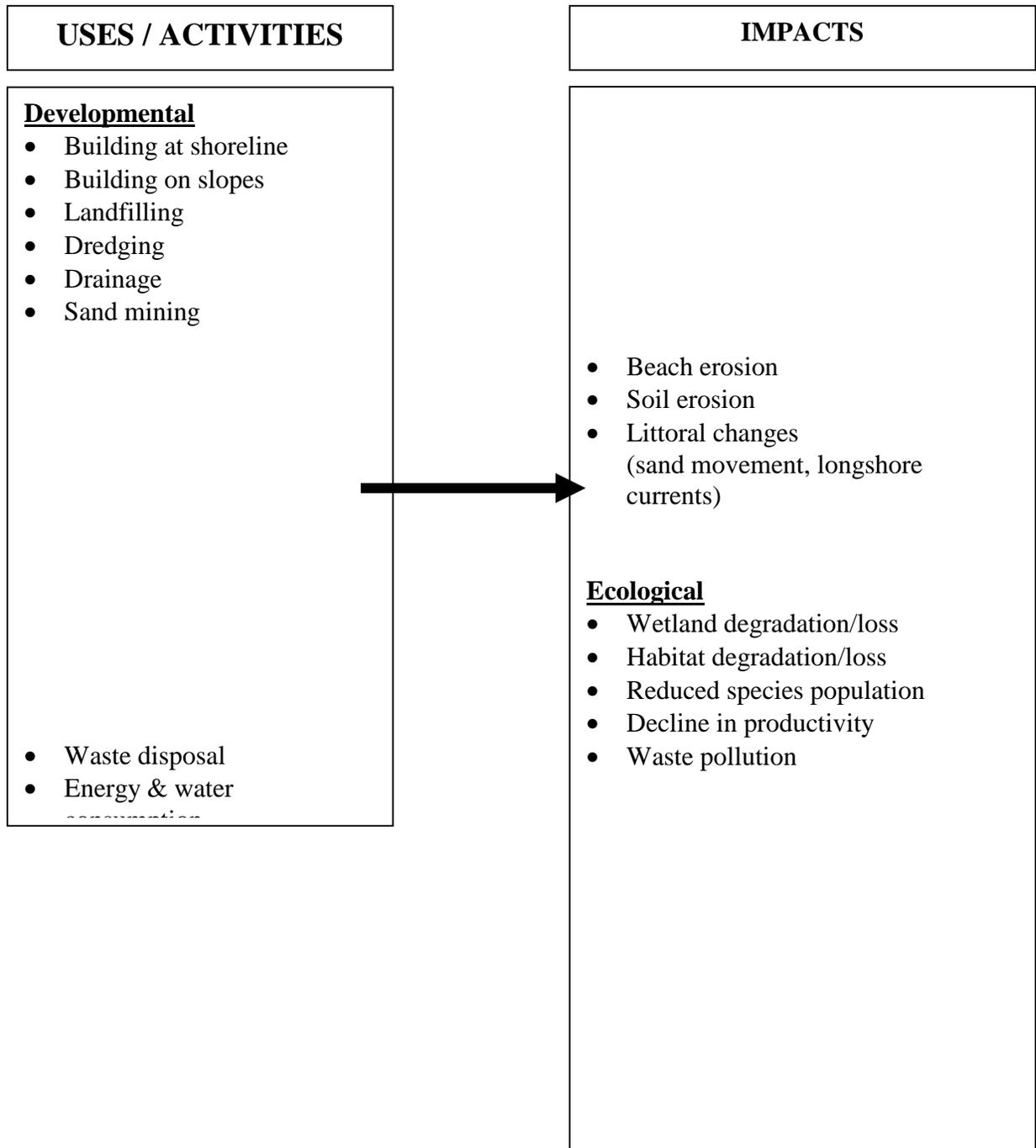
The impacts of these activities are summarized in Table 2.

Table 2: Impacts of Activities Indirectly Related to Tourism

ACTIVITY	
Over-fishing	<ul style="list-style-type: none"> • Damage to reef (dynamiting, herbivores removal, etc.) • Social conflicts
Harvesting of reef materials	<ul style="list-style-type: none"> • Coastal erosion • Loss of habitat for reef inhabitants • Loss of suitable materials for colonization by coral larvae • Social conflicts • International sanctions
Over-harvesting of trees/plants	<ul style="list-style-type: none"> • Coastal erosion • Destruction of wetlands • Decreasing income for uses of wetland resources • Social conflicts

Speculative land development	<ul style="list-style-type: none">• High land costs• Pollution (inadequate infrastructure)
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Figure 1: Negative Impacts of Tourism in the Eastern Caribbean



Source: Caribbean Conservation Association, 1991

2.3 Physical Planning and Coastal Zone Degradation

As stated before, the degradation of coastal resources results from physical damage and pollution arising from many sources. “The often dramatic and irreversible alteration of natural coastal ecosystems and the extensive pollution of the sea and inland waters are primarily caused by the rapid growth of coastal population, the expansion of recreational areas, inappropriate agroforestry practices, and the concentration of industrial development in coastal zones, accompanied by inadequate environmental, technological and economic policies” (UNEP, 1992). As IRF (1996a) points out, tourism impacts are really only a subset of the general problems associated with coastal zone management (Table 3).

Table 3: Sectors Utilizing or Affecting Coastal Resources

Sectors Often Specifically Related to the Coastal Zone or Ocean	Sectors Rarely Specifically Related to the Coastal Zone but may have Direct Impacts
<ol style="list-style-type: none"> 1. Naval and other national defense operations (e.g. testing, coast guard, customs) 2. Port and harbour development (including shipping channels) 3. Shipping and navigation 4. Recreational boating and harbours 5. Commercial and recreational fishing 6. Mariculture 7. Tourism and recreation 8. Marine and coastal research 9. Water supply 10. Waste disposal 11. Oil and gas facilities 	<ol style="list-style-type: none"> 1. Agriculture; aquaculture 2. Forestry 3. Wildlife management 4. Parks and recreation 5. Education 6. Public health (mosquito control, food) 7. Housing 8. Water and pollution control 9. Water supply 10. Transportation 11. Flood control 12. Oil and gas development 13. Mining 14. Industrial development 15. Energy generation 16. Waste disposal

Source: Adapted from Awosika, et al. (1993)

The articulation of the need for integrated coastal area management has progressed to the point of development of guidelines for coastal zone planning. Caribbean States and Territories that have or are developing integrated coastal area management plans include; Barbados, Jamaica, Puerto Rico, St. Lucia, British Virgin Islands, and the US Virgin Islands. However, such comprehensive plans are difficult to develop, and take several years to implement. Some states have developed resource management plans (St. Lucia) or recreational use plans (Jamaica) for small areas.

Though there is increased activity in the development of integrated coastal area management plans, as well as improved physical (land use) planning, interests in and out of the tourist industry have embarked on programmes to identify and correct the detrimental impacts attributable to tourism activities.

3. DETRIMENTAL IMPACTS OF TOURISM IN THE WIDER CARIBBEAN

Island Resources Foundation (1996a) developed a framework for the identification of potential tourism impact on coastal resources, based on a combination of the type of tourist activity and the geographic zone in which these activities occur. The framework identified 252 potential impacts. If the systemic (planning) inadequacies are ignored, the direct impacts from tourism on coastal resources result from factors that can be assembled into five (5) large groups, as shown by Table 4.

Impacts from Waste

UNEP (1994c) identifies pollution as the factor presenting the greatest threat to marine and coastal ecosystems and human health in the region; typifying those pollution sources as:

- Sewage
- Oil hydrocarbons
- Sediments
- Nutrients
- Pesticides
- Litter and marine debris
- Toxic wastes

Sewage was identified as the largest single source of pollution. As Simmons & Associates (1994) points out, 80-90% of the sewage generated across the region is disposed of in the nearshore coastal waters without adequate treatment. A survey of fourteen CARICOM countries in 1992 found that hotels owned and operated 49% of the sewage treatment plants (Vlugman, 1992). While some hotels are connected to central sewage systems, many dispose of the sewage effluent through sub-surface means. Additionally, it is estimated that water

consumption by tourists may be up to ten times more per head than the local community, especially in hot climates, where swimming pools, showers, golf courses and baths are heavily used (World Travel & Tourism Council et al., 1995).

Disposal of sewage and sewage effluent in the coastal area may contaminate surface and ground water resources. In many cases, contamination of the marine environment is immediate, as disposal takes place directly to the sea. Where sewage effluent is discharged to wetlands (such as in Jamaica and St. Maarten), other resources are affected before drainage to the marine environment.

Common impacts of sewage contamination include:

- Nutrient enrichment of surface and groundwater
- Deterioration of bathing and drinking water quality
- Outbreaks of disease
- Smothering of coral reefs by algal blooms
- Increased turbidity and reduced salinity in coastal waters close to outfall pipes and drains
- Fish kills
- Deterioration of the aesthetic quality of beaches and wetlands
- Health problems
- Odour problems

Improper disposal of oils and noxious chemicals create similar impacts to those above. However, in this case, the remedial actions are more costly, and the long-term implications for human health more complicated.

Table 4: Detrimental Impacts from Tourism

Causal Factor	Source	Type of Activity
Waste	<ul style="list-style-type: none"> • Hotels • Cruise ships • Yachts/boats • Marinas • Restaurants • Laundries • Shops • Merchants/ vendors 	<ul style="list-style-type: none"> • Sewage disposal directly to coastal waters • Sewage disposal to coastal wetlands • Sub-surface disposal and irrigation of green areas using sewage effluent • Solid waste disposal in coastal garbage dumps • Solid waste disposal in unauthorised areas • Disposal of used oils in drains and sewage systems • Boat/engine operation and repair • Inadequate sourcing of materials (food, products, etc.)
Recreation	<ul style="list-style-type: none"> • Hotels • Beaches • Clubs • Individual operators 	<ul style="list-style-type: none"> • Water sports • Nightlife • Noise • Illumination of beach
Mechanical Action/ Physical Change	<ul style="list-style-type: none"> • Hotels • Marinas • Piers/jetties /wharves 	<ul style="list-style-type: none"> • Landfilling • Dredging • Anchor damage and groundings • Construction of facilities

	<ul style="list-style-type: none"> • Groynes / breakwaters • Airports • Roads / seawalls • Boats 	<ul style="list-style-type: none"> • Beach construction • Snorkeling/diving • Sand mining
Resource Over-use/ Misuse	<ul style="list-style-type: none"> • Construction • Beach repair/ construction • Craft production 	<ul style="list-style-type: none"> • Over-fishing • Sand mining • Thatch harvesting • Coral harvesting
Beach Management	<ul style="list-style-type: none"> • Hotels • Public beaches 	<ul style="list-style-type: none"> • Over-crowding of beaches • Removal of dune vegetation • Construction of protective structures • Raking (grading) • Removal of seagrasses

The impacts from solid waste disposal result from both legal and illegal disposal sites. Illegal dumping of solid waste results in visual impairment of areas, odour problems, deterioration of bathing and drinking water quality, and flooding (from blocked drains). If the definition of solid waste is broadened to include abandoned equipment and old vehicles, then the impact is much greater. In this latter case, resort areas, wetlands, and recreational sites all contain varying quantities of this form of solid waste.

In most countries of the Wider Caribbean, solid waste disposal sites are located in areas with soils of high porosity. As such, leachate from the site, including chemicals, enters the groundwater; finally reaching surface waters or the marine environment. In the case of islands, most suffer from a lack of adequate space to site disposal sites. Most sites are open dumps, and properly managed landfills are almost non-existent. Due to the above, burning is often practiced. Unfortunately, burning also creates adverse impacts through the generation of noxious fumes. Additionally, dumps periodically emit noxious gases, which are produced from the breakdown of organic matter under anaerobic conditions.

The matter of disposal of hazardous wastes is not given much treatment in the literature. However, the dumping of hazardous wastes, especially waste from hospitals, in municipal dumps is obviously cause for concern, for the same reasons outline in the previous paragraph.

While the issues of the location and management of solid waste disposal sites are broader than tourism, the industry generates a higher per capita volume of waste than the domestic residential sector. Simmons & Associates (1994) quotes a number of sources that indicate that cruise ship-generated waste varied from 0.32-3.5 Kg./person/day. In contrast, PAHO (1996) estimates the per capita waste generation in Latin America and the Caribbean as 0.5-1 Kg/person/day. While there is a perception that the solid waste figures for land-based tourist operations are also higher than the domestic volumes generated, there is no quantitative evidence on which to base an analysis.

Illegal disposal of solid waste from ships, especially cruise ships, was considered a major problem in the region until the Wider Caribbean Area was declared a Special Area under Annex V of MARPOL 73/78 in 1993. Solid waste from ships creates a number of impacts, mainly:

- Threats to marine fauna (ingestion, strangulation)
- Physical degradation (accumulation in fish sanctuaries, fishing grounds, coral reefs, etc.)
- Visual impairment of beaches and other coastal areas
- Problem for commercial and recreational fishing, and
- Health (diseases, cuts, etc.)

The problem continues, but corrective efforts have been initiated through the implementation of a project by the International Maritime Organization for collection and disposal of ship-generated waste which should result in improvements in the near future.

Impacts from Recreational Activities

The Caribbean was traditionally marketed as a place of sand, sea and sun. This created a concentration of activities in the coastal area of each island. Impacts include:

- Concentration of sewage and other waste along coastal strips
- Increased accidents in water sports activities
- Increased deterioration of coral reefs, including dive sites
- Increased conflicts with other resource users, especially traditional users
- Erosion of beaches

Physical Change / Mechanical Action

Physical change is a constant feature of tourism projects, as most concern some form of alteration of the environment to accommodate the desired facility. These range from construction of airports, hotels, and marinas to creation of beaches, sand mining, and removal of corals. The impacts of physical change include the following:

- Loss of valuable habitats which act as breeding grounds for many species of animals
- Scarification of landscapes
- Increased flooding of coastal areas through the loss of wetlands
- Deterioration of water quality through high sediment loading, interruption of current movement in bays, and inadequate solid waste disposal
- Erosion of beaches through improper placement of structures
- Noise pollution
- Loss of income by affected properties, enterprises, and resource users

Although permanent features in many cases, the impacts are most pronounced during the construction phases. As such, many of these impacts can be prevented by utilising better engineering designs, construction management practices, and improved public sector planning and development control. However, many of the physical changes, along with improper siting of structures, combine to increase vulnerability to natural hazards (UNEP, 1989b; Nurse, 1990).

Resource Overuse/Misuse

Resource overuse and misuse results from many causes, and is only exacerbated by tourism in most cases. Changes in harvesting techniques for some resources (e.g. mangroves - St. Lucia and Jamaica) and use of alternate materials (e.g. sand production - Jamaica), should result in an improvement in the use of coastal resources. Unfortunately, the development of alternate practices is greatly outpaced by the use of destructive practices, and the resulting loss of coastal resources.

Additionally, misuses related to contamination of water resources, and social conflicts resulting from increased competition for natural resources are likely to continue for some time. These issues can only be dealt with through improvements in the planning and resource management systems.

Impacts from Beach Activities

The constant efforts to make the beaches bigger and more presentable stem from the marketing of the Caribbean as a place of sand, sea, and sun. This very issue is reflected in the fact that rooms located on beaches generally cost more than rooms located elsewhere. In fact, many hoteliers will only develop lands that have direct access to beaches, natural or man-made. Making beaches larger and more presentable (Table 4) result in loss of sand, and ultimately beach erosion.

The issue of the carrying capacity of beaches has been debated for a very long time. The issue of a minimum space requirement for some unspecified "level of comfort" is outdated. Attempts to deal with the matter of carrying capacity on beaches have highlighted the need for measurements which encompass factors relating to use intensity (Manning, 1996). However, these indicators need to be broadened to include factors related to site vulnerability (grain size of sand, wave impacts, etc.).

The synergistic effects of the multiplicity of activities and impacts listed above have only been alluded to, and this is an area which obviously requires more examination. Additionally, the extent and duration of the impacts resulting from the above-listed activities depend on the adequacy of the planning and development control systems, availability of suitable alternatives, management of the operations (facilities and activities), and consumer patterns, preferences, and expectations of the tourist.

3.1 Most Detrimental Tourism Practices

Any attempt to rank the importance of coastal zone threats will have to deal with issues of size of the countries, sensitivity of the resources being impacted, importance to national economy, duration and extent of the impact, reversibility of the effect, and full cost analysis (e.g. revenue losses, expenditure for prevention/rehabilitation).

The difficulty in ranking general coastal zone threats also holds true for ranking most detrimental practices from tourism, especially when it is difficult to separate tourism impacts from the impacts resulting from the activities of other sectors, as well as the wider systemic inadequacies. An additional limitation to this analysis is the fact that tourism as a sector is not clearly defined, and as such, its true size and impact (positive and negative) is extremely difficult to determine. More importantly, there is no clear sense of the level of degradation attributable to each factor, nor is there any idea of the assimilative capacity of the Caribbean's nearshore environment.

As such, this report will attempt to identify the most detrimental practices without attaching any rank to said practices. The determination of most detrimental practices will be based on the following factors:

- Scale of the impact
- Frequency of impact (sporadic versus chronic)
- Ecosystem linkages and significance
- Cost (lost revenue or rehabilitation costs)

Based on the above factors, the most detrimental practices related to tourism in the coastal zone are:

- Physical change/damage to habitats
- Sewage disposal
- Solid waste disposal

Physical Change/Habitat Damage

As mentioned above, physical changes to sites accompany the development of almost every tourist-related facility; ranging from construction of airports, hotels, and marinas to creation of beaches, sand mining, and removal of corals and seagrasses. Such changes can have very far-reaching consequences, depending on the area impacted. For example, loss of wetlands has several levels of impact (see Box 1 also). The immediate (primary) impact seen includes loss of habitat for species of wildlife, including breeding areas for fish, and export of sediments to the nearshore coastal environment. Secondary level impacts could include less fish recruitment to the reef fisheries due to loss of nursery grounds, reduced tourism visits to the site because particular wildlife species are no longer present or have deteriorated (e.g. coral reefs), property damage or erosion from flooding, and smothering of corals and seagrass beds by the sediment. These secondary impacts continue the chain of events, as all have resulting cost factors; either because of lost tourism and fisheries revenues or because of damages from coastal erosion or flooding.

More frequently, beach and sand dunes are destroyed during or for the construction of tourism facilities. Inevitably, this results in severe beach erosion, resulting in loss of amenity and damage to primary infrastructure and property, not to mention remediation. Remediation is usually costly, requiring the construction of shore protection structures, and usually is not as effective as maintaining the sand dune in its natural state.

Impacts from Sewage

The problems facing sewage disposal systems in the region have been discussed above. Where those facilities without package plants usually possess systems approved by the relevant regulatory agency, such systems usually dispose of the sewage effluent into the soil. As such, both forms of disposal eventually enter the marine environment. As with other sources of impacts, the impacts of sewage disposal occur in several forms and at several levels.

Sewage effluent creates impacts from the nutrients (primarily nitrates and phosphates), suspended organic matter, bacteria, and where there is direct input to the sea, the fresh water itself. Coral reefs have evolved to thrive in very precise conditions of low nutrients, normal saline conditions, specific sea water temperatures and clear water. Sediment increases the turbidity in the water, effectively reducing the sunlight reaching the corals. Additionally, it also smothers the corals, and the decaying organic matter uses up the available oxygen in the water column. The additional nutrients from the sewage effluent support the rapid growth of algae, which also smother the corals, particularly if sufficient herbivores are not present. A dead or severely impacted coral reef provides less of a habitat for fish and other reef-dwelling animals, and may start to break apart. The usual results are: coastal erosion, reduced fish catch, and reduced tourism earnings from diving and snorkeling.

In cases where freshwater sources (such as aquifers) are contaminated, the cost of providing potable water to residents and tourists increase. There is no information at this time to determine the impact of sewage and other pollutants on the desalination plants operated by many of the Eastern Caribbean countries, though a number of professionals have noted it as an area requiring investigation in the near future.

Impacts from Solid Waste

Solid waste disposal problems are pervasive and their effects affect both the natural and physical environment causing losses in wildlife, deteriorated human health, less aesthetic value of a site and losses in revenue due to less tourism. However, their effects might not be as permanent as the other two priority problems. To a great degree, the extent of the problem is dependent on the collection, monitoring, disposal and management (i.e. recycling, reuse, etc.) systems in place. The more significant impacts relate to the possibility of leachate from the dumps reaching aquifers and the coastal waters. In such a case, the problems enumerated for sewage would be compounded by the presence of hazardous chemicals in the leachate. The second major problem concerns the loss of amenity and the possibility of outbreaks of disease. Both impact on the local population as well as on tourists. Marine debris resulting from improper solid waste disposal practices also result in the loss of wildlife species such as seabirds, sea turtles and marine mammals.

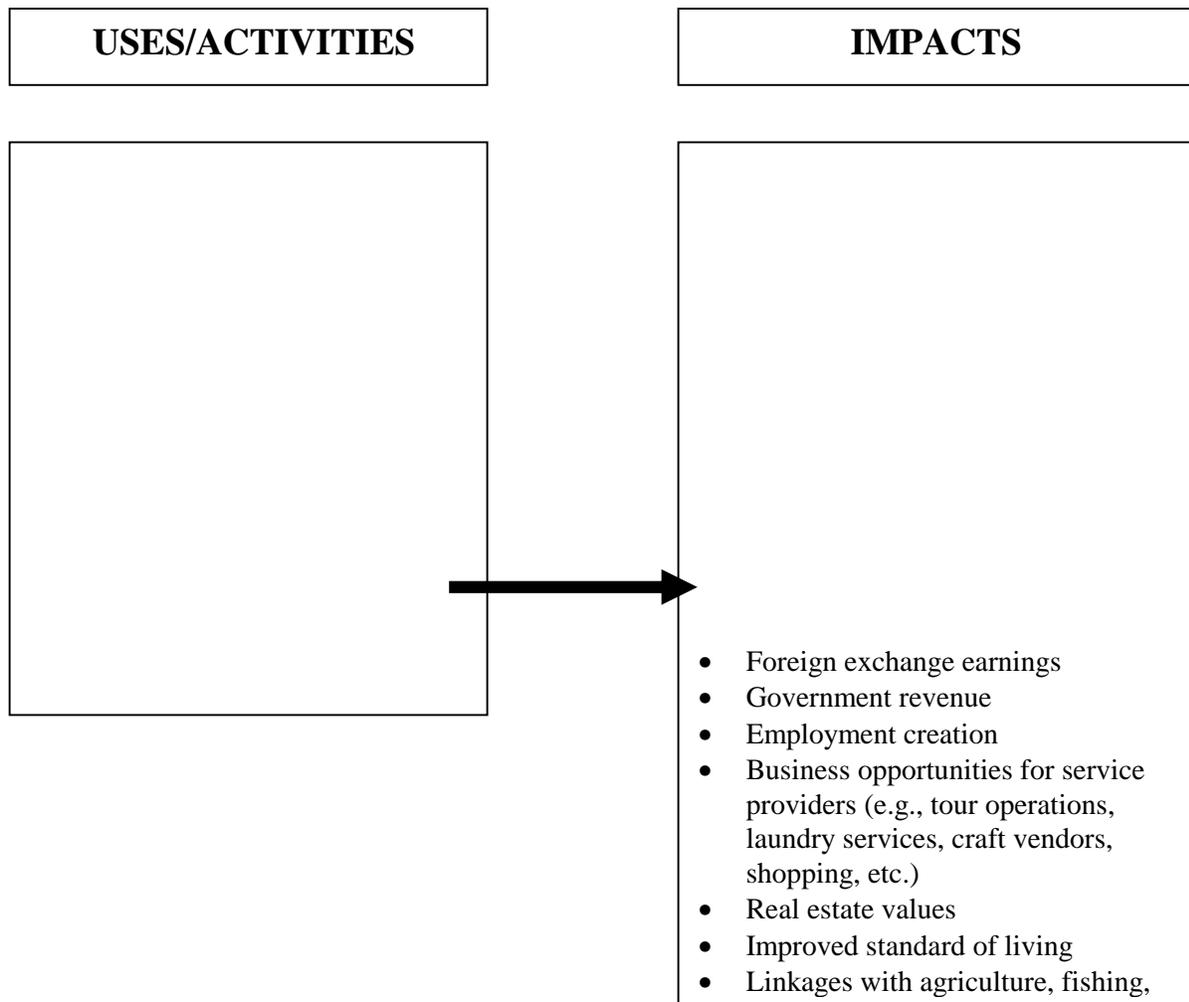
4. COSTS AND BENEFITS OF TOURISM USE OF COASTAL

RESOURCES

Though the review thus far has concentrated on the detrimental impacts of tourism on coastal resources, it is quite obvious that there are significant benefits being reaped by countries that operate a tourist industry. In fact, tourism is often touted as being the main foreign exchange earner for many countries of the insular Caribbean.

The direct and indirect costs and benefits of tourism use of coastal resources are significant throughout the Wider Caribbean. While the detrimental impacts have been expounded at length, the full cost of that development has never been quantified. In contrast, the benefits of tourism to national economies have been quantified in terms of contribution to national income, employment, and so on. Both the positive uses and impacts (Figure 2), and the cost and benefits (Tables 5-7) are examined below.

Figure 2: Positive Impacts of Tourism



Source: Modified from Caribbean Conservation Association, 1991

Table 5: Benefits and Costs of Tourism

Benefits	Costs
1. Improved port facilities	1. Exhaustion of water resources
2. Improved road networks	2. Pollution of coastal areas
3. Better communications	3. Beach erosion
4. Increased revenues	4. Damage to corals and other coastal systems
5. Improved recreation facilities	5. Loss of important land and marine habitats
6. Preservation of historic sites	6. Overfishing
7. Increased cultural offerings	7. Decreased aesthetic value
8. Stimulation of crafts	8. Noise pollution
9. Improved social infrastructure	9. Increased social conflicts
10. Employment and business opportunities	10. Erosion of traditional values
11. Capacity building for some sectors	11. High land costs
	12. Loss of agricultural productivity
	13. Capital transfer to metropolises
	14. Increased consumption of foreign products
	15. Shifting investments in infrastructure from more populated areas
	16. Conversion to mono-sector economy largely dependent on external inputs.

4.1 Contribution of Tourism to Caribbean Economies

Though it is well recognised that tourism has played an increasingly vital role in the economies of Caribbean economies, the existing information on the economic impacts of tourism does not provide a comprehensive view of the full costs and benefits (CDB, 1996). This is due primarily to the lack of reliable data, and a system to adequately measure the benefits of tourism to a country's economy. However, using aggregate measures and assumptions based on multiplier effects, estimates of economic impact are usually derived.

This issue of defining the tourism sector and measuring its full contribution to a country's economy was the focus of a seminar held in Kingston, Jamaica on 7-9 July 1997. The seminar, reported to be the first of its kind in the region, was attended by delegates from 23 countries of Latin America and the Caribbean, along with participants from regional tourism organisations, the World Tourism Organization, and the Inter-American Statistical Institute.

Foreign Exchange Earnings

Data published by the Caribbean Tourism Organization (CTO) for 32 countries of the region showed that visitor arrivals for 1995 amounted to 14.7 million stopover visitors and 9.7 million cruise ship passengers (CTO, 1996). This resulted in expenditure estimated at US\$12.7 billion (Table 6), an increase of 8.3% over 1994 expenditures.

Table 6: Estimates of Visitor Expenditure* (US\$millions)

Country	1994	1995
Anguilla	51.0	48.7
Antigua and Barbuda	394.0	328.5
Aruba	450.7	521.2
Bahamas	1,332.6	1,346.2
Barbados	597.6	679.5
Belize	71.4	77.6
Bermuda	525.3	487.9
Bonaire	32.4	37.0
British Virgin Islands	188.1	191.4
Cayman Islands	334.1	375.5
Cuba	850.0	1,100.0
Curacao	240.2	232.7
Dominica	30.6	32.5
Dominican Republic	1,147.5	1,568.4
Grenada	59.3	58.2
Guadeloupe	389.3	458.3
Guyana	47.0	46.5
Haiti	27.0	56.0
Jamaica	973.0	1,068.5
Martinique	378.9	414.8
Montserrat	18.5	15.5
Puerto Rico	1,728.3	1,826.1
St. Kitts and Nevis	76.9	65.1
St. Lucia	224.1	267.8
St. Maarten	419.8	348.7
St. Vincent and Grenadines	50.5	56.0
Suriname	13.5	13.5

Trinidad and Tobago	85.4	78.1
Turks and Caicos Islands	56.5	62.0
U.S. Virgin Islands	919.1	820.5

Total	11,712.9	12,682.5
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* A number of the figures are provisional

Source: CTO, 1996

Revenue from the tourism sector is vital to the economies of these Caribbean states, as not only does it help to pay for the region's import bill, it also makes up for an increasing percentage of the balance of payment budget (Table 7). Data from 1985/86 indicates that tourism earnings paid for approximately 40% of the Caribbean's total imports of approximately US\$4 billion/year from the United States of America (CTRC, 1987). While there is no data for 1995/96, the increase in visitor arrivals and expenditure, and the shortfall in earnings from other sectors, suggest that the region's dependence on tourism has increased.

Table 7: Contribution of Tourism Receipts (Visitor Expenditure)

to the Balance of Payments in 1985 in Selected Countries

Country	Export of Goods & Services (US\$ million)			Tourism Receipts as % of Total Exports
	Tourism Receipts	Other	Total	

Antigua & Barbuda	83.6	40.4	124.0	67.4
Bahamas	995.0	402.0	1,397.0	71.2
Dominica	8.7	25.3	34.0	25.6
Grenada	32.4	19.6	52.0	62.3
Montserrat (1994)	9.8	3.1	12.9	68.4
Anguilla	14.6	N/A	N/A	N/A
Barbados	309.0	490.0	799.0	38.7
St. Kitts & Nevis	31.0	18.0	49.0	63.3
St. Lucia	55.7	37.3	93.0	59.9
St. Vincent & the Gred.	23.0	57.0	80.0	28.8
Belize	11.1	119.9	131.0	8.5
British Virgin Is.	97.3	2.7	100.0	97.3
Cayman Islands	85.5	68.5	154.0	55.5
Guyana	22.0	223.0	245.0	9.0
Jamaica	406.8	754.7	1,093.0	37.2
Dominican Republic	368.0	367.0	735.0	50.0
Haiti	69.0	161.0	230.0	30.0
Trinidad & Tobago	197.3	2,448.7	2,646.0	7.5
Turks & Caicos Is.	12.2	N/A	N/A	N/A

Source: CTRC, 1987

Employment

Employment statistics are inadequate, as it covers mainly the employment in the accommodation establishments. Even with this limitation, employment in accommodations for 1995 was estimated at 192,500 persons. Based on the assumption that indirect employment is three times employment in the accommodation sub-sector, jobs generated were estimated at 578,000 persons.

Projected Growth in Caribbean Tourism

The Region has experienced steady growth in tourism during the past two decades, moving from earnings of US\$3.5 billion in 1980 (CTRC, 1987) to US\$12.7 billion in 1995 (CTO, 1996).

Estimates for 1996 by the World Travel & Tourism Council for Caribbean travel and tourism gross outputs are US\$25.4 billion (25.5% of GDP), and employment of 2.37 million persons

(22% of total employment). Projected growth for Caribbean tourism over the next decade is estimated at 34.6% (WTTC, 1996).

The data given above for tourism expenditure is obviously an underestimation of actual expenditures. Sub-sectors such as the restaurant and bar and recreation are not totally tourism oriented. Similarly, the contribution from sub-sectors such as the yachting/sailing sub-sector is difficult to calculate.

To further complicate the above problem, the full cost of tourism to the Caribbean is unknown, and extremely difficult to determine. This is due mainly to the fact that such costs include the consumption of imported goods and services by the sector, leakage in earnings [for the period 1980-1986, it was estimated that only 42% of each dollar earned was retained within the Caribbean as local value added (CTRC, 1987)], infrastructure costs, pollution problems, and the deterioration of the natural resource base on which tourism and other sectors depend.

Implication of Coastal Resources Degradation to Caribbean Tourism

The links between a pristine environment and tourism have long been established. However, tourism continues to create severe stresses in the system on which it depends. The issues of overuse of resources, damage to natural resources and ecosystems, increased conversion of coastal zone space to more stressful uses, and increased social tensions, all create major imbalances wherein the development path and the development goals are incompatible.

It has been suggested (McElroy and Albuquerque, 1991; Aniyar, 1994; IRF, 1996a) that the present approaches to tourism development are not sustainable; that is, if tourism-dependent economies suffer environmental degradation, tourism could decline. Added to this is the tendency of the tourist to avoid destinations where social dislocations are perceived to be generally high.

The different sub-sectors within tourism obviously contribute to the deterioration of the resource base to different degrees; not only in terms of the level of impact, but also in the location where the impact takes place. Conversely, the impact on the tourism industry will affect the sub-sectors differently. In so far as different countries depend on different sub-sectors (boating, water-sports, hotels, restaurants, attractions, etc.) to different degrees, the potential losses will affect them differently. What is obvious is that loss of natural resources or continuing deterioration of environmental quality will result in loss of jobs, reduction in private sector and government revenues, and worsening balance of payment problems.

Given the projections for increased tourism travel in the coming decade, it is imperative that steps be taken immediately to protect the natural resources on which tourism depends and without overlooking the cultural and architectural heritage. Maintaining the balance between resource use and good environmental quality require political commitment to undertake forceful policy intervention, improved planning and management systems, immediate remedial action, and a base of knowledge from which to operate.

5. BEST MANAGEMENT PRACTICES IN COASTAL TOURISM

Tourism planning, and the management of the impacts from the sector, is best approached as part of an overall integrated planning process for allocation of land resources required to support the development process. As such, many of the detrimental impacts of tourism on coastal resources can only be addressed through improved integrated planning and management, especially by the public sector.

However, and as indicated before, the impacts of tourism result not only from the siting and design of facilities, but also from their operations. Additionally, the attitudes promoted, and information shared with guests, help to reduce the impacts on the natural system.

Tourism impacts on coastal resources are far from uniform. First, the coastal zone is a complex of inter-linked ecosystems, with different sensitivities and vulnerabilities, and therefore different abilities to withstand stress. Secondly, the stresses produced by tourism are not exerted uniformly across the systems (nor across this sector alone) or even over the lifetime of projects, facilities, or activities.

Best management practices (BMP) for the tourist industry must therefore be undertaken within two complimentary areas of the industry:

- a. An integrated and participatory framework and management system for assessing and regulating facility design, construction, and operation; and
- b. Specific activities to be carried out by each site, with the aim of reducing the impacts on the surrounding environment.

5.1 Best Management Practices in Planning and Design

Any framework to promote best management practices in tourism should be able to address the systemic problems (public sector planning, inadequacy of essential services, social issues, etc.) as well as the more directed issues of site design, management, and regulation. As such, any effort to develop a coordinated approach to dealing with integrated coastal zone management must access resources from, and coordinate the actions of, non-tourism interests in the public sector.

Efforts to date have included the following:

- Integrated coastal area planning and management
- Coastal development (land use) plans
- Resort management plans
- National environmental action plans
- Environmental permit and license system (Jamaica)

The most successful programme to date appears to be the integrated coastal area plan. UNEP-CEP provides a comprehensive review of cases and guidelines on integrated planning and management of coastal and marine areas in the Wider Caribbean (UNEP, 1996b). The permit and licence system instituted by Jamaica went into effect on January 1, 1997; and it is still too early to evaluate the impacts of this programme. However, the various initiatives still do not function with the desired level of cross-sectoral and participatory planning; that is, the sharing of development objectives and plans, and information, still does not take place.

Requirements for best practices at the system level would cover the following areas:

- a. Standards for resort ambience (density, building height, setbacks, landscaping, etc.)
- b. Site selection and site and building design (including water and wastewater management systems, drainage, etc.)
- c. Management of construction activities
- d. Supporting infrastructure (transportation and road networks, waste collection and disposal, housing, etc.).

Best practices covered by the above categories include:

a. Site and Building Design

- Design complexes and buildings to reduce impacts from natural disasters, as well as to prevent interruption of ecosystem processes
- Protect valuable habitats (nesting areas for birds, turtles, nursery grounds for fisheries, etc.) and prevention of disturbance to mating/nesting rituals
- Avoid direct discharge from drains, roadways, and parking lots to water bodies
- Use of materials and designs that improve conservation of energy (lighting, ventilation, etc.)
- Establish appropriate setback from beach
- Design roads to reduce runoff from site
- Design wastewater system to permit separation of gray water from sewage; and adequate treatment and disposal of sewage effluent to prevent ground or surface water contamination. For larger properties which require a package plant, gray water should be used to irrigate green areas and flush toilets. Sewage effluent should also be used for irrigation purposes. For smaller properties with available space, evapotranspiration beds (or mounds) are the recommended method of sewage disposal
- Use of water conservation designs and strategies

b. Construction

- Use environmental impact assessment methods to identify impacts, mitigation measures, and environmental controls during site preparation and construction
- Use turbidity screens to protect sensitive areas (reefs, etc.) during marine works
- Minimise vehicular movement on beaches
- Prevent clear-cutting of vegetation on sites, and where possible, reuse local indigenous plants for landscaping

c. Supporting Infrastructure

- Link the development of infrastructure, social amenities, and housing for industry employees to the pace of resort development
- Define acceptable limits of change, in terms of the social and environmental characteristics of the area (link to standards for resort ambience)
- Develop disaster management plans, including mitigation

5.2 Best Management Practices for Operation of Tourism Facilities

In the area of operation of facilities, and the provision of services (including recreation), the application of best management practices can produce immediate, tangible, beneficial results. More importantly, implementation can take place across the industry as a whole, while showing reductions in cost and increases in profits. For example, 7 million gallons of water per year were saved in a hotel in Hawaii, through the use of fitted flow regulators to faucets and showers and through a programme to recycle cooling water for large-capacity ice machines and computer room air-conditioning (World Travel & Tourism Council et al., 1995). Additionally, this will increase the competitiveness for tourists, who are becoming more environmentally discerning. The development of best management practices should be supported by the development of the related management systems; that is, environmental policy, market-based incentives, appropriate purchasing policies, environmental management/monitoring system, staff training, and assigning the responsibility for the programme to a senior member of staff.

Areas of operation for which best practices have been identified include:

- a. Waste management
- b. Water usage
- c. Energy usage
- d. Facilities maintenance
- e. Recreation
- f. Public/social interaction

a. Waste Management

Waste management practices cover both solid waste and effluents. BMPs for solid waste management include:

- Reducing the packaging on materials; through:
 - i. Buying supplies, especially liquids, in bulk

- ii. Using bulk dispensers for fluids
- iii. Eliminating wrapping where possible
- iv. Negotiating with, or changing, suppliers to reduce packaging
- Eliminating the use of disposable plates, utensils, cups, etc.
- Recycling paper (stationery) and bags
- Using linen instead of paper napkins and hand towels
- Recycling linen and towels for use as dust rags, etc.
- Reusing paper where possible (shredding and using as packaging materials, etc.)
- Practicing composting where possible
- Sorting garbage for incineration where facilities exist
- Purchasing products which can be recycled
- Training staff to select better quality raw materials, such as produce (reduce spoilage)
- Ensuring correct storage of perishable goods (correct temperature, installation, maintenance, etc.)

BMPs for effluents include:

- Practicing water conservation
- Eliminating the use of detergent containing phosphates
- Redesigning sewage systems where possible, to reduce volume for disposal, enable recycling of gray water, and prevention of direct releases to water bodies
- Using laundry wastewater and sewage effluent to irrigate lawns and other vegetated areas

b. Water Usage

- Use of low flow shower heads and faucets
- Use of push faucets with reduced operating times
- Use of low flush toilets
- Use of automatic shut-off valves in common areas (beach showers and public bathrooms)
- Advise guests of the need for water conservation and provide alternatives
- Reduce the volume of laundry by asking guests to change towels less frequently
- Wash only full loads in washing machine
- Design laundry so that the rinse water from one load becomes the wash water for the subsequent load
- Recycle water (laundry water or gray water for flushing toilets, watering lawns, etc.)
- Carry out regular checks of plumbing fixtures to reduce leaks

c. Energy Usage

- Use of solar energy for water heating and exterior lighting
- Use motion detectors to control room lighting
- Replace electrical switches with timers where possible
- Use fluorescent instead of incandescent bulbs for lighting
- Conduct routine maintenance of appliances (especially refrigerators and air conditioning units)
- Design public areas to be open spaces
- Tint (mirror glazing) glass windows
- Develop energy saving practices (such as turning the air conditioner off 30 minutes before leaving offices, etc.)
- Adopt signs and orientation sessions to persuade guests to participate in energy conservation programme

d. Facilities Maintenance

- Develop maintenance schedules for electronic and refrigeration equipment
- Employ suitably trained staff for maintenance programmes, including monitoring and servicing of sewage treatment and disposal systems
- Repair equipment away from beach
- Dispose of water from washdown of floors, storage areas, etc, in waste treatment system
- Plant drought-resistant species in landscaped areas

e. Recreation

- Training of activity managers to understand natural resources and impacts of activities, and provide orientation to guests on each activity/tour.
- Reduce the impact on the beach from overuse
- Do not remove dune vegetation and seagrasses
- Do not drop anchor on reefs
- Do not stand on or break corals
- Do not empty bilge or sewage into the sea
- Place garbage in containers assigned for that purpose
- Do not operate jet skis or other motorised equipment in swimming areas
- Moorings and other structures should be placed in such a manner as to create minimal damage and prevent obstruction of coastal processes
- Do not deface attractions

f. Public/Social interaction

Some of the social impacts created by tourism can be mitigated using BMPs; including:

- Develop conflict resolution procedures for resource use, including beach access
- Develop systems to ensure that private haulage contractors do not dump solid waste in communities or areas used by communities
- Promote collaborative efforts between tour operators/hotels and community-managed attractions/operations

Appendix 2 provides a list of publications which include best management practices for operation of facilities in the travel and tourism industry and from which most of the BMPs listed above have been taken.

Existing Practices

A number of the best management practices identified have been tried in a number of hotels, operations, and countries in the Wider Caribbean. The most widely used practices include:

- Erosion and sediment control (Anguilla, US Virgin Islands, British Virgin Islands, Jamaica, Dominican Republic, Barbados)
- Selective purchasing to reduce packaging (several countries)
- Selection of produce to reduce wastage (Ciboney, Jamaica. Personal communication, Selena Tapper, CEPAT)
- Use of sculptured soap bars (Marriott Hotels. Personal communication, Kelly Robinson, CHA)
- Low flush toilets and low flow shower heads (several countries)
- Reuse of gray water for irrigation (several countries)
- Energy conservation (most countries)
- Asking guests to participate in energy and water conservation programmes (most countries)

There is no data to indicate the percentage of operations in each country which have adopted these practices. However, most of the recommended practices can be adopted by operations of all sizes. Appendix 3 contains a few case studies showing how particular sites have developed these practices. It must be noted that the ability of each operation to carry out most of these practices at any one time is dependent on a number of factors, internal and external to the operation. These include:

- The size of the operation and/or site
- The number and quality of the staff
- The design of the facility (to permit structural changes)
- The cost of the practice/change
- Cost of alternate systems/equipment
- Availability of supporting services (maintenance, spare parts, etc.)
- Government policy (import restrictions, technical assistance, market incentives, etc.)

5.3 Existing Programmes to Promote Best Management Practices in Tourism

To achieve environmental best management practices for sustainable tourism requires coordinated and concerted approaches, information sharing, available instruction materials, and incentives for the sector to invest in the idea and more importantly, political commitment. The following are a number of regional and international organisations which have embarked on programmes to improve the environmental practices within the tourism industry:

Caribbean Programmes

CESN and Caribbean Tourism Organization

The Caribbean Ecotourism Support Network (CESN) was established in 1995 as a programme of the Caribbean Tourism Organization (CTO). The CESN seeks to develop standards for ecotourism operations, promote the proper use of natural heritage, and promote and monitor development of ecotourism in the Caribbean.

From its Secretariat in Jamaica, the CESN has established national networks in a number of countries.

CTO has recently created an environmental and sustainable tourism post within its headquarters in Barbados to assist CTO with the promotion of a sustainable tourism product among its members and CTO's annual ecotourism conference has changed to a sustainable tourism event since 1997.

Caribbean Hotel Association

The Caribbean Hotel Association (CHA) promotes environmental management practices in the planning, construction, and operation of hotels. The CHA's environmental programme started with the production of its "Environmental Management Tool Kit for Caribbean Hotels" (Appendix 2). The CHA now conducts seminars for its 1,900 members, using the "tool kit" as the basic material.

The CHA has also established an Annual Environmental Award for its members. The focus thus far has been on wastewater management, solid waste management, and energy and water conservation. This programme also promotes the development of environmental policy and management systems in participating hotels.

CAST

The Caribbean Action for Sustainable Tourism (CAST) was launched in June 1997 by the CHA as a key private sector effort in implementing Agenda 21 for the tourism industry in the Caribbean. As a subsidiary organization of CHA, CAST is responsible, through membership, for assisting Caribbean hoteliers to meet the environmental standards established by international tour operators and other industry participants. Through its activities, CAST also seeks to educate and develop best management practices of the region's hoteliers.

International Initiatives

There are a number of international initiatives that are relevant to the Caribbean, either because they produce information that can be used to promote/guide BMPs, or because they target the Caribbean as a travel destination.

International Hotels Environment Initiative

The International Hotels Environmental Initiative (IHEI) was developed by The Prince of Wales Business Leaders Forum in 1992. The IHEI is a coalition of hotel companies and industry partners which encourages improvement in the environmental performance of the international hotel industry.

In addition to supporting its partners, some of whom are in the Caribbean, the Initiative has produced a number of publications promoting best practices (Appendix 2).

GREEN GLOBE

The World Travel and Tourism Council, a global coalition of industry chief executive officers, created the GREEN GLOBE Programme in 1993. In promoting the goals of the GREEN GLOBE Programme, a number of publications relevant to BMPs have been produced (Appendix 2) in collaboration with a number of organizations, including UNEP.

British Airways Holidays

British Airways Holidays developed a programme called "Tourism for Tomorrow", which seeks to promote environmentally friendly properties to its clients. Working with the IHEI and CHA, British Airways Holidays is presently conducting a survey of hotels in the Caribbean, in an effort to identify and promote hotels with good environmental practices.

ECoNETT

The European Community Network for Environmental Travel and Tourism (ECoNETT) is an environmental communications network which provides Internet access to information about environmental travel and tourism.

ISO 14000

The International Organization for Standardization (ISO) has developed standards (ISO 14000) for environmental management and environmental auditing. The ISO 14000 certification process requires sector-specific guidelines and standards. Though such standards do not presently exist for the tourism industry, a number of regional and international organisations are promoting the development of environmental management systems in participating hotels.

In April 1997, the CHA, UNEP-CEP and the United States Agency for International Development jointly sponsored a seminar covering ISO 14000 for industry participants in Negril, Jamaica.

6. INITIATIVES FOR MITIGATION OF COASTAL RESOURCES DEGRADATION

Initiatives to prevent or mitigate coastal resources degradation have been undertaken by local groups, national governments, regional bodies, and international organisations/programmes. Efforts to address the problems of coastal resources degradation generally have included the impacts from the tourist industry. Efforts to date at the national level have involved the following:

- a. Development of integrated coastal zone management plans/guidelines
- b. Improved land use planning and development control
- c. Development of environmental management tools, such as environmental impact assessment
- d. Preparation of policies to deal with coastal resources use and coastal developments

- e. Development of emergency response systems/teams for oil and other hazardous chemicals spills
- f. Promotion of sustainable harvesting methods for some coastal resources
- g. Development of pollution control strategies
- h. Construction of tourism infrastructure; primarily sewage systems
- i. Institutional strengthening for regulatory agencies
- j. Greater involvement of local groups and non-governmental organisations in decision making and resource management opportunities
- k. Establishment of marine parks
- l. Development of environmental databases
- m. Rehabilitation of degraded areas.

International Programmes

There are several regional and international initiatives that seek to deal with the issues of environmental degradation, the impacts from tourism being only one element of those programmes.

a. Coastal and Marine Resources Management

Under the Cartagena Convention, which sets the legal framework for the Caribbean Environment Programme (CEP), Protocols and programmes to deal with oil spills and establishment and management of protected areas and species of wildlife have been developed. Projects for clean up of selected harbours are being implemented, and a Protocol to address marine pollution from land-based activities is currently under negotiation.

The CEP is an integrated environmental programme adopted by Governments of the Wider Caribbean since 1981 to assist with the management of their coastal and marine resources. Assistance to Governments has been provided on integrated coastal area management, assessment and control of marine pollution, protected areas and wildlife management, coral reefs and associated ecosystems protection and information systems management. In this context, management guidelines on these areas have been developed and adopted by Governments, as well as general guidelines on revenue generation in protected areas, national sea turtles recovery plans, and manatee regional

management plan. Training and public awareness activities on the above areas are also developed and supported through the Programme.

The Regional Coordinating Unit (CAR/RCU) of the CEP collaborates with national and international organisations to monitor the status of the Wider Caribbean coastal and marine environment as well as of endangered species of wildlife of regional concern (such as sea turtles, manatees, migratory birds, etc.), prepare guidelines relating to a range of environmental management practices, and provide support to environmental education initiatives. More recently, CEP has embarked on a regional sustainable tourism project in collaboration with USAID on the promotion of BMPs through pilot projects, information dissemination, networking and training and capacity building.

A number of global initiatives relating to management of natural resources have been of benefit to the Wider Caribbean. These include the International Coral Reef Initiative (ICRI) and the Convention on Biological Diversity (CBD). UNEP-CEP serves as a contact point for ICRI in the Wider Caribbean and has signed a Memorandum of Co-operation with the CDB to co-operate through CEP on biodiversity issues in the region. Initiatives to deal with fisheries management have been operating in the CARICOM and Organization of Eastern Caribbean States countries for several decades, including those of CFRAMP and FAO.

Additionally, the National Resources Management Unit (NRMU) of the OECS has initiated, through a process of consultations with its member governments, the development of the Sustainable Tourism Strategy for the OECS countries.

The Association of Caribbean States (ACS) created in 1995 through intergovernmental ministerial decision includes, within its programme of action, two Special Committees on tourism and protection and conservation of the environment and Caribbean Sea, respectively. The Special Committee on Tourism has been working with governments and relevant organizations on the establishment of the Sustainable Tourism Zone of the Caribbean. The ACS was established as an organization for consultation, co-operation and concerted action to identify and promote the implementation of policies and programmes to achieve sustained economic advancement in the Caribbean. Other Special Committees of the ACS include trade development, natural resources and institutional co-operation.

The declaration in 1993 of the Caribbean as a Special Area under MARPOL 73/78 will address the issue of transport of waste through the region when the agreement enters into force.

b. Environmental Health

The Pan American Health Organization has maintained an active programme in environmental health in the Caribbean. Since the establishment of the Caribbean

Environmental Health Institute (CEHI), which provides technical support to environmental health issues in CARICOM countries, both institutions have provided a fairly comprehensive programme, covering monitoring, assessment, and the development of environmental health standards.

CEHI was established in 1979 in St. Lucia following a mandate from CARICOM Ministers responsible for Health. It provides technical and advisory services to Member States in all areas of environmental management, including promotion and collaboration in the planning, programming and conducting of symposia, workshops, and on-the-job training and courses in Member States, the Institute or other selected regional institutions, assistance to Governments on assessment, monitoring and control of environmental pollution; in particular, sewage, solid and toxic wastes.

Other initiatives to deal with solid waste include the annual beach clean-up activities coordinated by the Center for Marine Conservation, and the project coordinated by the International Maritime Organization related to the port facilities for accepting ship-generated solid waste.

c. Environmental Information Access

There have been attempts to develop information networks to service the needs of the Wider Caribbean, supported by institutions and programmes such as those of UNEP-CEP and its CEPNET regional programme, the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), Island Resources Foundation, CARICOM Secretariat, the Caribbean Conservation Association and the Center for Environment and Development of the University of the West Indies (UWICED).

The establishment of Conservation Data Centers in several countries in the Region has been taking place for the previous two decades. This initiative has registered mixed results, and attempts to realign it with national data management initiatives are being undertaken.

More recently, the Information Management Task Force of the IUCN's World Protected Areas Commission is attempting to develop a Caribbean programme to deal with the issue of information management related to protected areas.

d. Development of Environmental Programmes in Hotels

There has been a surge since the start of the 1990s to develop "Green Programmes" for hotels. These programmes were initiated primarily by European institutions, but Caribbean tourist industry organisations have been participants for a number of years. These initiatives have led to the preparation of guidelines for environmental actions and best management practices in the hotel industry (Section 5 and Appendix 2).

6.1 Present Needs

The investment in coastal area management and tourism is extremely high, both in terms of public expenditure and private investment. To protect this investment, additional investment in prevention of environmental degradation and remediation have also been made, and future investments will be made.

When the areas in which investments have been made are examined (see list above), it is obvious that under the present circumstances of coastal resources degradation, resource allocation to these activities must continue. If deterioration of the environmental capital is allowed to continue the industry will become unsustainable, as tourists will seek other destinations, earnings and employment will fall, infrastructure will deteriorate, there will be increased competition for smaller numbers of tourist and degrading natural resources, and social conflicts will increase. In such a scenario, the “Tourism Death Spiral” discussed by IRF (1996a) will surely follow. As such, no one questions the need for additional investment in preventing further loss of environmental quality.

However, investment within the context of the existing planning and management deficiencies appears to produce lower levels of return than expected or required. The benefits to accrue from allocating additional resources to coastal resources protection now instead of later will therefore depend on the areas of focus.

In order to ensure sustainability of the tourism industry and the coastal resources used by other sectors of Caribbean economies, increased focus must be placed on improving the decision making processes, the integrated planning and management of coastal resources and the tourism industry, and changing the orientation of professionals and industry actors to embrace more socially and environmentally sound approaches to development.

However, there are a number of prerequisites to this change; including:

- a. The need to draw on the skills from a number of professions (biologists, environmentalists, planners, architects, engineers, landscape architects), and sectors (public, private and including traditional users such as fishermen, farmers, local communities, etc.)
- b. Better management and analysis of information is required through:
 - Wide dissemination of concrete but revealing analytical information to decision and policy makers on the economic impact of environmental and tourism practices
 - Information on natural resources and environmental degradation from tourism need to be distributed to others apart from environmentalists and resource managers. Industry participants must be targeted
 - Systematic documentation of best practices and successes, and information dissemination to industry participants
 - Training and materials which target tourism participants

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- c. Improved public sector capability to plan, assess, and monitor coastal zone development, including adequate and harmonized policy, legislation and regulatory frameworks and enforcement. This requires both information and training.
- d. Standards for resort areas, and for properties and recreational operations.
- e. Modified guidelines for environmental management systems, especially with respect to coastal zone applicability in the Wider Caribbean, including more balanced demand and control systems and co-management where appropriate.
- f. Development of analytical tools, methods/and systems to determine the full monetary cost and social effects of tourism; including the cost of infrastructure, monitoring and assessment, environmental cost, etc.
- g. Information capture and systems to support long term analysis and decision making
- h. Additional research to focus on:
 - Recreational component and impact of individual (opportunistic/part-time operators)
 - Reduction of the aesthetic component of the tourism product from the loss of landscapes/seascapes through poor design and location of hotels, relocation of roads away from the coast, and high walls surrounding properties
 - The types and design of beach structures, in terms of their placement, ability to withstand storms, and their impact on coastal processes
 - Residential tourism (research, conferences, internal travel, etc.) and intra-Caribbean travel, and their impacts and benefits
 - Factors causing decay of tourism infrastructure and decline in resorts, and ways to prevent same
- i. Providing information on the risks and rewards of investing in tourism (external and internal risks, cost competition from non-Caribbean destinations, etc.)
- j. Development and implementation of market based incentives and effective cost recovery mechanisms, including benefits to communities
- k. Compliance with international conventions and treaties, in particular, the Cartagena Convention and its Protocols, which is the only regional environmental legal framework for the Wider Caribbean region.

Priority areas for action are:

- a. **Development of integrated environmental management systems and standards for tourism projects and tourist operations**

The implementation process will be much faster than attempting to undertake regulatory changes. The international demands for good environmental quality already provide a substantial level of motivation to the larger properties to participate in any such exercise; and in fact, there are similar activities presently taking place. Environmental management systems must be developed and implemented through an integrated intersectorial and participatory approach, with a more balanced command and control system which includes the possibility of co-management.

b. Development and implementation of standards for resorts

The constant complaint is that areas change too rapidly and lose their ambience. In many countries where regulatory agencies attempted to maintain the natural ambience of the resorts, the tourism lobby acted to prevent and stymie such regulation.

c. Improvement in public sector capability and intervention

Areas of focus must include industry assessment, physical and environmental integrated planning, site selection and assessment, as well as monitoring, under an adequate and harmonized multisectoral policy and regulatory framework which should include effective cost recovery mechanisms.

d. Changing the orientation of industry bosses, from planning for quick returns on their investments to development of a more sustainable industry.

There is therefore a need to develop a balance between the need for super-normal profits demanded by the high cost of investment capital, and the requirement to maintain ambience and general environmental quality. However, it is also necessary to develop market based incentives for the industry to encourage compliance and commitment.

7. ISSUES FOR CONSIDERATION

There are a number of issues that should be considered in making future investments in the tourist industry, (e.g. rooms, infrastructure, or remedial action). The main issues include:

- a. The impact of climate change and sea level rise, and possible decisions to use resources now versus later
- b. The relevance of present remediation efforts, and the cost and benefits of investment in remediation versus undertaking the necessary system changes
- c. The impacts of tourism and other sectors on natural resources versus the impacts of natural disasters; as well as the linkages between tourism and other sectors and resource use decisions
- d. The increasing change in the tourist preferences; information on what constitutes ecotourism; and the implications for present investments in infrastructure

LIST OF ACRONYMS

CARICOM	Caribbean Community
CAST	The Caribbean Action for Sustainable Tourism
CDB	Caribbean Development Bank
CEHI	Caribbean Environmental Health Institute
CEP	Caribbean Environment Programme
CEPAT	Continuing Education Programme in Agricultural Technology
CESN	The Caribbean Ecotourism Support Network
CFRAMP	CARICOM Fisheries Resources Assessment and Management Program
CHA	The Caribbean Hotel Association
CTO	Caribbean Tourism Organization
CTRC	Caribbean Tourism Research and Development Centre
IHEI	The International Hotels Environmental Initiative
IRF	Island Resources Foundation
ISO	International Organization for Standardization
IUCN	The World Conservation Union
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973 and Protocols
OECS	Organization of Eastern Caribbean States
PAHO	Pan-American Health Organisation
UNEP	United Nations Environment Programme
WTO	World Tourism Organization

REFERENCES

- Aniyar, S. 1994. A University Course Module on Resource Systems and Economic Development – St. Thomas Case. Consortium of Caribbean Universities for Natural Resource Management, St. Thomas.
- Awosika, L., S. Boromthanarat, R. Comforth, M. Hendry, R. Koudstall, M. Ridgley, S. Sorenson, L. De Vrees and S. Westmacott. 1993. Management Arrangements for the Development and Implementation of Coastal Zone Management Programmes. World Coast Conference Organising Committee. International Conference on Coastal Zone Management, The Netherlands, 1-5 November 1993.
- Caribbean Conservation Association. 1991. Environmental Guidelines for Caribbean Planners. OECS/UNDP/UNCHS. Barbados.
- Caribbean Development Bank. 1996. A Study to Assess the Economic Impact of Tourism on Selected CDB Borrowing Member Countries. CDB, Barbados.
- Caribbean Tourism Organization. 1996. Caribbean Tourism Statistical Report 1995. CTO, Barbados.
- Island Resources Foundation. 1996a. Tourism and Coastal Resources Degradation in the Wider Caribbean (Unpublished Draft). UNEP-CAR/RCU.
- Island Resources Foundation. 1996b. Guidance for Best Management Practices for Caribbean Coastal Tourism (Unpublished Draft). UNEP-CAR/RCU.
- Manning, E. 1996. “Carrying Capacity and Environmental Indicators: What Tourism Managers Need to Know”, in WTO News, May-June 1996.
- McElroy, J. and K. Albuquerque. 1991. “Tourism Styles and Policy Responses in the Open Economy – Closed Environment Context”, in N. Girvan & D. Simmons (Eds.), Caribbean Ecology and Economics. Caribbean Conservation Association, Barbados.
- Nurse, L. 1990. “The Deterioration of Caribbean Coastal Zones: A Recurring Issue in Regional Development”, in J. Cox & C. Embree (Eds.) Sustainable Development in the Caribbean. The Institute for Research on Public Policy, Halifax.
- PAHO/WHO. 1996. Municipal Solid Waste Management in Latin America and the Caribbean. Compiled by Francisco Zepeda. Environmental Series No. 15. Washington, D.C.

Pattullo, P. 1996. Last Resorts: The Cost of Tourism in the Caribbean. Ian Randle Publishers, Kingston, Jamaica.

Pernetta, J.C. and D. L. Elder. 1993. Cross-sectoral, Integrated Coastal Area Planning (CICAP): Guidelines and Principles for Coastal Area Development. A Marine Conservation and Development Report. IUCN, Gland, Switzerland.

Simmons & Associates. 1994. The Impact of Tourism on the Marine Environment of the Caribbean: With Special Reference to Cruise and Other Types of Marine-based Tourism. Caribbean Tourism Organization. Bridgetown, Barbados.

The Caribbean Tourism Research and Development Centre. 1987. The Contribution of Tourism to Economic Growth and Development in the Caribbean. CTRC.

UNEP. 1989a. Regional Overview of Environmental Problems and Priorities Affecting the Coastal and Marine Resources of the Wider Caribbean. CEP Technical Report No. 2. UNEP Caribbean Environment Programme, Kingston, Jamaica.

UNEP. 1989b. Assessment of the Economic Impacts of Hurricane Gilbert on the Coastal and Marine Resources in Jamaica. UNEP Regional Seas Reports and Studies No. 110, UNEP.

UNEP. 1992. Environmental Problems Affecting the Marine and Coastal Environment in the Wider Caribbean (Draft). UNEP, Kingston, Jamaica.

UNEP. 1994. Regional Overview of Land-Based Sources of Pollution in the Wider Caribbean Region. CEP Technical Report No. 33. UNEP Caribbean Environment Programme, Kingston.

UNEP. 1996. Guidelines for Integrated Planning and Management of Coastal and Marine Areas in the Wider Caribbean Region. UNEP Caribbean Environment Programme, Kingston, Jamaica.

Vlugman, A. 1992. Assessment of Operational Status of Waste Water Treatment Plants in the Caribbean. CEHI/PAHO.

World Travel & Tourism Council. 1996. Caribbean Travel and Tourism: A New Economic Perspective. WTTC.

World Travel & Tourism Council/World Tourism Organization/Earth Council. 1995. Agenda 21 for the Travel & Tourism Industry: Towards Environmentally Sustainable Development. London, U.K.

APPENDIX 1

Documentation on Coastal Environmental Pollution and Best Management Practices to Reduce Coastal Environmental Degradation

Compiled by Island Resources Foundation, 1996

- Adams, J. 1996. Cost Benefit Analysis: The Problem, Not the Solution, The Ecologist, Vol. 26, No. 1, January-February 1996. Dorset, United Kingdom.
- Amaral, M. 1993. Rhode Island's Non-point Source Pollution Abatement for Recreational Boating Facilities: Project Summary. Prepared for International Marina Institute's Marina and Boating Environment Conference, Atlanta, Georgia, USA (6-8 December 1993).
- Archer, A. 1984. Report on Land-based Sources of Pollution in Coastal, Marine and Land Areas of CARICOM States. Prepared under UNEP/CARICOM/PAHO Project for the Protection of the Coastal and Marine Environment of Caribbean Islands.
- Archer, A. 1992. Land-based Sources of Coastal and Marine Pollution in CARICOM Countries, Industry & Environment. UNEP, Vol. 15, No. 1-2, pp. 23-28.
- Armstrong, J. 1996. Lack of Integrated Planning Hurting Region, CARICAD Newsletter. Barbados, Summer 1996.
- Atlantic Center for the Environment. 1984. Tourism and Conservation: Compatible Ideas? Nexus Vol. 6, No. 3.
- Atherley, K. D. Smith, and L. Nurse. 1993. An Integrated Coastal Zone Management Programme for Barbados, Proceedings for Coastal Zone '93 pp. 2653-2667.
- Auer, M. 1991. Urban Impacts on Coastal Zones of Developing Countries: Problem Identification and Recommendations for Mitigation. Working Paper of the Office of Housing and Urban Programs, United States Agency for Development, Washington D.C.
- Baker, R. 1994. Pollution & Sustainable Ports, Sea Technology, (October 1994), pp. 25-30.
- Bartone, R. and H. Salas. 1984. Developing Alternative Approaches to Urban Wastewater Disposal in Latin America and the Caribbean, PAHO Bulletin, Vol. 18, No. 4, pp. 323-336.
- Bass, S. 1993. Ecology and Economics in Small Islands: Constructing A Framework for Sustainable Development, in Barbier, E. B., (Ed.), Economics and Ecology: New Frontiers and Sustainable Development. Chapman & Hall, London. pp. 156-176.
- Beleville, B. 1995. The Marine Conservation Challenge and Ecotourism. The Ecotourism Society Newsletter, Vol. 5, No. 3, pp. 1-3.
- Betz, K. 1989. A Report on Land-based Sources of Marine Pollution in the Caribbean.

- Unpublished internship report for the U.S. Environmental Protection Agency, International Affairs Office, Washington, D.C.
- Blommestein, E. 1985. Tourism and Environment in Caribbean Development: An Overview of the Eastern Caribbean. ECLAC. Port-of-Spain, Trinidad and Tobago.
- Blommestein, E. 1993. Sustainable Tourism in the Caribbean: Proposals for Action (WP /93 /10). ECLAC/CDCC. Port-of-Spain, Trinidad and Tobago.
- Blommestein, E. 1995. Sustainable Tourism in the Caribbean – An Enigma?, in: Griffith, M. and P. Bishnodat (Eds.), Economic Policy and the Environment - The Caribbean Experience. University of the West Indies, Kingston, Jamaica. pp. 208-210.
- Blommestein, E. and N. Singh. 1988. The Impact of the Climatic Changes on Tourism. Paper presented at the XXI Annual General Meeting of the Caribbean Conservation Association.
- Boo, E. 1990a. Ecotourism: The Potentials and Pitfalls. Volume 1. World Wildlife Fund, Washington, D.C.
- Boo, E. 1990b. Ecotourism: The Potentials and Pitfalls. Volume 2: Country Case Studies. World Wildlife Fund, Washington, D.C.
- Boo, E. 1992. The Ecotourism Boom: Planning for Development and Management. WHN Technical Paper Series, Paper #2. World Wildlife Fund, Wildlands and Human Needs, Washington, D.C.
- Bookman, S. 1993a. Agenda For Sustainable Island Tourism Development Videotape. Version 2. Prepared under the auspices of International Institute of Tourism Studies, The George Washington University, Washington, D.C.
- Bookman, S. 1993b. Island Tourism Development: A new Perspective. An Educational Supplement to the Video Program: Agenda for Sustainable Island Tourism Development. International Institute of Tourism Studies. The George Washington University, Washington, D.C.
- Brandon, K. 1996. Ecotourism and Conservation: A Review of Key Issues, Global Environment Department Paper Number 033. World Bank, Washington, D.C.
- Broadus, J. et al 1993. Comparative Assessment of Regional International Programs to Control Land-based Marine Pollution: The Baltic, North Sea, and Mediterranean. Woods Hole Oceanographic Institution, Marine Policy Center, Woods Hole, Massachusetts, U.S.A.
- Brower, D. T. Beatley, and D. Blatt. 1987. Reducing Hurricane and Coastal Hazards through Growth Management. University of North Carolina at Chapel Hill, North Carolina, U.S.A.
- Brown, B. W. Erb, and G. Maul. 1992. Intra-Americas Sea Marine Science Meeting of U.S. Experts: Report of a Workshop Held in Miami, Florida, 17-19 December 1990, U.S. Department of Commerce, NOAA/NMFS, Miami, Honda, U.S.A.

- Cambers, G. 1990. Overview of Coastal Zone Management in the CARICOM Countries. Paper prepared for the World Bank, Washington, D.C.
- Cambers, G. 1992. Coastal Zone Management: Case Studies from the Caribbean. Report No. 26. Latin America and the Caribbean Technical Department, Regional Studies Program, World Bank, Washington, D.C.
- Cambers, G. 1996. 1995 Annual Report. COSALC 1: Beach and Coastal Stability in the Lesser Antilles. UNESCO), Environment and Development in Coastal Regions and Small Islands and University of Puerto Rico, Sea Grant College Program.
- Caribbean Environment and Development Institute. 1995. Proceedings: Meeting of Environmental Technical Experts, Summit of the Americas. (Partnership for Pollution Prevention). San Juan, November 1995.
- Caribbean Tourism Organization. 1994. Caribbean Hotel Trends, 1994 Edition. CTO, Christ Church, Barbados.
- Caribbean Tourism Organization. 1995. Caribbean Tourism Statistical Report, 1994. CTO, Christ Church, Barbados.
- Caribbean Tourism Organization. 1996. Statistical News: Quarterly Review of Caribbean Tourism Trends. CTO, Christ Church, Barbados.
- Center for Marine Conservation. 1994. 1994 International Coastal Cleanup Results. CMC, Washington, D.C.
- Center for Marine Conservation. 1995. 1994 International Coastal Cleanup Results, Atlantic Regional Office, Hampton.
- Commission of the European Communities. 1994. Taking Account of Environment in Tourism Development. Directorate General XXIII - Tourism Unit Studies.
- Conlin, M. V. and T. Baum, (Eds). 1995. Island Tourism: Management Principles and Practice. John Wiley & Sons, New York.
- Coral Reef Alliance. 1995. CORAL/ PATA Sustainable Diving Checklist. Presented by The Coral Reef Alliance to the UN Conference on Sustainable Tourism, Dominican Republic, and the International Coral Reef Initiative Workshop, The Philippines (1995). Based on "Green leaf Questionnaire" developed by the Pacific Asia Travel Association (PATA).
- Cox, J. and C. Embree (Eds). 1990. Sustainable Development in the Caribbean: A Report on the Public Policy Implications of Sustainable Development in the Caribbean Region Conference, 28-30 May 1990, Kingston, Jamaica. Institute for Research on Public Policy, Halifax, NS, Canada.
- Chiu, G. et al (Eds.). 1994. Toxic Chemicals Control in the Caribbean: Towards Model

- Legislation. Prepared for the Management of Industrial Chemicals and Wastes in the CARICOM States Project. School for Resource and Environmental Studies, Dalhousie University, Halifax, Nova Scotia, Canada.
- Cicin-Sain, B. 1982. Management of Marine Conflicts, in Stroud, R.H., (Ed.), Marine Recreational Fisheries. International Game Fish Association, National Coalition for Marine Conservation, and Sport Fishing Institute. pp. 127-140.
- Cicin-Sain, B. 1993. Sustainable Development and Integrated Coastal Management, in Ocean and Coastal Management, 21(1993): 11-43. Elsevier Science Publishers Ltd., England.
- Clark, J. 1992. Integrated Management of Coastal Zones. FAO Fisheries Technical Paper 327. Food and Agriculture Organization of the United Nations, Rome.
- Clark, J. (Ed). 1985. Coastal Resources Management: Development Case Studies. Renewable Resources Information Series, Coastal Management Publication No. 3. Prepared for U.S. National Park Service and U.S. Agency for International Development by Research Planning Institute, Inc. Columbia, South Carolina, U.S.A.
- Clean Islands International. 1994. 1994 Island Waste Management Conference, Third Caribbean Marine Debris Workshop, and Inaugural Meeting of the Solid Waste Association of the Caribbean, Nassau, The Bahamas (10-14 January 1994). Pasadena, Maryland, U.S.A.
- Cole-King, A. 1996. Marine Shipping and the Environment: Assessing the Risks. A briefing to highlight WWF-UK's work in marine conservation. World Wide Fund for Nature-United Kingdom, Godalming, Surrey, U.K.
- Colgan, C. S. 1990. Valuing Coastal Zone Management. Prepared by the Center for Urban and Regional Studies, University of North Carolina at Chapel Hill for the National Coastal Resources Research and Development Institute. NCRI Publication No. NCRI-T-90-005. Portland, Oregon, U.S.A.
- Collymore, J. F. McDonald, and H. Brown. 1993. Natural and Environment Disaster Preparedness in the Caribbean. Background Paper for the Regional Technical Meeting on the Sustainable Development of Small Island Developing States, Port-of-Spain, Trinidad and Tobago (12-6 July 1993).
- Deane, C. 1972. Tsunamis, Eastern Caribbean. University of the West Indies.
- de Albuquerque, K. and J. McElroy. 1992. Caribbean Small-Island Tourism Styles and Sustainable Strategies. Environmental Management, 16(5), 619-632.
- de Albuquerque, K. and J. McElroy. 1995a. Alternative Tourism and Sustainability, in Conlin, M. and T. Baum (Eds.), Island Tourism: Management Principles and Practice. John Wiley & Sons, New York, N.Y. pp.23-32.
- de Albuquerque, K. and J. McElroy. 1995b. Policy Brief: Tourism Development and Coastal Decline, Lessons from Antigua and Barbuda and A Framework for Reform. Midwest Universities Consortium for International Activities, Columbus, Ohio, U.S.A.

- Sandwell, P.K.F. and M. G. Guy. 1995. Draft Pilot Project Monitoring Program and Results. Prepared for the Government of Barbados, Ministry of Tourism, International Transport and the Environment, Coastal Conservation Project Unit, Bridgetown.
- Diamante, J. et al. 1991. Background Paper: Land-based Sources (LBS) of Pollution as the Dominant Marine Pollution Problem in the Wider Caribbean Region. U.S. Environmental Protection Agency, Office of International Activities, Washington, D.C.
- Dixon, J., L. Scura and T. van't Hof. 1992. Meeting Ecological and Economic Goals: The Case Marine Parks in the Caribbean. Prepared for the Second Conference on the Ecology and Economics of Biodiversity Loss, Stockholm (29-31 July 1992), and also presented at the Second Meeting of the International Society for Ecological Economics, Stockholm (3-6 August 1992).
- Dixon, J. 1989. Project Appraisal: Evolving Application of Environmental Economics. Paper prepared for Conference on Economics and the Environment. Barbados, 6-8 November 1989.
- Douglas, J. 1992. Ecotourism: The Future for the Caribbean, Industry and Environment UNEP 1992, pp. 66.
- Drabek, T. L. 1994. Disaster Evacuation and the Tourist Industry. Program on Environment and Behavior Monograph No. 57, University of Colorado, Institute of Behavioral Science, Boulder, Colorado, U.S.A.
- Eakin, M. 1995. Effects of Land-based Pollutants on Coral Reef Ecosystems. Issue paper for the UNEP Intergovernmental Conference on the Protection of the Marine Environment from Land-based Activities (23 October – 3 November 1995).
- ECLAC/UNEP. 1986. Report of The Wider Caribbean Expert Meeting on Tourism and Environment in Caribbean Development. Port-of-Spain, Trinidad and Tobago (2-4 December 1985). LC CAR 180.
- Edwards, F. (Ed.). 1988. Environmentally Sound Tourism in the Caribbean. Banff Centre School of Management. University of Calgary Press, Calgary, Alberta, Canada.
- Ikington, J. 1988. The Environmental Audit: Holy Grail or Essential Management Tool? Industry and Environment Vol. 1, No. 4, pp. 17-20. UNEP.
- English Tourist Board and the Employment Department Group. 1991. Tourism and The Environment: Maintaining The Balance. Designed and produced by Glasgow & Associates.
- Environmental Resources Limited. 1991. Port Reception and Disposal Facilities for Garbage in the Wider Caribbean. Prepared for International Maritime Organisation and The World Bank. London, U.K.
- Epler, B. 1993. An Economic and Social Analysis of Tourism in the Galapagos Islands.

- Technical Report 2051. International Coastal Resource Management Project, Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island, U.S.A.
- Farell, B. 1986. Cooperative Tourism and the Coastal Zone, *Coastal Zone Management Journal*, Vol. 14, Nos. 1&2, pp. 113-130.
- Fernandez, E. 1994. How Can an Industrial Sector Participate in the Efforts for Sustainable Development? The Example of Hotels, *Industry and Environment*, Vol. 17, No. 3, pp. 49-50. UNEP.
- Food and Agriculture Organization of the United Nations. 1986. Facets of Watershed Management In the Caribbean. Caribbean Technical Cooperation Network on Upper Watershed Management. Technical Cooperation Programme: TCP/RLA/451 1, Strengthening National Institutions for Sub-Regional Training in Upper Watershed Management. FAO, Regional Office for Latin America and the Caribbean, Santiago, Chile.
- Frechtling, D. 1992. Annotated Bibliography on Health and Tourism Issues. Prepared for the Pan American Health Organization International Institute of Tourism Studies, The George Washington University, Washington, D.C.
- Gamman, J. 1990a. Comparative Analysis of Public Policies Affecting Natural Resources and the Environment: Interest Group Politics in the Eastern Caribbean. Prepared for the U.S. for International Development Alternatives under USAID' Strategies for Fragile Lands (DESFIL) Program, Washington, D.C.
- Gamman, J. 1990b. Environmental Policy Implementation in Developing Countries. Ph.D. Dissertation, Massachusetts Institute of Technology, U.S.A.
- Gasparovic, F. 1984. The Development of Tourism and the Environment on the Adriatic Coast of Yugoslavia. *UNEP Industry and Environment*, Vol. 7, No. 1, pp. 25-27.
- GESAMP. 1984. Thermal Discharges in the Marine Environment. *UNEP Regional Seas Reports and Studies* No. 45.
- GESAMP. 1990. The State of the Marine Environment. *UNEP Regional Seas Reports and Studies*, Number 115.
- Gladfelter, E. and J. Ogden. 1994. The Status of Relevant Scientific Capabilities and Knowledge of Land-based Marine Pollution Problems in the Caribbean. Discussion Paper for the Regional Control of Land-based Marine Pollution: Lessons from Other Regions of the Wider Caribbean Project. Woods Hole Oceanographic Institution, Marine Policy Center, with U.S. Environmental Protection Agency, Office of International Affairs.
- Godschalk, D., D. Brower, and T. Beatley. 1989. *Catastrophic Coastal Storms: Hazard, Mitigation and Development Management*, Durham, N.C.: Duke University Press.
- Good, J. and R. Goodwin. 1990. *Waterfront Revitalization for Small Cities*. Oregon State University, Corvallis, Oregon, U.S.A.

- Greenfield, M. 1993. Urban Waste Management Consultation/Seminar (3-4 March 1993). Faculty of Natural Sciences and the Centre for Sustainable Development, University of the West Indies, Mona, Jamaica.
- Griffith, M. and J. Ashe. 1993. Sustainable Development of Coastal and Marine Areas in Small Island Developing States: A Basis for Integrated Coastal Management, Ocean and Coastal Management, 21: 269-284. Elsevier Science Publishers Ltd., England.
- Grigg, D., W. Rainey, and E. Towle. 1970. Some Effects of Dredging and Sand Mining on Water Quality, Coral Reefs, Sea Grasses and Eastern Caribbean Coastal Environments. Occasional Paper No. 22. Island Resources Foundation, St. Thomas, U.S. Virgin Islands.
- Gumbs, B. and E. Blommestein. 1996. Draft Environmental Information Management in the Caribbean. ECLAC/UNEP/IDRC. Port-of-Spain.
- Hawkins, R. 1995. Tourism in the Wider Caribbean and its Impact on Marine and Coastal Ecosystems. Presented at the Seminar on Sustainable Development of Tourism in the Wider Caribbean, Mexico City (18-20 April 1995).
- Hendry, M. 1991. Resource Use Planning for Beaches in Caribbean Tourism. Presented at Caribbean Tourism Organisation Conference on Ecotourism, Belize (9-12 July 1991).
- Hendry, M. and P. Bacon. 1989. Hurricane Impacts on Caribbean Beaches: The Development of a Data Base and Guidelines for Coastal Area Planning and Management, in Larue, D. and G. Draper (Eds.), Transactions of the 12th Caribbean Geological Conference, St. Croix, U.S. Virgin Islands (7-11 August 1989).
- Hettige, H. et al. 1994. The Industrial Pollution Projection System. Research Report on the World Wide Web. The World Bank, Washington, D.C.
- Hiranyakit, S. 1984. Tourism Planning and Environment, UNEP Industry and Environment, Vol. 7, No. 1, pp. 2-3.
- Hirvonen, H. and R. Cote. 1986. Control Strategies for the Protection of the Marine Environment, Marine Policy, pp. 19-28. Butterworth & Co. (Publishers), Ltd.
- Hoagland, P., M. Schumacher, and A. Gaines, Jr. 1995. Toward an Effective Protocol on Land-based Marine Pollution in the Wider Caribbean Region. WHO I-95-10. Prepared by Woods Hole Oceanographic Institution for the U.S. EPA, Office of International Affairs. Marine Policy Center, WHOI, Woods Hole, Massachusetts, U.S.A.
- Holder, J. 1987. The Pattern and Impact of Tourism on the Environment of the Caribbean. Presented at a Workshop on Tourism and the Environment, Barbados (6 April 1987).
- Holder, J. 1990a. Overcoming the Socio-cultural and Environmental Impacts of Tourism - The

- Verdict for the Caribbean, *The Courier*, No. 122, pp. 64-65.
- Holder, J. 1990b. The Caribbean: Far Greater Dependence on Tourism Likely. *The Courier*, No. 122 (July-August, 1990), pp. 74-79.
- Hooten, A. and H. Marea (Ed.). 1995. Sustainable Financing Mechanisms for Coral Reef Conservation Proceedings of a Workshop held at the World Bank, Washington, 23 June 1995. Environmentally Sustainable Development Proceedings Series No. 9, The World Bank, Washington D.C.
- Houston, J. 1996. The Economic Value of Beaches. Extracted from the Internet. Point of contact: j.houston@cerc.wes.army.mil
- IHA/IHEI/UNEP/UNEP-IE. 1995. Environmental Action Pack for Hotels: Practical Steps To Benefit Your Business and the Environment. International Hotels Environment Initiative, London, England. Also presented as UNEP Industry and Environment Technical Report No. 31.
- Intergovernmental Oceanographic Commission. 1976a. Collected Contributions of Invited Lecturers and Authors to the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions. Port-of-Spain, Trinidad and Tobago (13-17 December 1976). Workshop Report No. I - Supplement.
- Intergovernmental Oceanographic Commission. 1976b. Report of the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions. Port-of-Spain, Trinidad (13-17 December 1976). Workshop Report No. 1.
- Intergovernmental Oceanographic Commission. 1989. IOC-UNEP Regional Workshop To Review, Priorities for Marine Pollution Monitoring, Research, Control and Abatement in the Wider Caribbean. San Jose, Costa Rica (24-30 August 1989). Workshop Report No. 59.
- Intergovernmental Oceanographic Commission. 1992. IOC Sub-Commission for the Caribbean and Adjacent Regions. Summary Report, Fourth Session, Veracruz, Mexico (2-7 December 1992).
- Intergovernmental Oceanographic Commission. 1993a. IOC Seminar on Integrated Coastal Management. New Orleans, Louisiana, USA (17-18 July 1993). Workshop Report No. 90.
- Intergovernmental Oceanographic Commission. 1993b. IOC Workshop on Small Island Oceanography In Relation To Sustainable Economic Development and Coastal Area Management of Small Island Developing States. Fort-de-France, Martinique (8-10 November 1993). Workshop Report No. 97.
- Intergovernmental Oceanographic Commission. 1993c. IODE (International Oceanographic Data and Information Exchange) Group of Experts on Marine Information Management. Summary Report, Fourth Session, Washington DC (6-9 October 1993).
- Intergovernmental Oceanographic Commission. 1994. IOC Workshop on Geographic Information Systems Applications in the Coastal Zone Management of Small Island Developing States. Barbados (20-22 April 1994). Workshop Report No. 103.

- Intergovernmental Oceanographic Commission, Sub-commission for the Caribbean and Adjacent Regions (IOCARIBE). 1991. *Global Change and Coastal Land Loss: Management and Decision-making in Support of Sustainable Development Within the Caribbean and Adjacent Regions*. A Program Proposal. IOCARIBE, Cartagena, Colombia.
- Intergovernmental Oceanographic Commission and United Nations Environment Programme. 1991. *Report on the CEPPOL Seminar on Monitoring and Control of Sanitary Quality of Bathing and Shellfish-Growing Marine Waters in the Wider Caribbean*. Kingston, Jamaica (8-12 April 1991). CEP Technical Report No. 9. UNEP Caribbean Environment Programme, Kingston, Jamaica.
- International Chamber of Commerce. 1988. *ICC Position Paper on Environmental Auditing*. UNEP Industry and Environment, Vol. II, No. 4, pp. 14-17.
- International Coral Reef Initiative (ICRI). 1996. *Report of ICRI to the United Nations Commission on Sustainable Development*. ICRI, Washington.
- ICRI. 1995a. *Partnership Building and Framework Development: Report of ICRI Workshop*. Silliman University, The Philippines (29 May - 2 June 1995).
- ICRI. 1995b. *State of the Reefs-ICR's Major Concern*. Silliman University, The Philippines (29 May - 2 June 1995).
- Jackson, I. 1988. *Integration of Tourism and Environment Through Resource Planning and Management*, Edwards, F. (Ed.), *Environmentally Sound Tourism in the Caribbean*. Prepared by the Banff Centre School of Management. University of Calgary Press Calgary, Alberta, Canada.
- Jackson, I. 1990a. *Links Between Tourism, Agriculture and the Environment*. The Courier, No.122, pp. 66-67.
- Jackson, I. 1990b. *Tourism and Sustainable Development in the Caribbean*, Cox, J. and C. Embree (Eds.), *Sustainable Development in the Caribbean. A Report on the Conference on Public Policy Implications of Sustainable Development in the Caribbean Region*, Kingston, Jamaica (28-30 May 1990). The Institute for Research on Public Policy, Halifax, Nova Scotia, Canada. pp. 127-138.
- Jackson, I. 1990c. *Environmental Problems Related to Urbanization in the Caribbean*. Paper Prepared for Conference on Urban Management: Understanding the Economic and Environmental Linkages. Bridgetown, Barbados (5-7 September 1990).
- Jackson, I. 1996. *Carrying Capacity for Tourism in Small Tropical Caribbean* UNEP Industry and Environment, Vol. 7, No. 1, pp. 7-10.
- Jernelov, A. and U. Marinov. 1990. *An Approach to Environmental Impact Assessment for Projects Affecting the Marine Environment*. United Nations Environment Programme, Regional Seas Reports and Studies, No. 122.
- Jones, B. and T. Tea. 1995. *Australia's National Ecotourism Strategy*, UNEP Industry and

- Environment, Vol. 18, No. 1, pp. 56-57.
- Jules, D. 1993. Assessment of Environmental Training Needs in the OECS and ENCORE Training Strategy. Prepared for the Organisation of Eastern Caribbean States, Natural Resources Management Unit, Castries, St. Lucia.
- Kelleher, G. and R. Kenchington. 1992. Guidelines for Establishing Marine Protected Areas. A Marine Conservation and Development Report. IUCN, Gland, Switzerland.
- Ketchum, B. (Ed.) 1972. The Water's Edge: Critical Problems of the Coastal Zone. The MIT Press, Cambridge, Massachusetts, U.S.A.
- Kingsley, T. 1990. Urbanization in the Caribbean: Prospects and Management Priorities. Prepared by The Urban Institute for U.S. Agency for International Development, Regional Housing and Urban Development Office for the Caribbean, Kingston, Jamaica.
- Lawrence, W. 1991. Financing Ecotourism Development. Presented by the Deputy Director, Infrastructure Division, Caribbean Development Bank, to the Ecotourism Conference, Belize (9-12 July 1991).
- Lestrade, S. 1987. Economic Issues Affecting the Development of Small Island States: The Case of the Caribbean. The Courier No. 104, pp. 78-84.
- Lewsey, C. 1990. Reassessing Policy Alternatives for Sustainable Development in Coastal Areas: Implications for the CARICOM Caribbean. Paper presented at Conference on Public Policy Implications of Sustainable Development in the Caribbean, Kingston, Jamaica (28-30 May 1990). Sponsored by the Government of Jamaica and the Institute for Research on Public Policy, Ottawa, Canada.
- Lewsey, C. 1991. Evaluating the Efficacy of CZM in the Eastern Caribbean, Cambers, Gillian, (Ed.) Coastlines of the Caribbean. Papers presented at Coastal Zone '91. Published by the American Society of Civil Engineers. New York, New York.
- Lindberg, K. 1991. Policies for Maximizing Nature Tourism's Ecological and Economic Benefits. International Conservation Financing Project Working Paper. World Resources Institute, Washington, D.C.
- Lorah, P. 1996 (in press). An Unsustainable Path: Tourism's Vulnerability to Environmental Decline in Antigua. Caribbean Geography.
- Maul, G. 1993. Ecosystem and Socioeconomic Response to Future Climatic Conditions in the Marine and Coastal Regions of the Caribbean Sea, Gulf of Mexico, Bahamas and the Northeast Coast of South America. Caribbean Programme (CEP) Technical Report No. 22. UNEP/CEP, Kingston, Jamaica.
- McEachern, J. and E. Towle. 1974. Ecological Guidelines for Island Development. IUCN, Gland, Switzerland.
- McElroy, J. 1991. The Stages of Tourist Development In Small Caribbean and Pacific Islands.

Paper prepared for International Symposium on the Island Economies: Policy Models for Planning Development, Lesbos, Greece (17-20 November 1991).

- McElroy, J. and K. Albuquerque. 1994. Island Tourist Profiles across the Destination Life Cycle, INSULA: International Journal of Island Affairs, Year 3, Number 1.
- McElroy, J. and A. Dioguardi. 1991. The Tourist Destination Life-Cycle Model: An Application to Small Caribbean and Pacific Islands. Paper prepared for the Annual Meeting of the Midwest Association for Latin American Studies, University of Northern Iowa (11-12 October 1991).
- McRae, G. and H. Shaner. 1996. Guidebook for Hospital Waste Reduction Planning and Program Implementation. American Society for Healthcare Environmental Service, Chicago, Illinois.
- Miller, M. and J. Auyong. 1990. Proceedings of the 1990 Congress on Coastal and Marine Tourism. National Coastal Resource Research and Development Institute. Newport, OR, 1991.
- Moser, M. and M. Arnold. 1993. The Greening of Business Schools, UNEP Industry and Environment, Vol. 16, No. 4, pp. 17-21.
- Murray, J. 1993. Community Economic Development Strategies for Small, Coastal Communities Manual. National Coastal Research Institute, Portland, Oregon, U.S.A.
- Natural Resources Conservation Authority. 1996. Jamaica, State of the 1995-96 Environment. Kingston.
- Natural Resources Defense Council, Inc. 1976. Who's Minding the Shore? A Citizens Guide to Coastal Management. Prepared for U.S. Department of Commerce, NOAA, OCZM, Washington, D.C.
- North Carolina Sea Grant. 1995-1996. Marine Debris WORLDWIDE, Faris, Jeannie, Managing Editor, Raleigh, 1996, Volumes 1 & 2.
- Nurse, L. 1990. The Deterioration of Caribbean Coastal Zones: A Recurring Issue in Regional Development, Cox, J. and C. Embree, (Eds.) Sustainable Development in the Caribbean. A Report on the Public Policy Implications of Sustainable Development in the Caribbean Region. Conference, Kingston, Jamaica (28-30 May 1990). Institute for Research on Public Policy, Halifax, Nova Scotia, Canada.
- Organization of American States. 1979. Tourism and Environment in the Wider Caribbean Area: An Overview: Contribution to joint UNEP ECLA Caribbean Environment Project (FP-1000-77-01). Prepared for Meeting of Government Nominated Experts to Review, the Draft Action Plan for the Wider Caribbean Region, Caracas, Venezuela (28 January - February 1980).
- Organization of American States. 1984. Enhancing the Positive Impact of Tourism on the Built and Natural Environment. Vol. 5 of Reference Guidelines for Enhancing the Positive Socio-cultural and Environmental Impacts of Tourism. Washington, D.C.
- Organization of American States. 1985a. Final Report on OAS Regional Work Improving

- Tourism-related Facilities in Downtown and Harbour-front Areas. St. Johns, Antigua and Barbuda (16-20 September 1985). Department of Regional Development, Washington D.C.
- Organization of American States. 1987a. Final Report of OAS Regional Workshop: The Optimum Size and Nature of New Hotel Development in the Caribbean, St. George's Grenada (15-16 July 1987). Department of Regional Development, Washington, D.C.
- Organization of American States. 1987b. Natural Tourism Attractions: Their Presentation and Development. Topic II.C.2. of the Agenda for the XV Inter-American Travel Congress, Kingston, Jamaica (22-24 July 1987). OEA Ser. K.III.16.1. (TURISMO 987, 12 June 1987).
- Organization of American States. 1987c. Optimum Size and Nature of New Hotel Development in the Caribbean. Department of Regional Development, Washington, D.C.
- Organization of American States. 1993. Compendium of Recent Studies on Tourism Development. Department of Regional Development and Environment, Washington, D.C.
- Organization of American States And Caribbean Tourism Research And Development Centre. 1988. Caribbean Cruise Ship Study, Volumes I through IV, Department of Regional Development Washington, D.C.
- Organization of American States and U.S. Department of the Interior. 1988. Inventory of Caribbean Marine and Coastal Protected Areas. OAS, Department of Regional Development, and U.S. Department of the Interior, National Park Service, Office of International Affairs, Washington, D.C.
- Pacific Asia Travel Association. 1992. Endemic Tourism: A Profitable Industry in a Sustainable Environment. PATA, New South Wales, Australia.
- Pan-American Health Organization/World Health Organization. 1992. Consultative Meeting on Excreta and Wastewater Disposal in Latin America and the Caribbean, PAHO Environmental Health Program, Washington, D.C.
- Pan-American Health Organization/World Health Organization. 1994. Proceedings of the Regional Conference on Environmental Health and Sustainable Tourism Development in the Caribbean, Nassau, November 1993. PAHO Division of Health and Environment, Washington D.C.
- Patullo, P. 1996. Last Resorts: The Costs of Tourism in the Caribbean. Latin American Bureau, Ltd. London.
- Pearce, D.G. and R. M. Kirk. 1980. Carrying Capacities for Coastal Tourism, UNEP Industry and Environment, Vol. 7, No. 1, pp. 3-7.
- Pemetta, J. and D. Elder. 1993. Cross-sectoral, Integrated Coastal Area Planning (CICAP): Guidelines and Principles for Coastal Area Development. IUCN, Marine and Coastal Areas Programme, Gland, Switzerland.

- Perez-Trejo, F. 1995. Integrated Coastal Planning An Evolutionary Perspective. Prepared for the Seminar/Workshop on Integrated Planning and Management in the Greater Caribbean. Kingston, Jamaica (28-30 June 1995).
- Pizam, A. and A. Milman. 1984. The Social Impacts of Tourism, UNEP Industry, and Environment, Vol. 7, No. 1, pp. 11 - 14.
- Poon, A. and R. Poon. 1994. Eco-tourism Opportunity in the Caribbean. University of the West Indies Centre for Environment and Development, Mona, Jamaica.
- Potter, B., D. Brower, and E. Towle. 1995. Draft Hazard Mitigation Plan for the U.S. Virgin Islands. Virgin Island Territorial Emergency Management Agency, St. Thomas.
- Price, J. 1991. Coastal Tourism: A Physical and Metaphysical Perspective, Miller, M. and J. Auyong (Eds.), Proceedings of the 1990 Congress on Coastal and Marine Tourism: NCRI-T-91-010. National Coastal Resources Research and Development Institute, Newport, Oregon, U.S.A.
- Price, A. and S. Humphrey, (Eds.). 1993. Application of the Biosphere Reserve Concept to Coastal Marine Areas. Papers presented at the UNESCO/IUCN Workshop, San Francisco (14- 20 August 1989). A Marine Conservation and Development Report of IUCN, Gland, Switzerland.
- Rainey, W. 1987. A Pesticide Impact Assessment For The Dominica (West Indies) Banana Industry Rehabilitation Project. Island Resources Foundation, St. Thomas.
- Ramsay, J. 1989. Jamaica Environmental Strategy: A Review of Opportunities for Canadian Assistance in Environmental Management. Study prepared for the Canadian International Development Agency.
- Richards, W. and J. Bohnsack. 1990. The Caribbean Sea: A Large Marine Ecosystem in Crisis, K. Sherman, L. Alexander and B. Gold (Eds.). Large Marine Ecosystems: Patterns, Processes and Yields. American Association for the Advancement of Science, Washington D.C.
- Rogers, C. 1990. Responses of Coral Reefs and Reef Organisms to Sedimentation', Marine Ecology Progress Series, 62:185-202.
- Rogers, C. 1991. Balancing Adverse Effects of Marine-based Tourism Resource Protection in the Virgin Islands National Park, St. John, U.S. Virgin Islands. In: Proceedings of the Regional Symposium on Public and Private Cooperation in National Park Development, Tortola, British Virgin Islands (23-25 August 1991). British Virgin Islands National Parks Trust, Tortola, B.V.I.
- Rogers, C. 1994. Coral Reef Monitoring Manual for the Caribbean and Western Atlantic. Virgin Islands National Park, St. John, U.S. Virgin Islands.
- Rogers, C, L. McLain, and C. Tobias. 1990. Damage to Marine Resources in Virgin Island National Park: Often Out of Sight, But No Longer Out of Mind, Miller, M. and J. Auyong, (Eds.). Proceedings of the 1990 Congress on Coastal and Marine Tourism. A Symposium and

Workshop on Balancing Conservation and Economic Development, Honolulu, Hawaii (25 - 31 May 1990).

- Romefil, M. 1984. Coastal Tourism - The Experience of Great Britain, UNEP Industry and Environment, Vol. 7, No. 1, pp. 4-7.
- Rousseau, M. 1988. France's Experience with Self-monitoring to Combat Industrial Pollution, UNEP Industry and Environment. Vol. 11, No. 4, pp. 22-25.
- Salm, R. 1984. Ecological Boundaries for Coral Reef Reserves: Principles and Guidelines, Environmental Conservation, 11(3): 209-215.
- Salm, R. 1986. Coral Reefs and Tourist carrying Capacity: The Indian Ocean Experience, UNEP Industry and Environment, Vol.9, No. 1, pp. 11-14.
- Salvat, B. (Ed.). 1987. Human Impacts on Coral Reefs: Facts and Recommendations. Antenne Museum E.P.H.E., French Polynesia.
- Sammy, G. 1995. Industrial Wastewater Management in the Caribbean Region, UNEP Industry and Environment, Vol. 18, No. 2-3, pp. 88-92.
- Sarasota Bay National Estuary Program. 1993. Comprehensive Cooperative Management Plan For Sarasota Bay, Sarasota.
- Schanzenbacher, B. 1995. Economic Incentives as Policy Instruments for Environmental Management and Sustainable Development. United Nations Environment Programme, Environment and Economics Unit, Nairobi, Kenya.
- Seward, S. and B. Spinard (Eds.). 1982. Tourism in the Caribbean: The Economic Impact. International Development Research Centre, Ottawa, Canada.
- Sheinkopf, K.(Ed.). 1989. Building for the Caribbean Basin and Latin America: Energy-efficient Building Strategies for Hot, Humid Climates. Solar Energy Industries Association, Arlington, Virginia, U.S.A.
- Simmons and Associates. 1994. The Impact of Tourism on the Marine Environment of the Caribbean, with Special Reference to Cruise and other Types of Marine-based Tourism. Prepared for Caribbean Tourism Organization, Barbados.
- Skinner, J., L. Spencer and K. Helgason. 1995. Survey of Information Systems Related to Environmentally Sound Technologies, UNEP Industry Environment, Vol. 18, No. 2-3, pp. 83-87.
- Snedaker, S. and C. Getter. 1985. Coastal Resources Management Guidelines. Renewable Resources Information Series, Coastal Management Publication No. 2. Prepared for U.S. National Park Service and U.S. Agency for International Development by Research Planning, Institute, Inc., Columbia, South Carolina, U.S.A.
- Sorensen, J. 1993. The International Proliferation of Integrated Coastal Zone Management Efforts, Ocean and Coastal Management. Elsevier Science Publishers, Ltd., England.

- Stankey, G. 1990. Conservation, Recreation and Tourism in Marine Settings: The Good, The Bad and the Ugly?, Miller, M. and J. Auyong (Eds.), Proceedings of the 1990 Congress on Coastal and Marine Tourism. NCRI-T-910 1 0. National Coastal Resources Research and Development Institute, Newport, Oregon, U.S.A.
- Stans, J. 1995. Development of ISO Standards for Environmental Auditing, UNEP Industry and Environment, Vol. 18, No. 2-3, pp. 24-27.
- Stockley, M. 1984. Tourism and Conservation: Compatible Ideas?, *Nexus*, Volume 6, Number 3, Summer, 1994. Atlantic Center for the Environment, a Division of the Quebec-Labrador Foundation, Montreal, 1984.
- Tetra Tech, Inc. 1991. Draft Report Characterizing Use Impairments of the U.S. Virgin Islands and Puerto Pico. Prepared for U.S. Environmental Protection Agency, Region 11, Marine and Wetlands Protection Branch, New York, N.Y.
- Thomas, P. 1990. Coastal and Marine Tourism: A Conservation Perspective, Miller, M. and J. Auyong, Proceedings of the 1990 Congress on Coastal and Marine Tourism. NCRI-91-010. National Coastal Resources Research and Development Institute, Newport, Oregon, U.S.A.
- Tibor, T. with Ira Feldman. 1996. ISO 14000: A Guide to the New Environmental Management Standards. Irwin Professional Publishing, Chicago and London.
- Towle, E., J. Towle, and R. Teytaud. 1991. Grenada Environmental Profile. Prepared by Island Resources Foundation for Caribbean Conservation Association and USAID. Island Resources, Foundation, St. Thomas, U.S. Virgin Islands.
- Towle, E. 1985. The Island Microcosm. Island Resources, Foundation, St. Thomas, U.S. Virgin Islands.
- Towle, E. et al. 1985. Tourism and the Environment: A Case Study of Frigate Bay, St. Kitts. Prepared by Island Resources Foundation for ECLAC/UNEP Tourism and the Environment in the Wider Caribbean Project. Island Resources, Foundation, St. Thomas, U.S. Virgin Islands.
- Trigano, G. 1984. Tourism and the Environment: The Club Méditerranée Experience, in UNEP Industry, and Environment. Vol. 7, No. 1, pp. 20-21.
- United Nations Commission on Sustainable Development. 1996(a). Coastal Area Management in Small Island Developing States. Addendum to the Report of the Secretary General on Progress in the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Commission on Sustainable Development, Fourth Session (18 April - 3 May 1996).
- United Nations Commission on Sustainable Development. 1996(b). Institutional Arrangements for the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities. Protection of the Atmosphere and Protection of the

Oceans and All Kinds of Seas. Commission on Sustainable Development, Fourth Session (18 April - 3 May 1996), Agenda Item 6 (a).

United Nations Commission on Sustainable Development. 1996(c). Review of the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Progress in the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Commission on Sustainable Development, Fourth Session (18 April - 3 May 1996), Agenda Item 7.

United Nations Commission on Sustainable Development. 1996(d). Sustainable Development of Coastal Areas, Tourism, Energy Resources, Air Transport, Maritime Transport, Telecommunications, and Management of Natural and Environmental Disasters in Small Island Developing States. Report of the Secretary General on Progress in the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Commission on Sustainable Development, Fourth Session (18 April - 3 May 1996).

United Nations Commission on Sustainable Development. 1996(e). Sustainable Tourism Development In Small Island Developing States. Addendum to Report of the Secretary General on Progress in the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Commission on Sustainable Development, Fourth Session (19 April - 3 March 1996).

United Nations Commission on Sustainable Development. 1996(f). Supplementary Statistics on Tourism in Small Island Developing States. Addendum to the Report of the Secretary General on Progress in the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Commission on Sustainable Development, Fourth Session (18 April - 3 May 1996).

United Nations Department for Development Support and Management Services. 1993. Integrated Macroeconomic Development Planning and Management for Sustainable Development: Guidelines for Island Developing Countries. New York, New York.

UNEP. 1989. Regional Overview of Environmental Problems and Priorities Affecting the Coastal and Marine Resources of the Wider Caribbean CEP Technical Report No. 2. UNEP Caribbean Environment Programme, Kingston, Jamaica.

UNEP. 1990. An Approach to Environmental Impact Assessment for Projects Affecting the Coastal and Marine Environment. (Section 4.2: General Guidelines for Preparation of An Environmental Impact Assessment Document for A Tourist Complex.) UNEP Regional Seas Reports and Studies No. 122.

UNEP. 1992a. Draft Report of the Meeting of Experts on Land-based Sources of Pollution, Veracruz, Mexico (6 - 10 July 1992). UNEP (OCA)/CAR WG.9/CRII.

UNEP. 1992b. Marine Pollution from Land-based Sources: Facts and Figures, UNEP Industry and Environment, Vol. 15, No. 1-2, pp. 3-6.

UNEP. 1992c. Meeting of Experts on Integrated Planning and Institutional Development for the

Tourism: Impacts and Best Practices...

- Management of Marine and Coastal Resources in the Wider Caribbean Region. Report of the Meeting, Kingston, Jamaica (19 - 21 May 1992). UNEP (OCA)/CAR WG.7/1.
- UNEP. 1992d. Preliminary Consolidated Regional Overview on Land-based Sources of Pollution. Prepared for Meeting of Experts on Land-based Sources of Pollution, Veracruz, Mexico (6 - 10 July 1992). UNEP (OCA)/CAR WG.9/3.
- UNEP. 1994a. Ecotourism in the Wider Caribbean Region: An Assessment. CEP Technical Report No. 31. UNEP Caribbean Environment Programme, Kingston, Jamaica.
- UNEP. 1994b. Draft Recommendations On A Pollution Prevention, Reduction and Control Strategy for LBSMP in the Wider Caribbean Region. Second Meeting of Experts on Land-based Sources of Pollution in the Wider Caribbean Region, San Juan, Puerto Rico (21 - 25 March 1994).
- UNEP. 1994c. Regional Overview of Land-based Sources of Pollution in the Wider Caribbean Region. UNEP CEP Technical Report No. 33.
- UNEP. 1995. Framework Action Programme on Environment and Economics. Environment and Economics Unit, Environment and Economics Programme.
- UNEP. 1996a. Guidelines for Sediment Control Practices in the Insular Caribbean. CEP Technical Report No. 32. Prepared by Island Resources Foundation for (UNEP Caribbean Environment Programme, Kingston, Jamaica.
- UNEP. 1996b. Guidelines for Integrated Planning and Management of Coastal and Marine Areas in the Wider Caribbean Region. Prepared in cooperation with Island Resources Foundation UNEP Caribbean Environment Programme, Kingston.
- UNEP and Advisory Committee on Protection of the Sea, 1995. Mexico City, Recommendations on Sustainable Development of Tourism in the Wider Caribbean. Mexico City (18 - 20 April 1995). Organised by ACOPS and UNEP's Regional Office for Latin America and the Caribbean.
- UNEP/ECLAC. 1994. The State of Marine Pollution in the Wider Caribbean Region. UNEP Regional Seas Reports and Studies No. 36.
- UNEP and Intergovernmental Oceanographic Commission. 1992. Environmental Quality Criteria for Coastal Zones in the Wider Caribbean Region: A Compilation. CEP Technical Report No. 14. UNEP(OCA)/CAR WG.9/3.
- UNEP International Chamber of Commerce, and International Federation of Consulting Engineers. Environmental Management Systems Training Resource Kit. Distributed by SMI Limited, Hertfordshire, England.
- UNEP, World Tourism Organization, and Foundation for Environmental Education in Europe. 1996a. Awards for improving the Coastal Environment: The Blue Flag. Prepared by UNEP, Industry and Environment, Paris, France; World Tourism Organisation, Madrid, Spain and Foundation for Environmental Education In Europe, Copenhagen, Denmark.

- UNEP, World Tourism Organization, Foundation for Environmental Education in Europe (forthcoming). Awards for Improving the Coastal Environment: The Example of the Blue Flag FEEE, Denmark.
- UNEP and Research for Man and Environment. 1994. An Overview of Environmental Indicators: State of the Art and Perspectives. UNEP/EATR 94-OI; RIVM/402001001. UNEP Environmental Assessment Sub-Programme, Nairobi, Kenya.
- USAID and Center for International Development and Environment. 1993. Green Guidance for Latin America and the Caribbean. Bureau for Latin America and the Caribbean, USAID and Center for International Development and Environment, World Resources Institute, Washington, D.C.
- United States Coast Guard. 1994a. Guidelines for Ship Operators on Developing Waste Management Plans. U.S. Coast Guard, Marine Environmental Protection Division, Environmental Coordination Branch, Washington, D.C.
- United States Coast Guard. 1994b. Managing Oily Waste and Garbage From Ships: A Guide to Waste Management Practices for Shipping Agents, Waste Haulers, Shipping Companies, and Port and Terminal Operators. U.S. Coast Guard, Marine Environmental Protection Division, Environmental Coordination Branch, Washington, D.C.
- United States Coast Guard. 1991. Designation of the Wider Caribbean As A Special Area Under Annex V of MARPOL 73/78: A Status Report. Prepared by Environmental Coordination Branch, Marine Environmental Protection Division, U.S. Coast Guard.
- United States Congress, Office of Technology Assessment. 1992. Science and Technology Issues in Coastal Ecotourism – Background paper. OTA-BP-F-86. Washington, D.C.
- United States Department of Commerce. 1980. Improving Your Waterfront: A Practical Guide. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management, Washington, D.C.
- United States Department of Commerce. 1993. Tourism in the Caribbean. U.S. Department of Commerce, US Travel and Tourism Administration, Office of Policy and Planning, Washington, D.C.
- United States Department of the Interior. 1993. Guiding Principles of Sustainable Design. U.S. Department of the Interior, National Park Service, Denver Service Center.
- United States Department of State. 1989. Land-based Sources of Marine Pollution in the Wider Caribbean Region. Report on Workshop in San Juan, Puerto Rico (7-9 August 1989). U.S. Man and the Biosphere Program, OES/EGC/MAB, Department of State, Washington, D.C.
- United States Department of Transportation. 1995. Report on Port and Shipping Safety and Environmental Protection. Quarterly Report Number 37 (October 1995). U.S. Department of Transportation, Maritime Administration.

- United States Environmental Protection Agency. 1992. Monitoring Guidance for the National Estuary Program: Final. EPA 842-B-92-004 (September 1992). Office of Water, Office of Wetlands, Oceans, and Watersheds, Oceans and Coastal Protection Division, Washington, D.C.
- United States Environmental Protection Agency. 1993. Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters. EPA 840-B-92-002. Office of Water, Washington, D.C.
- United States Environmental Protection Agency. 1995. Economic Benefits of Runoff Controls. EPA 841-S-95-002. Office of Wetlands, Oceans and Watersheds, Washington, D.C.
- United States Virgin Islands Department of Commerce, Bureau of Economic Research. 1996. U.S. Virgin Islands Annual Economic Indicators, St. Thomas, U.S. Virgin Islands.
- United States Virgin Islands Government. 1996. Virgin Islands Coastal Non-point Pollution Control Program. Department of Planning and Natural Resources, Coastal Zone Management Program, St. Thomas, U.S. Virgin Islands.
- United States Virgin Islands Government. 1995. Environmental Protection Handbook: A Guide To Assist in the Implementation of Environmental Protection Laws of the United States Virgin Islands. Original Document by the Virgin Islands Conservation District (1976). Revised Edition (1995) by Virgin Islands Non-point Source Pollution Control Committee.
- United States Virgin Islands Government. 1984-85. Handbook for Home Builders and Developers. Virgin Islands Coastal Zone Management Program, St. Thomas, U.S. Virgin Islands.
- Vallejo, S. 1993. The Integration of Coastal Zone Management into National Development Planning, *Ocean and Coastal Management*, 21(1993):163-182. Elsevier Science Publishers Ltd., England.
- van der Pol, T. 1991. The Future of the Cruise Ship Industry: Opportunities and Constraints. Occasional Paper No. 9. Marine Affairs, Program, Dalhousie University, Nova Scotia, Canada.
- Vlugman, A. 1993. Wastewater Management At Hotels and Resorts in the Caribbean. Report from Regional Conference on Environmental Health and Sustainable Tourism Development, Nassau, Bahamas (8 - 11 November 1993).
- Wall Street Journal. 1996. Travel: Hawaii's Allure for Tourists Has Faded, And Some Say State has Itself to Blame. Page B 1, 7 June 1996.
- Washington Post. 1996. Divers, Cruise Ships Battle Over Cozumel's Coral Reef. Page 1, 25 May 1996. and The Battle to Protect Paradise Reef, Letters to the Editor, Page A 18, 10 June 1996.
- Wells, S. 1988. Coral Reefs of the World. Volume 1: Atlantic and Eastern Pacific. IUCN Conservation Monitoring Centre, Cambridge, United Kingdom.

- Wilkinson, P. 1990. Carrying Capacity in Tourism Planning: Is the Question How Many is Too Many? Either Appropriate or Heuristic. Report from Conference on Tourism and Socio-Cultural Change in the Caribbean, Caribbean Tourism Organisation, Trinidad and Tobago (25-28 June 1990).
- Woodley, J. 1995. Tropical Americas Regional Report on the Issues and Activities Associated with Coral Reefs and Related Ecosystems. Prepared for 1995 International Coral Reef Initiative Workshop, The Philippines (May 1995), in cooperation UNEP's Caribbean Environment Programme, Regional Co-ordinating Unit, and CARICOMP. Kingston, Jamaica.
- World Bank. 1972. Tourism Sector Working Paper, Washington, D.C.
- World Bank. 1991. Environmental Assessment Sourcebook. Volume 11: Sectoral Guidelines. Environment Department, Washington, D.C.
- World Bank. 1992. Coastal Zone Management: Case Studies from the Caribbean. Latin America and the Caribbean Technical Department, Regional Studies Program, Washington, D.C.
- World Health Organization. 1994. Public Health and Coastal Tourism (Sea, Tourism and Health) Report from a WHO Symposium, Rimini, Italy (26-28 May 1994). WHO /EOS/94.39.
- World Tourism Organization. 1984. Tourist Carrying Capacity in UNEP Industry and Environment, Vol. 7, No. 1, pp. 30-36.
- World Travel & Tourism Council/World Tourism Organization/Earth Council. 1995. Agenda 21 for The Travel & Tourism Industry: Towards Environmentally Sustainable Development. London, U.K.
- World Tourism Organization and World Meteorological Organization. 1996. Handbook on Natural Disaster Reduction in Tourist Areas. Forthcoming in 1996.

APPENDIX 2

**Publications Aimed at Improving Environmental Performance in the
Travel and Tourism Industry**

- Australian Tourism Industry Association. 1990. Environmental Guidelines for Tourism Developments. Canberra, Australia.
- Caribbean Hotel Association. 1995. Environmental Management Tool Kit for Caribbean Hotels. San Juan, Puerto Rico.
- Ecotourism Society. 1994. Ecotourism Guidelines for Nature Tour Operators. Bennington, U.S.A.
- European Golf Association Ecology Unit. 1995. An Environmental Strategy for Golf in Europe. U.K.
- Federation of Nature and National Parks in Europe. 1993. Loving them to Death? Sustainable Tourism in Europe's Nature and National Parks. Grafenau, Germany.
- GREEN GLOBE. 1994. Developing and Effective Environmental Policy. London, U.K.
- GREEN GLOBE. 1994. Environmental Management for Your Business: An Introductory Guide. London, U.K.
- GREEN GLOBE. 1994. Managing Energy (Available for the following sectors: Hotels, Office Facilities, Restaurants and Catering Facilities, Tour Operators and Travel Agents, Transport, Visitor Attractions). London, U.K.

- GREEN GLOBE. 1994. Marketing and Communicating Environmental Quality: An Introductory Guide. London, U.K.
- GREEN GLOBE. 1994. The Environment and Your Business: Taking the GREEN GLOBE Path. London, U.K.
- GREEN GLOBE. 1994. Understanding the Potential Environmental Impacts of Your Business. London, U.K.
- GREEN GLOBE. 1994. Waste Minimization (available for the following sectors: Hotels, Office Facilities, Restaurants and Catering Facilities, Tour Operators and Travel Agents, Transport, Visitor Attractions). London, U.K.
- GREEN GLOBE. 1994. Water Management (available for the following sectors: Hotels, Office Facilities, Restaurants and Catering Facilities, Tour Operators and Travel Agents, Transport, Visitor Attractions). London, U.K.
- GREEN GLOBE. 1994. Your Employees and the Environment. London, U.K.
- GREEN GLOBE. 1995. Company Transport and the Environment. London, U.K.
- GREEN GLOBE. 1995. Environmental Communication with Customers. London, U.K.
- GREEN GLOBE. 1995. Environmentally Responsible Purchasing. London, U.K.
- GREEN GLOBE. 1995. Visitors and the Environment. London, U.K.
- Hotel and Restaurant Council of Finland. 1991. Environmentally Friendly Hotel and Restaurant Business.
- International Hotels Environment Initiative. 1994. Green Innovations: Worldwide Directory of Environmental Resources for Hotels. London, U.K.
- International Hotels Environment Initiative. 1993. Environmental Management for Hotels: the Industry Guide to Best Practice. London, U.K.
- International Hotels Environment Initiative. Green Hotelier (Quarterly Magazine).
- International Hotels Environment Initiative. Going Green Makes Cent\$: Environmental Management in Hotels. A 20-minute video.
- International Hotels Environment Initiative. Striving for Excellence: Communicating Environmental Quality in the Hotel industry.
- International Hotels Environment Initiative. Environmental Management in Hotels: A Students Handbook.

- IHEI/UNEP/IHA. 1995. Environmental Action Pack for Hotels: Practical Steps to Benefit Your Business and the Environment. London, U.K.
- International Hotel & Restaurant Association and UNEP. 1995. Environmental Good Practice in *Hotels: Case Studies from the International Hotel & Restaurant Association Environmental Award. Paris, France.*
- Troyer, W. 1992. The Green Partnership Guide: 12 Steps to Help Create an Environmentally *Friendly Setting for Our Guests, Ourselves, and Our Future. Canadian Pacific Hotels and Resorts.*
- UNEP. 1995. Environmental Codes of Conduct for Tourism. UNEP/IE, Technical Report No. 29.
- World Tourism Organization. 1991. Integrated Tourist Resorts. Madrid, Spain.
- World Tourism Organization. 1994. Sustainable Tourism Development: A Guide for Local Planners. Madrid, Spain.
- World Tourism Organization. 1995. Handbook on Natural Disaster Reduction in Tourist Areas. Madrid, Spain.
- World Tourism Organization. 1995. National and Regional Tourism Planning: Methodologies and Case Studies. Routledge, London, U.K.
- WTO and UNEP (IE/PAC). 1995. Guidelines for the Development of National Parks and Protected Areas for Tourism. Madrid, Spain.
- World Travel & Tourism Council/World Tourism Organization/Earth Council. 1995. Agenda 21 for The Travel & Tourism Industry: Towards Environmentally Sustainable Development. London, U.K.

APPENDIX 3

Selected Case Studies Highlighting Environmental Best Management Practices

Case 1: Hotel Inter-Continental Miami, USA

*Case 2:
Half Moon
Golf, Tennis and
Beach Club,
Montego Bay,
Jamaica*

Case 3: Dive Tourism, British Virgin Islands

Case 4: Ecotourism at Maho Bay, US Virgin Islands

Hotel Inter-Continental Miami

Winner of the 1993 IHA Environmental Award

About the Hotel

The Hotel Inter-Continental Miami is a 34-storey property located in the heart of Miami's financial and commercial district. With its 664 rooms, 240 of which are designated as non-smoking rooms, 33 suites, 5 restaurants, and over 61,000ft² of meeting and banqueting space, the hotel caters to business executives, conventions, and leisure travelers.

“Since 1991, the hotel has taken actions that promote the efficient use of natural resources, curb environmental degradation, aid the local community, and result in financial savings.”

Water Conservation

Water Quality Improvements

A VIC dry cleaning machine is used in the laundry department which significantly reduces the amount of the toxin, Perc, that is used and subsequently disposed as hazardous waste. The old system used five (5) drums per month. Drought-resistant plant varieties have been used in the gardens. In 1994, the hotel installed a water-metering device that monitors the quantities consumed by each department, and improves the control of water use.

Reducing Water Consumption

In the bathrooms, water outlets and showers are equipped with aerators. Four-gallon toilets have 1.5-gallon water saver units.

Environmental and Economic Benefits

These measures collectively save the hotel over 400,000 gallons of water per year, which amounts to US\$4,000.

Energy Conservation

Reducing Energy Consumption

Incandescent lights have been replaced with single florescent lamps; and in renovated guestrooms, the wattage has been reduced from 40 to 34 watts. The air conditioning system has been retrofitted to an automatic thermostat system.

Chiller Unit

A new, highly efficient, and CFC-free chiller unit was installed, the first of three slated for implementation. This innovative system operates at about twice the efficiencies afforded standard units.

Energy Efficiency Programme

The Miami Inter-Continental has implemented the Florida Power and Light (the local power company) Energy Efficiency Programme. Monitor sensors have been installed in all meeting rooms, air condition filters are changed once per month instead of every two months, temperatures on corridors and elevators are adjusted, variable frequency drives are fixed on all electric motors, and timers are fitted on all energy equipment.

Environmental and Economic Benefits

Collectively, these actions save an estimated 14 million-kilowatt hours of energy annually; which amounts to US\$98,400.

Waste Management

“Inter-Cycle” is the name of the waste minimization and management programme of the Inter-Continental Miami. Its objectives are to reduce, reuse, and recycle water whenever possible; guarantee appropriate disposal; and ensure regular monitoring through waste management audits and an annual cost/benefit analysis.

Reducing the Generation of Waste

All suppliers are asked to take responsibility for their packaging. Suppliers must take back wooden crates and pallets that were previously left on the hotel loading dock. The hotel reports that “the results are remarkable”.

Purchasing Environmentally Friendly Products and “Closing the Recycling Loop”

The Inter-Continental Miami has adopted a policy to purchase environmentally sensitive products (e.g. items that are recyclable or biodegradable, and are made from recycled materials). Suppliers are asked to provide information on the environmental sensitivity of their products, and to suggest alternatives for toxic and heavy resource consuming items. The above actions aim to “close the recycling loop” and help stimulate the market for recycled products.

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Environmental and Economic Benefits

Over 98% of the hotel's general ledger consist of materials with the highest possible recycled content, minimised toxicity, and reduced packaging. 100%-recycled purchases include stationery and all promotional material, toilet and tissue paper, guest amenity containers, and refillable pencils for guest rooms.

Recycling and Reuse

- Waste collection and recycling programmes have been set up for paper, PET (Polyethylene Tetraphthalate) and HDPE (High Density Polyethylene) plastics, cardboard, glass, batteries, used florescent lamps, motor and kitchen oils, scrap irons, styrofoam, and aluminum
- Edible leftover food is donated to the food bank
- Inedible food is given to livestock farmers for use as animal feed
- Old furniture and decorative ancillaries are donated to local charities
- Old sheeting is reused as laundry bags (to replace plastic bags)
- Old electric appliances are re-sold to suppliers
- Batteries and florescent lamps are recycled
- Reusable containers are used for storing and holding cleaning liquids
- 50-gallon containers are reused as recycling bins and garbage cans
- Photocopying on both sides of the paper
- Non-recyclable waste is compacted in a 30 cubic meter compactor

Environmental and Economic Benefits

Before Inter-Cycle began, the hotel generated 1,420 tons of waste annually, and disposal costs amounted to US\$85,000. Since 1992, with Inter-Cycle "up and running", over 28 items and 60% of the hotel's waste stream are recovered and recycled. Disposal volumes have fallen to 679 tons, and disposal costs are down to US\$79,000 per annum; with garbage collection just once per week instead of every day.

Purchasing Policies

The Hotel encourages cooperation and dialogue with suppliers through its annual Vendors Summit. This serves as a forum to inform suppliers of the hotel's commitment to resource conservation and pollution prevention, as well as to encourage them to apply environmentally sound practices in the production and distribution of their products.

Monitoring

Checklists

Monitoring checklists are used to verify if each item the hotel uses can be better reused or recycled. A record of its waste output is reviewed annually, and new potential items to be recycled are identified.

Cost Benefit Analysis

A regular waste management audit is performed, with assistance from an environmental consultant. This is followed by an annual cost benefit analysis of the entire Inter-Cycle initiative. Both economic and environmental costs are evaluated.

The costs of operating the Inter-Cycle programme (purchase of containers for collection, internal publicity costs, Coordinator's time, etc.) and actual waste disposal fees are calculated and offset against:

- The extra waste disposal charges that would have been due if recycling/reuse initiatives were not in operation
- Revenues from selling recyclables
- Estimated value of the intangible benefits of Inter-Cycle, such as marketing gains and improved employee morale

Improved Noise Comfort

The laundry was formerly located next to the hotel ventilation system's air compressors, and the engineer's shop next to the chiller plant. Due to the excess noise, both work areas have been relocated. Additionally, mechanics and groundkeepers are required to wear earplugs when working with power equipment.

Wider Benefits and Networking

The Inter-Continental Miami is a member of the Florida Department of Transportation's "Keep Florida Beautiful" programme, and has adopted 2 miles of highway, extending from the front of the hotel to Biscayne Boulevard. The hotel also participates in numerous regional and local environmental campaigns; such as Earth Day anniversary festivities, the US Conference of Mayors National Paper Recycling Project, and the Buy Recycled Business Alliance.

Support Measures

Staff

The "Green Team" coordinates the environmental effort. It includes all department heads and a representative from the environmental consulting company. To coordinate the collection of recyclables, the special post of "Captain Inter-Cycle" was created. Additionally, the hotel maintains an environmental coordinator, which is usually a department head or the resident manager.

Special training sessions are held on environmental awareness and incorporating environmental action into daily operational procedure. Much emphasis is given to good housekeeping practices. Training sessions are held in English, Spanish, and Creole. Likewise, Inter-Cycle promotional posters and recycling container labels also appear in these

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languages. An information sheet on the Inter-Cycle programme is included in all job descriptions.

Visitor Communication

The Hotel Inter-Continental Miami displays its environmental policy statement at the front desk. Through an environmental overview, which can be found in the Guest Services Directory and in a message on the in-room television system, guests are asked to leave their newspapers and aluminum cans for collection.



Half Moon Golf, Tennis and Beach Club

About the Hotel

The Half Moon Golf, Tennis and Beach Club, Jamaica's largest resort, is a 480-room hotel, occupying 162 hectares of land, 10 minutes from the centre of Montego Bay. In addition to the 480 rooms, the hotel offers an 18-hole golf course, 8 meeting rooms, and a comprehensive programme of passive and active outdoor activities, including a 6.5 hectare nature reserve. The hotel has won several awards for its environmental programme.

Environmental Education, Training and Awareness

A public awareness campaign informs and alerts employees, suppliers, guests, and the local community about the environment and why it must be protected. Environmental information is presented as:

- A booklet ("Half Moon in Touch with Nature and the Environment")
- Bird/wildlife spotting forms available to guests at the reception and concierge desks
- Laundry and Energy Advisory notices placed in all guest rooms
- News releases attached to the daily newspapers and left on displays for guests
- Press releases in selected mailings, and
- As part of a new web site

The hotel also conducts tours of its environmentally friendly projects, in which ten schools were accommodated in 1996.

Design Features

The colonial style buildings are low rise, and placed amid lush vegetation covering the 162 hectares of the property. In addition to the diversity of flora and fauna that such design ensures, 6.5 hectares of land (covered primarily by mangroves) are maintained as a nature reserve.

Renovations to buildings over the years have incorporated ceilings and windows with cooler boxes to allow cool sea breeze into the rooms.

Landscaping

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In addition to the maintenance of trees and shrubs, a plant nursery is maintained to supply indoor plants to the guestrooms and offices. Produce from a herbal garden is supplied to the kitchen, in order to ensure that such produce is organically grown. Materials used in growing is composted from shredded wood chips, grass cuttings, fruit and vegetable scraps, and soil.

Waste Management

The solid waste programme aims at reducing and recycling waste. The kitchen and housekeeping staff sort the waste to ensure that the correct materials are placed in the correct recycle bins. Non-biodegradable items are compacted prior to disposal off-site.

Recycling and Reuse

An extensive recycling programme was launched in 1994.

- All scrap paper is used as note pads, as well as to send internal memoranda
- Reused paper and old news paper are shredded and sold to packaging companies
- Outdated stationery and old envelopes are used for internal notes and messages
- Old plastic furniture is reconditioned for use in guest rooms
- Scrap materials from the upholstery shop is reused in making stuffed animals, head bands, small knapsacks and bags for the Children's programme, cushions for guest rooms, and in decorating greeting cards
- Linen withdrawn from guest use is reused in making laundry bags and linen bags for room attendants
- Old cotton bedspreads are used to make table cloths, old quilted bedspreads are used to make mittens and pot holders for the villa kitchens, and old soiled towels are used as dusting cloths for housemen and room attendants
- Soap that is partially used by guests is pulverised and used to soak badly soiled linen
- Partially used candles are collected and used to produce large decorative candles which are placed in the guest rooms
- Left over tiles and old parquet flooring are used to make table tops
- Some glass bottles are sold to the West Indies Glass Company, while some are cut and decorated with raffia and shells for use as flower vases
- PET plastic bottles recycled
- Cardboard is sold to a local company for shipping to the USA, where it is used as coat insulation
- Treated effluent from the sewage treatment plant is used to irrigate the golf course and some of the gardens

Composting

Cuttings from trees and gardens, seaweed, and raw fruit and vegetable waste from the kitchen are stored in 30 compost boxes for a period of 90 days, and subsequently used as fertiliser.

Energy Conservation

- Energy advisory notices are posted in all guests rooms
- Staff are instructed to lights off when not in use
- Energy-efficient mini-split air conditioners have been installed in most rooms
- All rooms have separate thermostats to allow for greater control
- Most light bulbs used on the property are low energy florescent bulbs
- Street, walkway, and garden lights are controlled by timers
- Steam from the boiler is used in ironing the linen
- The hotel is in the process of changing from electric to solar water heaters
- A programme of preventative maintenance on air conditioners and water heaters is in place
- Guests are encouraged to participate in a comprehensive programme of outdoor activities

Water Conservation

A number of water saving devises and practices are used to reduce the amount of water used by the property.

- All guests and staff are advised to use water sparingly
- Posted signs (in several languages) in guest rooms ask guests to reduce the number of towels used daily
- Water-saving toilets have been installed
- Water-saving showerheads and low flow valves have been added to many of the plumbing fixtures in public areas, offices, and guestrooms.
- Foot valves have been added to plumbing fixtures in public areas, offices, guestrooms, one bar, and the cafeteria
- Lawns and gardens are watered during the evening to decrease loss by evaporation
- Lawn and tree cuttings are used as mulch on flowerbeds. This serves not only to reduce water loss; but also reduces weed growth, reduces soil erosion, and improves soil texture
- Water from the sewage plant is used to irrigate the golf course and some of the gardens
- A 34 million-liter (9 million gallons) reservoir was constructed on the golf course to hold rainwater. This is used to irrigate the golf course and sections of the Half Moon Royal Villas

Purchasing Policies

The policies are designed to reduce the use of plastics and chemicals, including:

- A ban on the purchase and use of plastic cups and straws
- A ban on the use of chlorine in the laundry

- Purchase of phosphate-free laundry detergents
- Decreased use of chemicals for pool, laundry, kitchen, and housekeeping
- Purchase of only environmentally friendly chemicals

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- A ban on the purchase of aerosol insecticides (insect screens have been installed in most rooms)

Environmental Protection Practices

Operational procedures to prevent pollution or environmental damage have been instituted; including:

- The use of Floatron Solar Powered Water Power enables the reduced use of chemicals
- Reef and beach protection is ensured by banning jet skis and water skiing from the bay
- Boats are tied to sea moorings instead of using anchors
- Diesel shuttle buses have been replaced by electric personnel carriers, thereby eliminating noise pollution and emissions
- Thousands of trees and shrubs have been planted (in weekly plant-a-tree sessions) as a way of preventing soil erosion and creating habitats for the faunal population in the area
- An aviary of 35 birds has been maintained
- Electric deionization has replaced the use of water softeners, thereby reducing water pollution
- Fish have been introduced into the drains and canals for control of insect populations
- An experiment in reef regeneration has been established. This involves the use of solar power to direct low voltage electricity through wire wrapped around the damaged portion of a coral reef, thus encouraging new formations

Monitoring

A monitoring programme has been developed for the environmental programme. The results are assembled in the following reports:

- Daily water consumption report
- Monthly electrical consumption report
- Quarterly chemical usage report
- Sewage plant effluent tested regularly
- Energy audits in collaboration with the local utility company
- Daily fruit and vegetable spoilage report
- Tree planting activity report
- Paper shredding activity report
- Daily recreation and potable water quality reports

Support Measures

Approximately 700 employees are involved in the environmental programme, which is coordinated by the Manager for Special Projects. In addition, guest contact staff discuss the programme with guests. Policy directives dealing with all the facets of the programme have also been developed.

Benefits Achieved

The environmental programme has resulted in several benefits, both environmental and business related.

Environmental benefits include:

- The use of the solar powered water purifier simplifies pool management, provides for consistent water quality, and reduces the operating time of the pool pumps. This reduces water pollution, improves guest safety, and reduces operating cost
- Reduced use of chemicals, water softeners, and aerosol insecticides reduces air and water pollution
- The use of composted material as fertilizer instead of chemical fertilizers reduces soil and water pollution, and reduces costs
- The use of tree and lawn cuttings as mulch reduces water and soil loss
- The reef experiment has resulted in an increased growth rate in the area of reef so protected
- Marine turtles have returned to the protected beach area (for the past three nesting seasons) to lay eggs. The protection of hatchlings has been undertaken with the assistance of personnel from the Montego Bay Marine Park

Economic benefits include:

- Significant savings on water and electric bills; confirmed by energy audits
- Cost savings from the reduction in the amount of chemicals used. A 46.59% decrease in the cost of chemicals was achieved during the 1994-1995 period (US\$20,570 in 1994 compared to US\$10,986 in 1995)
- The recognition of the efforts of the hotel by the market has led to new sources of sales

International recognition of the above efforts led to the hotel receiving the following awards:

- “Green Hotel of the Year” for the Caribbean for 1995, 1996, and 1997
- Certification from the Audubon Cooperative Sanctuary System in the areas of Employee/Public Involvement and Education & Resource Conservation

- Commendation from the International Hotel Association/American Express sponsored Green Hotelier of the Year Award 1996
- British Airways Tourism for Tomorrow Award for 1996



Dive Tourism, British Virgin Islands

Dive operators in the British Virgin Islands (BVI) give customers a short “orientation” about the need to protect coral reefs prior to each dive or snorkel trip. The main printed materials used during such sessions are brochures produced by the British Virgin Islands Natural History Society. The brochure targets divers, snorkellers, and boaters, and conveys the following information:

- The coral reefs are precious and delicate. Their future depends on you
- Worldwide, coral reefs are suffering degradation from various factors – pollution, over-fishing, excess nutrients,....and tourist activity
- Please take care not to inflict further damage
- **TOUCH NOTHING** – The slightest touch with hands, fins, or equipment can irreparably damage coral polyps, the tiny animals that build the coral reefs. Remember, most corals only grow a half-inch per year
- **REMAIN HORIZONTAL** in the water, and snorkel in water over your dept. Snorkeling on shallow reefs can easily inflict damage to the coral and cause personal injury. In a vertical position, your flapping fins are killers. They break coral and stir up sediment that can smother the coral polyps. For equipment adjustment, swim out and away from the coral into deep water
- **UNSURE, UNEASY** – Wear a float vest, and practice your skills off a sandy beach
- **DO NOT ANCHOR ON CORAL** – Use mooring buoys where available, or anchor on a sandy bottom. Anchors, chain, and line should not touch coral (dinghy anchors included). If there is no sandy bottom, don't anchor, but leave an attendant in the dinghy while the rest of the party snorkel or dive
- **FEEDING THE FISH** – Caution, you may be injured. Feeding can make fish aggressive and dangerous. It also upsets species distribution and may introduce disease
- **PHOTOGRAPHERS** – Avoid cumbersome rigs. Don't brace yourself on the coral to take a photo. Damaging the reef even inadvertently for the sake of a photo is not worth it

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- **DIVERS** – Adjust buoyancy. Secure all dangling gauges, consoles, and octopus regulators. Know where your fins are. Air bubbles trapped in caves will destroy marine growth. Bubbles rising on a vertical rock face can scour, don't get too close

Think, care, and enjoy. Help the reef give continuing enjoyment.



Ecotourism at Maho Bay, Virgin Islands

Maho Bay Camps and Harmony Studios (collectively called Maho Bay) have based their product on a commitment to:

1. Minimise impact on the environment
2. Conserve natural resources
3. Engage in active and passive environmental education of their guests, and
4. Contribute to the local community

Use of New Technology

- The building materials at Harmony include recycled materials, such as:
 - i. Timbrex – a recycled plastic and sawdust compound that is made into lumber and is used for walkways, decking, stairs, and handrails
 - ii. The tiles in the units are made from recycled light bulb manufacturing materials, recycled glass, or recycled scrap clay
 - iii. The interior ceiling panels are made from 100% recycled newspaper
 - iv. The wallboards are made from gypsum and cellulose fibers from recycled waste paper.
- The keys given to guests includes a power key, which operates a wall-mounted switch, which in turn turns the power system on when the guest is in the room, and off when the guest leaves
- The “next generation of tents”, the Concordia Eco-Tent, is designed and built with recycled building materials, passive-solar design, solar panels, solar hot water, and individual composting toilets

Waste Management

Reduction

- Bulk purchasing is done for kitchen and housekeeping departments
- Large freezer and cooler allow adequate room for bulk purchasing of perishables for the kitchen
- Homemade granola is offered for breakfast, in order to eliminate individual cereal boxes
- Styrofoam containers have been eliminated from the campground
- Guests are provided with 2.5-gallon refillable drinking water dispensers
- Propane gas tanks supplying the stoves in tent-cottages are refillable
- Reusable nylon bags are used for laundry and linen delivery instead of disposable plastic bags

- All glasses, cups, plates, utensils, etc., supplied in the tent-cottages or restaurant are reusable. No disposable item is provided
- The number of disposable bottles and cans have been reduced by installing a draft beer and soda system at the restaurant
- Packaging is a serious consideration when ordering for the store and restaurant, and the purchase of some products has been discontinued due to excess packaging

Recycling and Reuse

The recycling programme has been constrained due to the fact that many of the waste items are not currently accepted/recycled in the Virgin Islands. On-site activities include the following:

- Cardboard boxes and egg crates from vendor deliveries are used in the store as alternatives to disposable shopping bags
- Water from the sewage treatment plant and laundry is used for irrigation of the gardens
- Guests are encouraged to leave items they no longer need or want at a “Vacation Trading Center”, for other guests to use
- Purchase of a glass crusher is planned to recycle glass into cement
- Cardboard is shredded and used as mulch in the gardens
- Six-pack beverage holders are sent to a local company to be recycled
- Used stationery from the office is recycled into scratch pads, copying is duplexed, and envelopes are reused for internal mail
- Old newspaper is given to the humane society for use as bedding in their facilities
- Housekeeping recycles old towels into cleaning rags, old sheets are sent to maintenance, and old blankets are sent to the store to be used as insulation for the freezers when there is a power failure
- Waste oil from all company vehicles is delivered to a collection station provided at the Public Works waste handling facilities

Composting

- Kitchen waste and grass clippings are used for compost in the organic garden and other vegetation on the property.

Sewage treatment and Disposal

Sewage treatment takes place via a 7,000-gallon aerobic treatment plant, the effluent from which is chlorinated, stored in a holding tank, and finally used to irrigate the gardens. Waste water from the kitchen flows through two grease traps before entering the sewage plant. The grease traps are emptied by a sludge removal truck at the same the sludge is removed from the sewage plant.

Energy Conservation

At Harmony, all eight units were built to use traditional energy sources. Energy generated by solar panels is stored in batteries, which provides electricity for all the units. The wind scoop design of the ceilings helps provide natural ventilation, and the mirror glazing on the windows reduce the energy consumption of the units. Other conservation measures include:

- The temperature of coolers and freezers in the store is constantly monitored
- Tent-cottage design and fabric capitalise on cooling trade winds and natural light

- The design provides for easy cleaning, negating the use of electrical cleaning equipment
- Construction amidst tree provides natural shade, allowing cooling by electric fans instead of air conditioning units
- Thermal coolers are provided instead of electrically-powered refrigerators
- Water in bath houses and laundry is not heated
- Future plans include replacing light bulbs with halogen-type bulbs, and putting timers on electric switches in bath houses

Water Conservation

Cisterns collect rainwater, which is filtered and used. Additional water conservation measures include the following:

- Experimenting with the use of “gray water” for flushing toilets, and laundry water for irrigation of plants around the property
- Low water-use toilets are installed
- Spring-loaded faucets are installed in sinks and showers
- Running water is not supplied to most tent-cottages
- There are limited shower hours in bathhouses

Benefits

These efforts have resulted in extremely low water usage, approximately 25-30 gallons per person.

Purchasing Policies

The policy at Maho Bay is to buy recycled materials where possible.

- Paper towels and toilet seat covers provided in bathhouses, and paper napkins provided in the restaurant are made from recycled paper
- Recycled note paper and paper towels are for sale in the store
- Most building materials for the construction of Harmony Studios were made from recycled glass, wood, rubber tyres, etc.

Other Conservation Efforts

Other conservation practices and promotional activities include the following:

- When Maho Bay Camps was built, no construction road was created, few trees were removed, footings were hand-dug, and there was minimal use of heavy machinery, thus ensuring that the area remained as pristine as possible
- Harmony Studios was built following National Park Service environmental standards and guidelines
- A natural balance of wildlife on Maho Bay’s hillside is intact, and there are efforts to keep the feral cat population under control
- Nine iguanas were brought in from St. Thomas (to St. John), and are reproducing

Tourism: Impacts and Best Practices...

- Bat houses are placed in various locations to attract bats for insect control
- Elevated walkways and stairs preserve ground cover and avoid soil erosion
- Boric acid powder is used for roach control, instead of poisonous sprays which affect other wildlife
- Bio-compatible cleaning products are used in place of harsh, non-biodegradable detergents whenever possible
- Products known to originate from endangered plants or animals are not sold or used
- Cigarettes are not sold in the store, and many no-smoking areas have been established
- Radios and televisions are not allowed without headphones, thereby avoiding noise pollution and interfering with the natural surroundings
- The restaurant and store have consolidated ordering of supplies to reduce traffic and fuel consumption by delivery trucks
- Regular shuttles are provided for guest transportation to reduce the need to rent cars
- There is minimal use of motorized vehicles for operational purposes on the property

Environmental Education

In addition to the unique experience offered to guests, educational and nature activities are also undertaken:

- Evening programmes with speakers and slide shows (often in conjunction with the National Parks Service) are held weekly, covering such topics as the local history of St.

John, and the flora and fauna

- Maho Bay is immediately adjacent to the U.S. Virgin Islands National Park, and therefore within walking distance of many hiking trails and snorkel spots
- T-shirts with environmental slogans are available for sale in the store. Future plans include the sale of environmental products
- Happy hour prices are on “environmentally friendly” drinks (e.g. draft beer and jug wine), not on beverages which sell in individual cans or bottles
- Guests are asked to separate their food scraps for composting
- Local flora is identified with small signs, and an “Adopt-a-Plant” programme is being developed

- The bulletin board outside the office displays articles on health and the environment
- Placards posted around the resort advise guests of water conservation tips
- Maho Bay runs a “Four Hour Worker Program”, which offers people the opportunity to work and gain training in “responsible tourism”
- Tours of Harmony Studios are available for guests of Maho Bay Camps, so that they can learn more about its construction, self-sufficiency, and conservation practices
- Guests staying at Harmony Studios can monitor their own energy and water consumption through a computer in their unit

- Maho Bay Camps/Harmony Studios recently entered into a collaborative effort with the Virgin Islands Energy Office and the Sustainable Development Education Foundation on programmes and activities that will further the education on energy conservation

Support to Local Communities/Culture

- Maho Bay participates in, and furnishes supplies and transportation for, island clean-up projects
- A percentage of each year's profits is set aside for donations to local organisations, e.g. University of the Virgin Islands scholarships, Victim Advocacy, etc.
- Guests are given the option of donating their US\$30 security deposit to Friends of the National Park
- Maho Bay encourages the hiring of local people, and periodically provides hospitality training to persons in St. John
- The restaurant and store patronize local distributors whenever possible
- Items produced by local cottage industries are sold in the store

Staffing

The position of Environmental Resources Manager was recently created. In addition to educating the guests, staff, and public about environmental issues, the new manager will be responsible for:

- Supervising the development of an organic garden
- Overseeing recycling efforts
- Conducting a weekly environmental programme
- Writing a mission statement and updating and coordinating the environmental action plan for the two resorts

Maho Bay intends to stay informed of new developments, to assess their applicability at Maho Bay, and to continue its contribution to environmentally friendly resort development.



CEP Technical Reports

1. 1989. The Action Plan for the Caribbean Environment Programme: Evaluation of its Development and Achievements (1976-1987).
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The series of CEP Technical Reports contains selected information resulting from the various activities performed within the framework of the UNEP Caribbean Environment Programme (CEP). CEP was initiated in 1976 by UNEP with the assistance of ECLAC, at the request of the Governments of the region. A framework for regional projects and activities was first formulated in Montego Bay in 1981, when the Action Plan for the Caribbean Environment Programme was adopted by the First Intergovernmental Meeting.

The major legal instrument of CEP was adopted at the Second Intergovernmental Meeting, convened at Cartagena de Indias, in 1983: the Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region. The Cartagena Convention provides a framework for the development of specific protocols.

The implementation of CEP is supported mainly by the Caribbean Trust Fund, established by the participating States and Territories. Their active participation is ensured through regular Intergovernmental and Contracting Parties Meetings, a rotating Monitoring Committee formed by representatives from nine States and Territories and through the National Focal Points. The principal focal point in each State or Territory is the ministry or department responsible for external relations or foreign affairs. Additionally, the agency responsible for the management of marine and coastal resources is the focal point for technical purposes.

Currently the Action Plan of CEP concentrates in five major areas for management of marine and coastal resources: Overall Co-ordination, Specially Protected Areas and Wildlife (SPAW), Assessment and Management of Environmental Pollution (AMEP), Information Systems (CEPNET), and Education, Training and Awareness (ETA).