
Tourism and Coastal Resources Degradation in the Wider Caribbean

A Study for the
United Nations Environment Programme
Caribbean Environment Programme
Regional Coordinating Unit
Kingston, Jamaica

by

Island Resources Foundation
St. Thomas, Virgin Islands
December 1996

Table of Contents

Table of Contents	i
List of Tables	ii
List of Figures	ii
Acronyms	iii
1. Introduction	1
2. Review of Coastal Degradation	2
Overview of Condition of Coastal and Marine Resources	2
Characteristics of States in the Caribbean	5
Characteristics of Tourism in the Caribbean	7
Analytical Framework Summary	8
Documentation of Coastal Degradation of Environmental Resources	18
3. Benefits and Costs	20
Limits on Calculating Costs and Benefits of Tourism.....	20
Benefits of Tourism in Coastal Areas	22
Costs of Tourism in Coastal Areas	24
Summary of Benefits and Costs.....	28
4. Mitigating Tourism Degradation of Coastal Areas	30
A Framework for Analyzing Tourism and the Environment.....	30
Win-win Coastal Planning	31
Adequate Technical Expertise	31
Knowledge of Program and Natural Resources.....	32
Mitigation Strategies.....	34
Related Programs of International Groups	38
5. References	41
Appendix A: Analytical Framework	49
Appendix B: Matrices of Benefits and Costs	51
Appendix C: References for Beach Valuation	54

List of Tables

Table 1. Overview of Coastal and Marine Pollution	4
Table 2. Selected Tourism Characteristics of States of the Wider Caribbean	6
Table 3: Growth of Tourism in the Wider Caribbean, 1990 through 1994.....	8
Table 4: Summary of Tourism Impacts, Facilities, and Geographic Zones	8
Table 5: Benefits and Costs of Tourism.....	22
Table 6: Documents Related to Environmental Degradation.....	48
Table 7: Overview of Environmental Degradation from Tourism Facilities in the Coastal Zone	50
Table 8: Benefits from Tourism Facilities in Coastal Areas	52
Table 9. Costs from Tourism Facilities in Coastal Areas.....	53

List of Figures

Figure 1. World and Caribbean Tourism Growth	7
Figure 2. Hotel Wastewater Treatment Compliance.....	13
Figure 3. Tourism Impact and GDP	21
Figure 4. Risk/Reward Summary Diagram.....	28

Acronyms

BDD	British Development Division
BMP	best management practices
BVI	British Virgin Islands
CANARI	Caribbean Natural Resources Institute (St. Lucia and St. Croix)
CARICOM	Caribbean Community
CARICOMP	Caribbean Coastal Marine Productivity
CBO	community based organization
CCA	Caribbean Conservation Association
CDB	Caribbean Development Bank
CED	Centre for Environment and Development (UWI)
CEP	Caribbean Environment Programme (UNEP)
CHA	Caribbean Hotel Association
CIDA	Canadian International Development Agency
COSALC	Coastal and Beach Stability in the Lesser Antilles
CTO	Caribbean Tourism Organisation
ECLAC	Economic Commission for Latin America and the Caribbean (UNESCO)
ECODEF	Eastern Caribbean Organisation of Development Foundations
ECDPM	European Centre for Development Policy Management
ENCORE	Environmental and Coastal Resources Project (of the OECS/NRMU)
GDP	gross domestic product
GEF	Global Environmental Facility
GTZ	German Agency for Technical Cooperation
IAF	Inter-American Foundation
I&E	Industry and Environment Unit (UNEP)
IDB	Inter-American Development Bank
IDRC	International Development Resources Center (Canada)
IITF	International Institute of Tropical Forestry (US Dept. of Agriculture)
IISD	International Institute for Sustainable Development
IRF	Island Resources Foundation
IUCN	World Conservation Union
MAREMP	Marine Resource and Environmental Management Programme (UWI)
NGO	Non Governmental Organization
NRMU	Natural Resources Management Unit (of the OECS)
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
RCU	Regional Coordinating Unit
SIDA	Swedish International Development Agency
SIDS	Small Island Developing States
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Social and Cultural Organisation
USAID	United States Agency for International Development
USVI	United States Virgin Islands
UWI	University of the West Indies
WHOI	Woods Hole Oceanographic Institution
WTO	World Tourism Organization
WTTC	World Travel and Tourism Council
WWF-US	World Wildlife Fund/United States
WWF-UK	World Wide Fund for Nature (UK)

1. Introduction

“The main problem in understanding environmental impacts of tourism is that few scientific tools exist to determine the more subtle changes. The methodology to monitor changes and to establish biological carrying capacity is still unsophisticated. Therefore, we know little about the long-term environmental impacts of tourism on natural resources.”

Elizabeth Boo, 1992

The Caribbean Environment Programme of UNEP (UNEP/RCU/CEP) is implementing a regional project in cooperation with the United States Agency for International Development (USAID) in support of the International Coral Reef Initiative. The objective of the project is to promote corrective actions on land-based sources of pollution caused by the tourism industry which negatively impact coastal and marine resources.

This report is one of a series of studies to determine the level of coastal degradation, the best approaches and practices available to address these issues, and effective public awareness and training activities. The information contained in these studies will be used *inter alia* to further develop the activities of this project which include pilot projects, training workshops and courses, public awareness activities and networking.

This report of *Tourism and Coastal Resources Degradation* includes Island Resources Foundation’s assessment of the extent of coastal resource degradation due to tourism and recommends approaches to address this degradation in the Wider Caribbean. The assessment and recommendations have been written with special attention to promoting the use of the information by regional and national planners and policy managers.

The companion study by the Foundation on *Best Management Practices for Coastal Tourism* has been written for use *by national planners and industrial participants themselves*, as partners in sustainable tourism development and maintenance and conservation of the industry’s primary resource.

Other Sections of this report include:

- Review of coastal degradation
- Economic and social benefits and costs from tourism and allied sources
- Mitigation and amelioration strategies for addressing coastal degradation.

2. _____ Review of Coastal Degradation

This Section provides an overview of coastal degradation, a three-dimensional framework for analyzing the environmental effects of coastal tourism, and a summary of the topical focus of references used in this report in terms of the analytical framework for coastal tourism.

The principal conclusions of this section are:

- tourism impacts in the Wider Caribbean are extremely diverse, depending on differences among state economies, the relative and absolute size of the tourism sector, the rate of growth of tourism, and the nature of the tourism facilities involved;
- environmental degradation effects from tourism facilities in the coastal area are generally small, often dispersed, critically placed, and multi-faceted. Resolution of these effects are addressed by marshaling information and expertise from a wide range of technical resources in both the private and public sector.

Overview of Condition of Coastal and Marine Resources

Coastal and marine resources throughout the Wider Caribbean Region have suffered major impacts by human actions since early colonial days. A synthesis of major impacts conveys a picture in which virtually every state of the Wider Caribbean suffers from sewage pollution of coastal waters, most suffer some contamination from oil spills and production leakages, a majority of states report coastal pollution from mining and industrial activity, and most of the low income states of the region report solid waste contamination of coastal areas. In addition, many states report inadequate monitoring and assessment systems to understand the causes, dimensions, and impacts of coastal pollution. Table 1 illustrates observed and reported marine and coastal conditions in the region in the period from the late eighties to the present.

Of these impairments of coastal and marine environments, tourism is a major direct contributor to sewage and solid waste pollution in virtually every country. In tourism-dependent states it is the prime contributor to coastal erosion and sedimentation from construction activities.

Tourism is also a major indirect contributor to much of the oil and fertilizer/pesticide pollution of coastal waters. For example, in the US Virgin Islands most reportable oil spills stem from yacht, ferry and cruiseship fueling activities. In both the Sarasota Bay and the Corpus Christy National Estuary Program assessments, lawn care practices on golf courses and second-homes and condominium resorts were found to be major sources of nitrate and phosphate contamination of the bay from storm water runoff (Sarasota, 1993, and personal communication).

For countries in the top quintile (20%) of those dependent on tourism (*i.e.*, those states with more than 50 rooms per 1000 inhabitants: Cayman Islands, Northern Netherlands Antilles, Anguilla, Turks & Caicos, Aruba, Montserrat, British Virgin Islands, Antigua and Barbuda, US Virgin Islands), the environmental costs of tourism are even more evident when examining the named sources of “damage to reefs, mangroves and associated coastal ecosystems:” anchor

damage (3 countries), litter (4 countries), spearfishing (4), mangrove clearing (4), diver damage (2), dredging, dynamiting (2), sand removal (2), trampling, and boat groundings (Hoagland, *et al.*, Table 11).

Table 1. Overview of Coastal and Marine Pollution

Countries Listed by Tourism Dependency*	Sewage	Oil	Fertilizers/ Pesticides	Mining & Industry	Solid Waste	Construction Erosion	Lack Info
Cayman Islands	X	X					
Netherlands Antilles(No)	X	X		X			
Anguilla							X
Turks & Caicos							X
Aruba	X	X		X	X		
Montserrat							X
British Virgin Islands	X			X			
Antigua & Barbuda						X	
US Virgin Islands	X	X		X			
Bahamas	X						X
St. Kitts & Nevis	X					X	
Barbados	X	X	X	X		X	
St. Lucia						X	
Martinique	X						X
Guadeloupe	X	X	X	X	X		X
Netherlands Antilles (So)	X	X		X	X		
Belize	X						
Grenada	X		X		X		
St. Vincent & Grenadines						X	
Dominica		X			X	X	
Jamaica	X	X		X		X	
Dominican Republic	X	X		X			
Surinam	X						X
Guyana	X						X
Puerto Rico	X	X		X			
Trinidad & Tobago	X	X		X			
Cuba	X	X		X			
Haiti	X			X			X
Costa Rica	X	X	X				
Panama	X	X					X
Mexico	X	X		X			X
Colombia	X	X		X	X		X
Nicaragua		X					X
Venezuela	X	X		X		X	
French Guyana							X
Guatemala		X				X	X
US Gulf Coast	X	X	X	X			
Honduras	X	X	X	X			

Source: Hoagland et al., 1995, Table 11.

* See following Section for definition of tourism dependency rankings.

In “Tourism’s Vulnerability to Environmental Decline in Antigua,” Paul Lorah (1996) discusses the “Mismanagement of Coastal Resources” in a summary that could be applied to many of the coastal tourism effects within the Wider Caribbean:

The fact that the expansion of the tourism infrastructure is likely to be confined to the narrow coastal zone makes sustainable development ... all the more difficult. Coastal ecosystems are already under stress, and short-sighted development goals and governmental mismanagement poses a clear threat to their sustainable use.

Characteristics of States in the Caribbean

Politically, socially, and economically, the Wider Caribbean is a large and diverse region (Hoagland, et al., 1995); ecologically, the area is a large marine ecosystem (Richards and Bohnsack, 1990). Some of the diversity of the region is demonstrable in terms of the different impacts of tourism. Table 2. Selected Tourism Characteristics of States of the Wider Caribbean lists the countries of the Wider Caribbean, with several economic indicators and broad measures of tourism impact.

The table is sorted by the relative impact of tourism on the national economies of the Wider Caribbean states, as measured by the number of tourist rooms per thousand local inhabitants. This measure is chosen, rather than the more conventional measures of tourists per capita, or tourism percent of gross domestic product, because it is more reliable (major investments in physical plant are more visible than estimates of expenditures for intangibles) and less variable (capital investments take years to plan and execute) than other measures.

Table 2. Selected Tourism Characteristics of States of the Wider Caribbean

	Population thousand * WHOI	GDP (\$millions) CTO & WHOI	GDP/capita (1993)	Tourism % GDP	Pop Density per Km ²	Rooms/ 1,000
Cayman Islands	30	\$ 670	\$ 23,000	49%	100	115
Netherlands Antilles(No)	36	\$ 1,400	\$ 7,600	35%	191	107
Anguilla	9.5	\$ 56	\$ 6,800	91%	75	103
Turks & Caicos	13	\$ 69	\$ 5,000	81%	21	82
Aruba	78.9	\$ 854	\$ 13,600	47%	326	78
Montserrat	10	\$ 58	\$ 5,800	31%	120	71
British Virgin Islands	18	\$ 133	\$ 10,800	82%	80	68
Average (first quintile)			\$10,371	59%	130	89
Antigua & Barbuda	64.2	\$ 424	\$ 6,800	74%	146	52
US Virgin Islands	109	\$ 1,200	\$ 11,000	59%	284	50
Bahamas	273	\$ 2,600	\$ 10,200	47%	250	49
St. Kitts & Nevis	42	\$ 142	\$ 3,500	52%	147	38
Barbados	264	\$ 1,800	\$ 7,000	25%	612	22
St. Lucia	142.7	\$ 250	\$ 1,650	69%	251	21
Martinique	360	\$ 2,000	\$ 6,000	13%	321	20
Average (2nd quintile)			\$ 6,593	48%	287	36
Guadeloupe	405	\$ 1,100	\$ 3,300	24%	194	19
Netherlands Antilles (So)	158.3	\$ 1,400	\$ 7,600	35%	191	19
Belize	211	\$ 420	\$ 2,165	23%	8	17
Grenada	96.5	\$ 250	\$ 3,000	15%	247	15
St. Vincent & Grenadines	110.5	\$ 171	\$ 1,500	31%	332	11
Dominica	73	\$ 174	\$ 2,100	16%	113	10
Jamaica	2480	\$ 3,497	\$ 1,431	21%	224	8
Dominican Republic	7157	\$ 7,148	\$ 976	12%	148	4
Average (3rd quintile)			\$ 2,759	22%	182	13
Surinam	174	\$ 1,941	\$ 4,513	1%	3	3
Guyana	305	\$ 349	\$ 435	9%	4	3
Puerto Rico	3685	\$ 22,800	\$ 6,200	6%	368	3
Trinidad & Tobago	1257.3	\$ 4,939	\$ 3,948	2%	242	2
Cuba	10900	\$ 17,000	\$ 1,580	2%	96	2
Haiti	7041.5	\$ 2,641	\$ 399	2%	236	0
Costa Rica	632	\$ 5,365	\$ 1,930	6%	60	0
Panama	230	\$ 5,544	\$ 2,248	4%	32	0
Average (4th quintile)			\$ 2,657	4%	130	2
Mexico	5491	\$ 286,628	\$ 3,321	2%	44	0
Colombia	1603	\$ 41,700	\$ 1,269	1%	31	0
Nicaragua	88	\$ 1,736	\$ 456	1%	29	0
Venezuela	7129	\$ 53,441	\$ 2,705	1%	22	0
French Guyana	83	\$ 421	\$ 4,390	0%	1	0
Guatemala		\$ 9,353	\$ 988	2%	85	NA
US Gulf Coast	15600	\$ 752,000	\$ 22,219	3%	27	NA
Honduras	1131	\$ 3,004	\$ 567	1%	46	NA
Average (5th quintile)			\$ 4,489	1%	35	0

*Population of coastal areas for continental states

WHOI = Hoagland, et al., 1995

CTO = Caribbean Tourism Organization, 1995

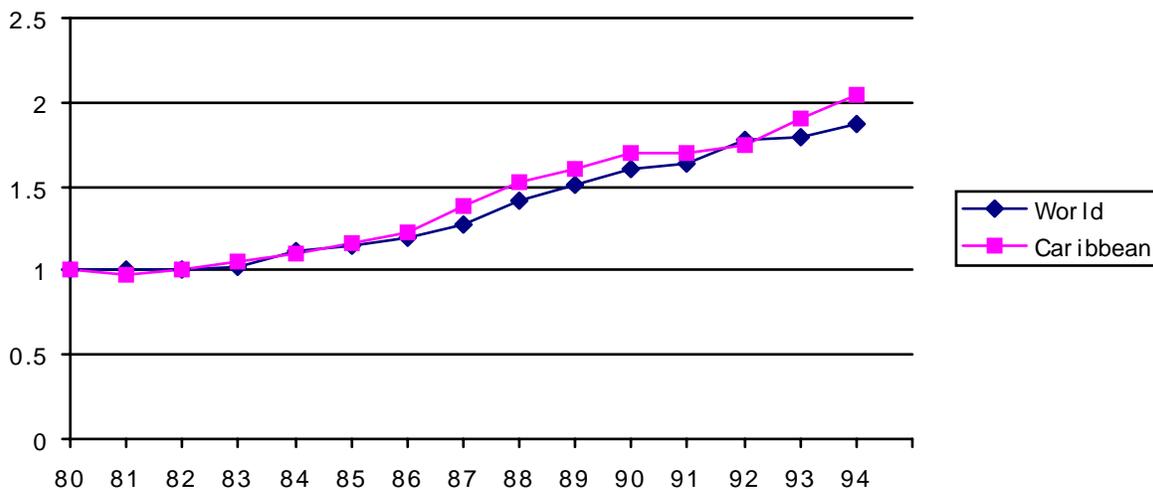
Source: Adapted from Hoagland, et al., 1995, and Caribbean Tourism Organization, 1995.

Characteristics of Tourism in the Caribbean

Coastal degradation from tourism depends on the number of tourists and the rate of growth of the industry. Tourism is now the largest industry in the world (World Tourism Organization, 1996), with 567 million international tourists estimated for 1995. As illustrated in Table 2. Selected Tourism Characteristics of States of the Wider Caribbean, above, tourism is also an important economic sector for most states of the Caribbean, and dominant in many of the smaller island states.

For the past fifteen years, as illustrated in Figure 1, tourism growth in the Caribbean has mirrored the general growth of international tourism throughout the world. By 1995, the World Tourism Organization (WTO) estimates that world tourist arrivals equaled 567 million people, with total expenditures of \$372 billion. For the year 2010, the WTO projects that one billion people, spending a total of \$1.5 trillion (US) will be involved in international tourism.

Figure 1. World and Caribbean Tourism Growth



Source: Caribbean Tourism Organization, 1994, Table 1.

Within the Caribbean, as we have seen in Table 2. Selected Tourism Characteristics of States of the Wider Caribbean, the absolute and relative importance of tourism varies greatly among the states of the region. Similarly, the growth rate of tourism varies among the states of the region, which should also affect the strategies to be employed in managing the environmental impacts of the industry. Table 3: Growth of Tourism in the Wider Caribbean, 1990 through 1994, shows how this growth varies among most of the states of the Caribbean.

Table 3: Growth of Tourism in the Wider Caribbean, 1990 through 1994

NS	Surinam	-30%	SC	St. Kitts & Nevis	24%
BF	Bahamas	-3%	DO	Dominica	25%
BB	Barbados	-2%	AC	Antigua & Barbuda	28%
HA	Haiti	0%	GJ	Grenada	33%
VC	St. Vincent & Grenadines	2%	AR	Aruba	34%
NA	Netherlands Antilles (North)	6%	CJ	Cayman Islands	35%
NA	Netherlands Antilles (South)	13%	TD	Trinidad & Tobago	37%
MH	Montserrat	14%	AV	Anguilla	40%
DR	Dominican Republic	15%	MB	Martinique	49%
JM	Jamaica	16%	VI	British Virgin Islands	50%
VQ	US Virgin Islands	17%	BH	Belize	51%
RQ	Puerto Rico	19%	ST	St. Lucia	58%
Carib	Caribbean	20%	GP	Guadeloupe	65%
			TK	Turks & Caicos	69%
			GY	Guyana	76%
			CU	Cuba	81%

Source: Percent growth calculated from Caribbean Tourism Organization, 1994, Table 2.

Analytical Framework Summary

To cope with this regional complexity, and to provide a comprehensible setting for examining the relationship of tourism and coastal environmental impacts, we have created an analytical framework. This framework is original to this paper, but it is based on a number of regional and international tourism and environmental impact studies over the past two decades.

There are three dimensions to this framework. They are: (1) tourism impacts (“nature of the tourism effect” in the project’s terms of reference); (2) type of tourism facility; and (3) geographic zones of environmental impact.

Table 4: Summary of Tourism Impacts, Facilities, and Geographic Zones

Tourism Impacts

- Displacement of Traditional Uses
- Physical Changes and Habitat Damage
- Solid Waste Disposal
- Toxics and Nitrification
- Groundwater Depletion and Contamination
- Change in Sediment Loads

- Visual Impacts

Tourism Facilities

- Tourism Complexes and Large Resorts
- Marine Recreational Facilities
- Small Hotels and Resorts
- Entertainment Facilities
- Shoreside Recreational Facilities
- Parks and Protected Areas

Geographic Zones of Environmental Impact

- Near Coastal Waters and Fringing Reefs
- Beach and Shoreline
- Estuaries, Back Bays, Salt Ponds and Lagoons
- Coastal Plain
- Uplands
- Offshore Waters

The purpose of the framework is to illustrate *where* in the coastal zone specific types of *tourist activity* or facility are likely to have *what kinds* of environmental effect. The framework identifies seven different *effects* which can occur under thirty-six different combinations of facility type and geographic zone. Each of these 252 potential tourism impacts are then assessed in terms of major, direct or indirect effects, giving a total analytical matrix of 756 elements. Table 7: Overview of Environmental Degradation from Tourism Facilities in the Coastal Zone (in Appendix A) then summarizes the 112 *priority tourism impacts* which are judged to be major problems in the six-by-six matrix of geographic zones and tourism facilities.

The analytical model is derived from a wealth of real world experience—its usefulness lies in our ability to use the model for a variety of planning and management processes, but two stand out:

- to look for expected but so far unreported effects, such as “if most entertainment facilities in the beach lead to solid waste problems, why does the beach at Cane Garden Bay remain relatively clean?” or
- to place impacts in a larger framework. For example, a government faced with a number of large coastal resort proposals *must* anticipate making a major investment in *controlling and monitoring construction impacts* because these are known consequences of large resorts in shoreline areas.

Details of the Analytical Framework, including detailed definitions of the elements of each of the three dimensions (Tourism Impacts, Geographic Zones of Environmental Impact and Tourism Facilities), as well as the detailed matrix of tourism impacts are presented in Appendix A.

This section of the report highlights the occurrence of patterns of tourism impact within the Wider Caribbean.

Tourism Impacts

This first dimension of the analytical framework encompasses the direct and indirect effects of tourism facilities. These effects are dynamic and often interactive. At its most basic, if tourism facilities and activities result in a high degree of environmental impact, it is likely that tourism will be reduced. This can become a “development death spiral” if the reduction in tourists causes loss in income which results in curtailment of essential services (*e.g.*, operation and oversight of sewage treatment plants) which further alienates tourists. [See Section 3. Benefits and Costs, for an example.]

Available evidence (UNEP, 1994a; Hoagland, *et al.*, 1995) for the Caribbean indicates that the environmental effects of tourism activities in the coastal area occur within national boundaries. The MARPOL study (UNEP, 1994a) indicated little international transport of land-based sources of marine pollution in the Wider Caribbean, and the contribution of tourism to that problem is undoubtedly small.* Marine debris aside, the major “international” environmental effect of coastal tourism in the Caribbean may be the impact of yachts, charter boats, or cruiseships in near-coastal and marine environments, especially anchoring in sea grass beds or on coral reefs.

The major tourism impacts used in this study include:

Displacement of Traditional Uses and Users [26]**

Coastal areas have always been heavily used, especially in the most densely populated areas of the Wider Caribbean, which are also the areas most dependent on tourism. Promotion of tourism uses necessarily creates some level of conflict and displacement, which can be expressed by crowding traditional users out of areas, such as banning fishing from tourist beaches, or inappropriate adaptation of cultural and historic resources. Noise pollution is an element of displacement.

Displacement effects of tourism are surprisingly pervasive, occurring in two-thirds (26/36) of the possible combinations of tourism facility and zone. It may be this very pervasiveness which accounts for the strong social and political reactions against tourism in many quarters. From the Mighty Sparrow’s mocking of American sailors at the Naval Base at Chaguaramas (the Mighty Eagle, in contradistinction to Sparrow’s name) in the 1940’s to Rastafarian rejection of “Babylon” coming out of Jamaica in the 1970’s and 1980’s, there remain lively sources of resistance to the growth of foreign influence in the Caribbean in general, and to increases in mass tourism specifically. Unfortunately these social pressures also tend to reinforce pressures for

* An exception to this generalization is highly visible marine debris, which is often identified with foreign sources (NC Sea Grant, 1995). The Texas State Land Office, for example, finds a significant proportion of marine debris on Texas’s beaches comes from foreign sources.

** Numbers in brackets indicate the number of “votes” received by the topic, out of 112 total major, direct or indirect environmental impacts from tourism, as portrayed in the Analytical Framework in Appendix A. That is, the number of times the issue is identified as a problem in Table 7: Overview of Environmental Degradation from Tourism Facilities in the Coastal Zone, in the Appendix.

enclosed resorts and concentrated tourism enclaves which may increase the negative environmental effects of tourism.

In *Last Resorts*, Polly Patullo quotes the chorus of the 1994 calypso “Alien” by Rohan Seon of St. Lucia, in her discussion of the social impacts of tourism in the Caribbean:

*Like an alien
In we own land
I feel like a stranger
And I sensing danger
We can't sell out whole country
To please the foreign lobby
What's the point of progress?
Is it really success
If we gain ten billion
But lose the land we live on?*

Physical Changes and Habitat Damage [25]

Including “major” earth changes, bulkheading, construction and maintenance of jetties, groins, piers and wharves, dredging and spoil disposal. “Minor” physical alteration impacts—many of which are very widespread—include sand removal, destruction of mangroves and salt ponds, anchoring damage to corals and sea grass beds, and other coral destruction. The cumulative effects of minor alterations can obviously be extreme. Physical alterations are generally thought to increase susceptibility to natural hazards, as discussed in the section on benefits and costs.

This is the most widespread environmental effect of tourism in the Caribbean, since it results from many different kinds of tourism facility in all of the geographic zones. Spectacularly wrong-headed tourism constructions, such as the Pigeon Island causeway in St. Lucia, or the causeways providing access to the new hotels on the north coast of Cuba receive most attention. Even minor actions, however can have unanticipated effects, such as the installation of a seawall at a guest house in Long Bay Tortola, which changes local wave and transport dynamics and scours a major recreational beach.

Tourism-related physical changes are also common for a wide range of tourism infrastructure projects, such as the much-debated cruiseship pier proposed for Cozumel (*New York Times*, Sept. 28, 1996), or the obligatory 10,000 foot runway required on every Caribbean island to accommodate intercontinental jets. In some of the land-scarce islands, building any kind of runway is difficult—the 7,000 foot runway in St. Thomas includes 88 feet of vertical fill at the end of its seaward extension, the second-deepest fill project in the world at the time of its construction in the early 1980's.

Although distressingly common, impacts from inappropriate physical changes can be “solved” by *known* improvements in construction practice, engineering, architecture, and design processes, and by *known* improvements in public sector planning, control and monitoring. Examples include the Barbados Coastal Zone Management Unit, or the St. Lucia Northwest Coastal Zone Project, which were designed to correct physical changes from decades-old tourism development projects. Greed and opportunism, of course, describe why such projects continue to happen, such as the rash of new gambling casinos and associated resort developments being built on the Gulf Coast barrier islands of Alabama.

Habitat restoration, especially for critical mangrove systems, is being investigated as a coastal management policy by a number of the National Estuaries Programs on the US Gulf Coast. As

this technology is refined around the world,* it offers promise for coastal tourism impact mitigation. For example, new marinas in the US and British Virgin Islands are being built with some attention to preserving existing mangrove stands—it would be a small step to seeking offsets for mangrove destruction in some areas, with restoration of equivalent resources in other areas.

Solid Waste Disposal [17]

In addition to the migration of chemical pollutants through surface and groundwater resources, as described below, tourism generates direct and indirect solid waste impacts. This problem has received special attention in the smaller islands of the Eastern Caribbean which face difficulties siting solid waste disposal facilities, and which are too small to be able to support economically viable re-cycling programs.

In part because of its high density, high energy-consumption tourism styles, the highly tourism-dependent US Virgin Islands has solid waste problems which have reached extreme levels in recent years, with a number of crises:

- A prolonged “dump” fire on the island of St. John (the least populated of the three Virgin Islands, where 60% of the island is reserved for the Virgin Islands National Park) costs hundreds of thousands of dollars to extinguish.
- Community pressure and the lack of viable alternatives have caused the Government of the Virgin Islands to close *all* public dumps on St. John.
- Trash is now collected in St. John and *trucked daily* via inter-island ferry to St. Thomas (five miles away), where it is deposited in the overfilled Bovoni landfill, the only such site in St. Thomas.
- In St. Thomas, the Bovoni dump has been burning underground for more than a year, with occasional surface “breakthroughs” which spew noxious smoke, fumes and clouds of flies over nearby government-supported housing, a junior high school, and resort and second home communities. The US Environmental Protection Agency is studying both health effects of the burning, and engineering processes required to extinguish the fires.
- Both the Bovoni landfill on St. Thomas, and the Anguilla dump on St. Croix are estimated to be near or above their total capacity.
- To add environmental insult to environmental injury, the Bovoni landfill, much of which is not lined or sealed, is also adjacent to the last surviving mangrove forest in St. Thomas.

Most continental coastal areas and many islands in the Wider Caribbean are forced to site solid waste disposal areas in highly porous soils which are hard to seal, leading to groundwater contamination.

Solid waste problems are also problems of waste that is NOT disposed of in dumps—in many cases the environmental effects of abandoned materials and equipment is very significant. In a scoping study in Tortola, Island Resources Foundation estimates that one five-acre shoreline and mangrove area holds *50 tons* of abandoned and discarded barges, vehicles, boats, and heavy

* Internet traffic on the mangrove mailing list indicates some of the most ambitious projects are currently being implemented in Thailand and the Philippines.

construction equipment—and this is in an area generally believed to be in good environmental condition.

Solid waste impacts include the land disposal of ship-generated waste which can no longer be disposed at sea, as a result of the designation of the Caribbean Sea as a special area under the Law of the Sea. The World Bank and the Global Environment Facility have projects to address this problem in many of the Eastern Caribbean states.

Recent hurricanes have also provided a reminder that disasters in tourist facilities have major solid waste impacts both on land (which can include the abandonment of entire resort and hotel complexes) and also from the grounding and loss of boats on shorelines and in lagoons and estuaries.

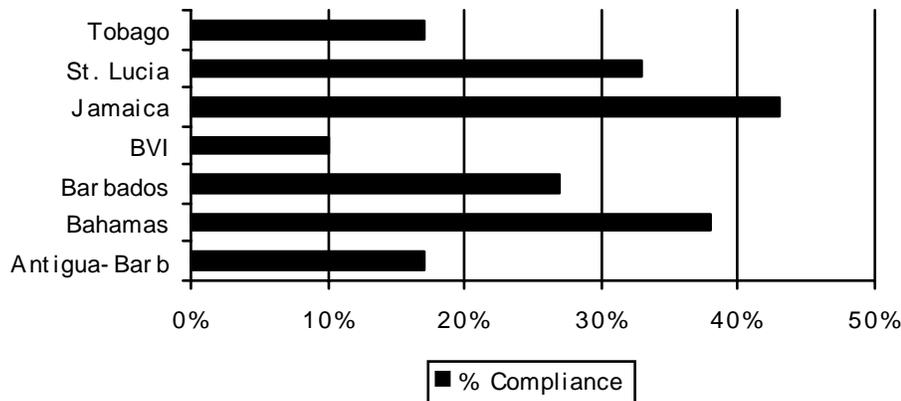
Toxic Chemicals and Nitrification from Surface Waters [15]

Includes herbicides, pesticides, and fertilizers from agriculture and resort landscaping. Sewage discharges are generally believed to be the most serious and widespread pollutant associated with land-based sources of pollution in the Wider Caribbean (Gladfelter and Ogden, 1995). Surveys by PAHO (1993) and other organizational have indicated that non-existent or improperly operated sewerage systems at hotels, resorts, and vacation condominiums are major contributors to this problem.

The lack of sewer systems in the Caribbean has resulted in a proliferation of package plants especially in the tourism industry.

Half of the wastewater treatment plants in the Caribbean are operated by hotels and resorts. Three-quarter of these plants do not comply with a basic effluent criteria of 30 mg/l BOD and SS or 85% removal of BOD and SS (see also Figure 2).*

Figure 2. Hotel Wastewater Treatment Compliance



Source: PAHO, 1994, A.A. Vlugman, page 258

* This assessment echoes operational statistics gathered by Island Resources Foundation for package treatment plants in the US Virgin Islands in 1978.

Groundwater Depletion and Contamination [10]

This category includes the introduction of toxic chemicals, pesticides, herbicides, and nutrients to groundwater by both direct injection and percolation from surface waters and irrigation systems. Groundwater depletion and contamination affect both the availability of groundwater for other human uses (or re-use) and the natural systems which use the water in freshwater springs on land and in the sea. Groundwater contamination is also a significant by-product of the region's well-known solid waste management problems.

Groundwater impacts are a major environmental impact of tourism in the Wider Caribbean because they are widespread, and because they are extremely intractable for both assessment and remediation. In a case study of the environmental impact of tourism in Jamaica (PAHO, 1994, page 109), Eleanor Jones of Environmental Solutions identified water quality issues as the second impact of tourism:

The tourist industry is the single largest consumer of treated water. Calculations by NWC [National Water Company of Jamaica] of water demand in various sectors shows the industry as demanding 10 times as much domestic water per capita....Inadequate sewage and solid waste and industrial effluent disposal systems, together with water sports and boat discharges have taken their toll to varying degrees on water quality in tourism areas.

In questioning the announcement of a major new resort complex to be constructed next to the Beef Island Airport in Tortola, British Virgin Islands, environmentalists cited concerns about impacts on groundwater, wetlands, and surface water quality as a result of a planned golf course as major reasons for opposing the project.

Studies of contamination by the common fungicide Benamyl, used in the banana industry in Dominica, but also common in golf course management, indicated no significant persistent contamination of ground or surface waters under normal farming practices, but a possibility of interference with freshwater crustacean and soil fungi when applied in heavy concentrations, or when washed into streams shortly after application (Rainey, 1987).

Change in Sediment Loads [10]

Sediment loads are increased by coastal and upland development, construction, roads (especially dirt roads in resorts and subdivisions) and deforestation. *Decreases* in sediment loads from dams and canals can also be damaging to some large estuarine and deltaic ecosystems, such as those found in major river mouths.

Tourism in the coastal zone contributes to increases in sediment loads for both back bay and shore areas, from construction, access and transport systems (especially dirt roads and some ferry activities), facility operations, and run off. Upland tourism facilities, which are not the direct focus of this report, contribute to sediment loads from rivers and other upland surface run off conditions. The Caribbean is especially susceptible to heavy sediment pulses because of the probability of heavy rains. A recent "shower" (November 21, 1996) dropped eight inches of rain (a typical rainfall amount for an entire hurricane) on St. Thomas in three hours, resulting in severe sediment plumes from all developed areas along the coastline, threatening reefs and seagrass beds and forcing the closing of swimming beaches.

In addition to the beach profiling conducted by the UNESCO-supported COSALC I program, researchers are also starting to gather information on coastal stability which includes some effects related to sediment loading for 11 countries of the Lesser Antilles (Cambers, 1996).

Visual Impacts [8]

Visual impacts have a high esthetic component which can be culturally biased, but they also derive from poor design, inattention, and large-scale physical alterations to land. “Scenic landscapes and other natural attractions provide the basis for tourism in the [Caribbean] and their value in the region to the tourism industry must be fully appreciated.” (Jackson, 1990)

Tourism Facilities in the Coastal Zone

This section identifies six categories of tourism facility and the relative extent to which they can cause environmental degradation. These categories are designed to capture the bulk of tourism activity, but they are not meant to be totally comprehensive or exclusive. That is, for example, a tourism complex could include large and small hotels, restaurants and beach recreational facilities. These categories refer to the activities of tourists, services provided to tourists, and the necessary infrastructure to support those services.

Tourism Complexes and Large Resorts [28]

Tourism complexes are large areas of intensive tourist development, generally larger than any single resort, which are almost totally dependent on tourism for economic activity. Complexes include large and small hotels and a variety of ancillary services usually offered by individual operators. Examples include Negril, Ocho Rios, or Montego Bay in Jamaica, La Romana in the Dominican Republic, and areas such as St. Lawrence Gap in Barbados, the Lagoon in St. Martin/St. Maarten, and Rodney Bay in St. Lucia. This category also includes large hotels, condominiums, and timesharing accommodations, which may have very different management structures, but which will have similar environmental effects.

All-inclusive tourist resorts in the coastal zone can exhibit most of the negative environmental effects discussed previously, but they are especially likely to contribute to displacement, physical changes especially related to coastal filling and elimination of mangroves and salt ponds. Groundwater depletion and contamination is another common impact of large resorts (Appendix A).

The size and complexity of large resorts requires a high level of technical expertise for review of permits and on-going monitoring of both construction and routine operations. For example, Jamaica is able to attain a relatively high level of operational compliance with hotel wastewater treatment standards by providing special training to government health inspectors (PAHO, 1994, page 257).

Marine Recreational Facilities [22]

Includes boat charters, sport fishing and SCUBA diving, as well as marinas, piers, and cruiseship docks (and specialized cruise shopping services such as Pointe Seraphine in Castries, St. Lucia, or Havensite Mall in St. Thomas). Marine recreational facilities create impacts at two different levels:

- One is similar to other mass tourism concerns, based on cruiseships which now carry as many as 3,600 passengers—the equivalent of a floating 1,500 room hotel.
- Two is the effect of scores/hundreds/thousands of individual actions, such as anchoring in sea grass or snorklers touching the edge of a coral patch. These individual insults are not very damaging, but the gradual increase in the number of divers or sailors and the cumulative effect of their actions result in gradual deterioration of the affected ecosystems .

Small Hotels and Resorts [19]

In this study, small hotels and resorts are facilities under 100 rooms. There are dozens of ways to characterize hotels and resorts—a simple strategy being the following:

Small hotels and resorts may have relatively smaller negative environmental impacts, but they are also significantly less viable economically. Hoteliers and tourism officials generally believe that a threshold effective size in the Caribbean is approximately 250 rooms, which permits international advertising at a sufficient scale to recruit new guests each year. This rule-of-thumb suggests that governments need to understand the level of subsidy that is required to promote small-scale tourism—a factor that is generally understood. The point that is not understood, however, is that *less* impact does not mean that the facility is totally benign, and in some cases small hotels and resorts need added environmental support. For example, the PAHO study of hotel-based wastewater treatment plants indicated clearly that larger hotel treatment plants were more reliable than smaller plants (PAHO, 1994).

The Grand Anse beach in Grenada is an example of a tourist area where small hotels contaminated the beach because none of them could afford adequate sewage treatment, and because the growth of the tourist area stimulated hillside development of housing (with no sewage treatment facilities) for hotel staff and ancillary service personnel, all of which resulted in severe water quality problems for the near shore areas and eventual destruction of the fronting reefs (Towle, 1991).

Entertainment Facilities [19]

Entertainment facilities include bars and restaurants and similar facilities. The scale of these services can range from the simplest beach bar to large restaurants with acres of macadam parking lots. Food and beverage service facilities are singled out because they imply a number of special costs and benefits such as the disposal of fats and pesticides, and low impact use of shorelines. As indicated in the discussion of small hotel and resort facilities, above, enlightened public policy in support of low impact entertainment facilities also needs to plan for the extra public infrastructure costs which would otherwise be born by larger scale developments.

Shoreside Recreational Facilities [19]

This category includes beach and shore services such as sunbathing, snorkeling, day sailing, glass bottom boats, submarines, pools, jet skis, and activities such as harbor cruises and reef tours. The use of the term “recreational” facilities is an important reminder that the domestic service component of these services (and their potential environmental impacts) are indistinguishable from the tourist service component. The same overlap occurs for entertainment facilities. Anchoring and mooring systems are features of both shoreside recreational and marine facilities with special environmental implications.

Parks and Protected Areas [5]

Although often thought of as areas protected *from* tourism and other intrusions, it is clear that throughout the Wider Caribbean, parks and protected areas are major factors in attracting and managing tourists and tourism. Throughout the Eastern Caribbean, for example, cruiseship visitor surveys indicate that 30% of cruiseship passengers who go ashore want to visit the natural areas and parks (OAS and CTRC, 1988).^{*} Negative environmental effects of tourism in parks and

^{*} Note that the subject of this study is primarily protected areas and marine parks in coastal areas, rather than inland parks which might be affected by coastal tourists.

protected areas tend to be small, but it is also true that the ability to tolerate such impacts is also small.

Geographic Zones of Environmental Impact

The “coastal zone” is not a homogeneous, easily demarcated area. It is a variety of geomorphological and environmental complexes which are impacted and react differently to stress caused by coastal tourism activities and associated support systems.

For this study there are three general areas of impact: 1) mainland, 2) coast, and 3) ocean; and three directions to look for environmental effects: 1) inland, 2) along the coast, and 3) seaward. These classes are similar to the “coastal environments” used by Pearce and Kirk in their 1986 paper on “Carrying Capacities for Coastal Tourism,” UNEP *Industry and Environment*, March 1986. We have used the following six classes for this framework, approximating a transect through the watershed—from the heights through the limits of a country’s exclusive economic zone. For this analytical framework there are no hard edges to most geographic zones of environmental impact, but it should be understood that environmental impacts from tourism in upland areas are generally excluded from this study, which concentrates on coastal tourism impacts.

Impacts are most acute in the immediate area of the shoreline, with two-thirds of the identified impacts occurring between the back bays and the fronting reefs. These areas of impact coincide with areas of greatest human use conflict (tourism, housing, agriculture, ports and transportation, urban settlements), and with the most productive and critical habitats and coastal nurseries for reef, coastal and pelagic marine species.

Near Coastal Waters and Fringing Reefs [26]

The outer limits of these near coastal and fringing reef areas is a broad band, possibly out to 20-fathom depths. Most offshore islets and cays—which are an entire topic for protection unto themselves—are in this area. Impacts result from:

- the construction and operation of docks, piers, wharves, groins, breakwaters and other physical structures;
- sediments stirred up by sea traffic;
- new current and wave regimes created by other changes,;
- anchoring and diving insults;
- the direct introduction of toxics and other pollutants from anti-fouling paints, ship operations and waste discharges;
- the visual impact of anchorages, piers and ports;
- the displacement of fishers and other traditional water users, and
- the irritation caused by loud and boisterous parties on harbor and coastal day-trip boats and barges.

Beach and Shoreline [24]

The geographic zone describing the actual intersection of sea and land, which in this framework includes barrier islands.

Numerous human and natural factors contribute to the character of a beach, including ocean currents, presence of reefs, long shore currents, the state of rivers emptying into the sea, and adjacent wetlands. Construction activity, sand mining, effluent discharges, wetland reclamation, sewage and solid waste disposal practices are tourism-related activities which affect beach quality. (PAHO, 1994, p. 209)

Estuaries, Back Bays, Salt Ponds and Lagoons [23]

These are the buffers between the land mass and the sea—usually thought of as sinks for sediments and pollutants from the land, these areas also buffer the coastal plain and shorelines from offshore storms and waves. These areas are easily accessible for development and are difficult to protect.

Coastal Plain [19]

This is the site of the bulk of coastal tourism facilities. In general, this is the area which sees most of the use conflicts in the coastal zone as facilities are moved back from the shore and as population growth and migration from the hinterlands leads to higher residential densities.

Uplands [10]

This area is impacted indirectly by coastal tourism activity, usually resulting from either the displacement of traditional users to upland areas, or the immigration of workers for the tourism services who are excluded from living in the coastal plain or shore areas by high costs of land or land ownership. *Direct* tourism effects in upland areas can occur by visual intrusions on the viewshed of upland properties, especially from high-rise coastal development.

Offshore Waters [10]

Isolated offshore reefs, islets and cays, and the open sea, to the limits of the exclusive economic zone. Because these areas are so dispersed, there is not much direct tourism impact on the zone—but again, there is a big difference between “not much” and “acceptable.” The problem of marine debris, including beach-fouling tar balls remains acute.

Documentation of Coastal Degradation of Environmental Resources

Research for this project has identified more than 100 publications (See Section 5. References, below) about environmental degradation from coastal tourism. These references summarize the content of the information available most immediately to the best informed coastal managers.

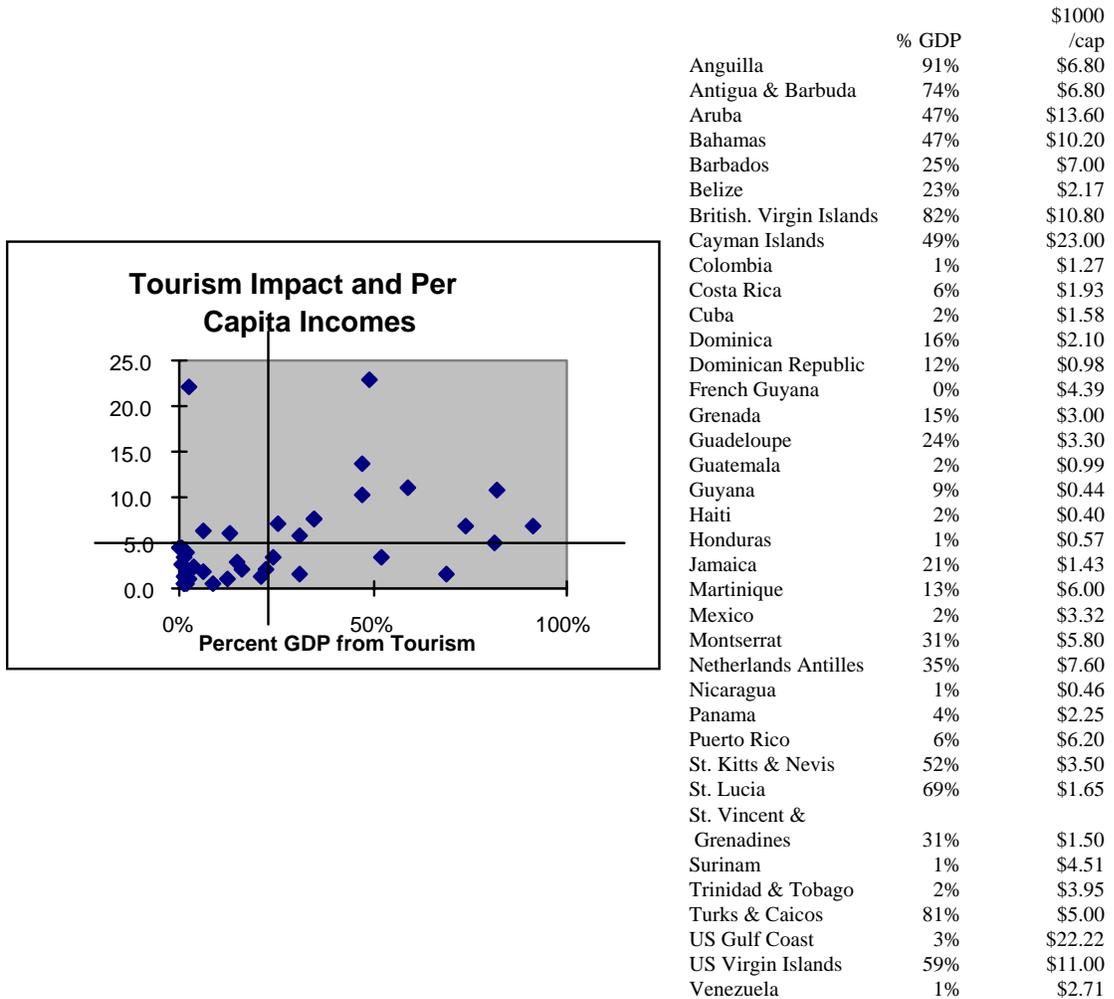
Table 6: Documents Related to Environmental Degradation, at the end of Section 5, displays an analysis of these references in relation to our analytical framework. This analysis leads to three conclusions:

- Information resources for environmental degradation from tourism facilities and services in coastal areas are not evenly distributed.
- Environmental degradation effects can be mitigated by known actions from a number of disciplines *outside of* the coastal environment and tourism planning sector.
- *Mitigation* of environmental degradation effects can best be supported by broad involvement *and information sharing* with several sectors, including for example, agriculture, forestry, hydrology, and environmental health.

At one level, this merely demonstrates the often-repeated statement that coastal environmental planning is multi-sectoral and multi-disciplinary. It also confirms the need for coastal planners to seek information from sources outside of planning.

For example, our references have few works which deal with the visual impacts of upland-stimulated developments arising from coastal tourism facilities (*e.g., favela-style* development, such as that seen above the beaches Grand Anse Bay in Grenada). But clearly there are regional planning, landscape planning and architectural resources which could be mustered to address the problem, *if* broad-ranging information sharing for environmental impact mitigation is a priority for planners.

Figure 3. Tourism Impact and GDP



Source: Table 2, above.

Figure 3. Tourism Impact and GDP, shows the relationship of per capita Gross Domestic Product (in thousands of US dollars) to the proportion of total GDP earned by tourism (Hoagland, et al., 1995). As highlighted in the accompanying chart, Caribbean states with a high proportion of the total GDP derived from tourism (*e.g.*, over 20%) also have higher per capita incomes (*e.g.*, over \$5,000). There are many reasons why this apparent relationship may not reflect a true increase in individual well-being or “quality of life,” but it does support the commonly held beliefs of many residents and policy makers.

Impact of Tourism on the Environment

In April of 1986, Mr. Jean Holder, then Secretary-General of the Caribbean Tourism Research and Development Centre, speaking at a workshop organized by CIDA, suggested the following pattern of costs and benefits of tourism in the Caribbean:

Table 5: Benefits and Costs of Tourism

Benefits	Costs
<ul style="list-style-type: none"> • Improved ports • Better transport • Better telecommunications • Tax revenues • Parks and Protected Areas • Recreation Facilities • Preservation of historic sites • Appreciation of vernacular architecture • Beautification of public places • Increased cultural offerings • Stimulation of crafts • Museums 	<ul style="list-style-type: none"> • Exhaustion of potable water resources • Beach pollution • Shore pollution • Beach erosion • Damage and removal of coral • Visual obstruction • Over fishing • Species and habitat loss • Noise pollution • Litter • Village social impacts • Loss of traditional values • Loss of agriculture • High land costs

Holder stressed that balancing the costs and benefits requires:

- 1) acceptance of change,
- 2) a recognition that we need to be flexible in adjusting to new information, and
- 3) great care in awarding concessions with irreversible consequences (a statement now called the Precautionary Principle).

These are still good rules.

The significance of the coast as an element in the tourist attractiveness of the Caribbean cannot be overestimated. In the United States a recent paper by the Director of the US Army Corps of Engineers Center for Environmental Research (and a recognized authority on beach valuation) pointed out that Miami Beach received twice as many visitors as the Grand Canyon, Yosemite and Yellowstone National Parks combined (Houston, 1996).

Benefits of Tourism in Coastal Areas

Income

Direct and indirect income effects of tourism in the coastal zone are large throughout the Caribbean, where tourism is both the largest single industry, and also the fastest growing industrial sector. In the small island developing states of the Caribbean tourism accounts for up to 88% of gross domestic product (United Nations Commission on Sustainable Development, 1996c)

Jobs

Tourism has a major employment impact both because of the size of the tourism industry, and also because tourism is a labor-intensive industry (0.9 to 1.8 jobs per room in the Caribbean, according to the Caribbean Tourism Organisation, CTO, 1994). Although tourist industry jobs are generally thought of as low paying, in the United States wages are equivalent to or slightly above manufacturing jobs (Houston, 1996).

Foreign Investment

Construction of tourism facilities in the developing countries of the Wider Caribbean is generally financed by foreign investment, and is itself a major source of income and employment for the developing countries of the region.

Infrastructure Development

Tourism, and especially the development of mass tourism, frequently brings with it the improved airports, roads, docks and seaports, and commercial distribution systems which improve the quality of life for all of the inhabitants of an island or region. These infrastructure improvements can include sewerage systems, solid waste management facilities, potable water systems, and other infrastructure with direct impacts on environmental conditions and the public health.

Examples of infrastructural improvements from tourism include the World Bank- and Global Environmental Facility-funded programs for solid waste management and disposal of ship-generated solid waste, which are designed specifically to enable governments in the Eastern Caribbean to cope with solid waste impacts from tourism, especially waste resulting from cruise ship tourism. Surveys on all of the islands associated with these projects indicate that the predominant source of solid waste and marine debris in these islands is local, domestic users. Other projects include public power generating facilities and submarine cables paid for by resorts, cruiseship docks and airports throughout the region, and expansion of potable water systems.

Increased Local Support for Environmental Amenities

Many of the most tourist-dependent areas of the Wider Caribbean have environmental NGOs or initiatives (e.g., beach clean-up campaigns) which are supported by tourists, and which have gradually created new awareness of environmental issues and problems in the region. For example, financial support of some conservation groups, particularly those with an historic preservation focus, relies heavily on contributions from winter residents of the Caribbean.

Conversion to Less Stressful Use

In some areas of the Caribbean tourism facilities in the coastal zone replace activities which have demonstrably or presumably greater impacts on the environment, such as intensive agriculture with pollutant effects from herbicides and pesticides.

The following box illustrates the ambiguity over the costs and benefits of tourism in the coastal zone. In this excerpt from an article by Gilberto Romero about environmental conditions in Cuba, damages to the country’s beaches are enumerated critically, both as direct and indirect effects of tourism, and also because they implicitly prevent the country from exploiting more tourist opportunities.

CUBA, CRISIS DEL MEDIO AMBIENTE

Por Gilberto Romero Jr.

THE CHAOTIC SITUATION OF THE BEACHES

For Cubans and foreigners alike it is no secret that the beaches of Cuba constitute one of the principal tourist attractions in the country. However, beaches have not escaped the onslaught of environmental degradation. Sand from the famous beaches east of Havana have been [removed for] the construction of buildings.

Oil spills from production wells along the coast and the wastewaters from sewers are the worst pollutants of the sand and the water of the beaches. The coastal area west of

Havana has highly polluted rivers, such as the Quiba, which pollute the beaches of the province of Havana. The contamination of the Quiba even prompted a popular song about it.

... even Varadero, has not managed to survive [untouched]. Much of its sand ... was removed during these last three decades. ... southern beaches, such as Caimito, Rosario, Mayabeque, Cajío and Guanamar... have been impacted by discharges from nearby sugar mills. ...

Three bull breeding centers created another overwhelming source of pollutants. Each discharges waste comparable to that produced by a city of 100,000 inhabitants. In the south too,... mangroves ... have decreased as have the fish, birds and mammals in that region.

Contacto, septiembre 1996.

Conditions cited for the Cuban beaches could be identified with numerous other countries in the Wider Caribbean.

Costs of Tourism in Coastal Areas

Water Quality and Quantity

Groundwater and surface water supplies throughout the Wider Caribbean are being impacted by overuse and contamination. Loss of this critical resource may be one of the major long-term development problems facing the Wider Caribbean, and tourism facilities have contributed to the problem for many years.

Water quality problems may result in the need to invest in alternative potable water supplies, to develop more complex treatment systems with increased operating costs, and to incur extra investments in water distribution systems. Degraded water quality may also result in extra costs for water supplies during droughts and other emergencies, and increased costs from lost work and medical treatment caused by polluted drinking water and contaminated beaches. In direct impacts on tourism, poor water quality effects can range from simply compromising tourist expectations, to major public relations disasters if tourists have to be warned to stay out of the sea in front of their hotels. The Coastal Zone Management program in Barbados grew out of public health and public relations concerns (Atherley, Smith, and Nurse, 1993).

Sewage and Solid Waste Disposal

Tourists generate greater amounts of solid and liquid waste *per capita* than domestic users. The upside of this cost is that the impacts are generally concentrated in small geographic areas which makes it more economic to collect and treat these pollutants than those generated by the more widely dispersed local users. The downside, as shown in the PAHO study cited previously (PAHO, 1994), is that these small waste treatment plants and landfills are seldom managed to the level of performance that modern standards require. Even the best monitoring of hotel waste treatment plants, for example (in Jamaica) achieved only a 43% compliance with regional standards.

Loss of Non-renewable Resources

Sand mining from beaches is a major negative impact related to tourism development in the Wider Caribbean. Beach sand is a non-renewable resource used by tourism for construction and beach replenishment. Sand mining in combination with regional sea level rise and erosion caused

by a variety of manmade and natural factors can destroy beaches. The 1995 Annual Report for COSALC I (Cambers, 1996) describes and illustrates the loss of the beach in front of Pinney's Beach resort (Nevis) over the past 30 years, with the resort now occupying a peninsula protected by rock revetments, where it once nestled in the midst of the coconut plantation which fringed the old beach.

Overharvesting of Renewable Resources

Some tourists are aware that grouper, conch and lobster are becoming scarce throughout the Caribbean. Fewer are aware that mangroves, for example, are renewable resources which are becoming severely stressed throughout the region by overharvesting for fuel and construction materials and by coastal development that diminishes or destroys mangrove habitat. The list of degraded coastal and marine resources is getting longer, and includes the region's critical coral reefs (Gladfelter and Ogden, 1994).

The Death of Reefs

Conditions affecting reef communities are familiar to planners and environmentalists throughout the Caribbean:

- *sediment-laden runoff from upslope erosion and fertilization causes corals to die or to grow much slower;*
- *major physical damage, such as boat anchoring, ship groundings, trawlers, and repetitive minor insults, such as boat wakes, fish traps and diver contacts increase the rate of "normal" coral attrition;*
- *sediment pulses from storm run-off, either stimulated by construction disturbances or permitted by the destruction of fringing mangroves, salt ponds and other shoreside buffers, smother and further weaken or eventually kill corals;*
- *warm ocean waters, caused by natural factors or as an affect of global climate change, seem to reduce the resistance of corals to disease and other stresses;*
- *diseases (such as white band disease) caused by natural or unknown sources, and abetted by systemic stresses such as those listed above, wreak havoc on major elements of the coral community, destroying vast proportions of the elk horn corals in fringing and patch reefs throughout the Caribbean;*
- *major storms—again, possibly caused by global climate change—destroy large areas of weakened reef and totally obliterate large areas of reef rubble which had served as reef and shore protection barriers (Dr. Barry Blake, former director of environmental programs for the British Development Division in the Caribbean, personal communication).*

Increased Social Tensions

Large number of tourists, especially foreign, richer tourists, tend to stimulate social friction among different classes and racial groups. It is worth noting that the recent review of tourism for the Small Island Developing States Unit of the UN Commission on Sustainable Development recommends three measures for coping with the adverse social and cultural impacts of tourism, including studies of a social carrying capacity for tourism, public education programs, and improved security measures to address increased crime and drug problems (UN PRCSO, 1996c).

Stimulation of Imports of Foods and Other Consumables

Many tourist destinations, especially in the most tourist-dependent small island states of the Wider Caribbean, are unable to meet the needs of tourists for basic food and other consumables. This economic reality, in combination with the preferences of tourists for goods from the metropolitan countries, contributes to the weak economic benefits of tourism in many countries. This is not an unmixed negative impact, since it provides a scale of import demand which helps to reduce costs for local residents. Foreign consumption patterns also dramatically increase the volume of trash produced from packaging (GESAMP, 1990).

Costs of Damage from Natural Hazards

Increased density of development, higher unit investments in the precarious coastal zone, and more fanciful architectural styles increase the risks and costs from natural hazards. The 1995 hurricane season heightened awareness of the vulnerability of coastal areas in the Wider Caribbean to natural disasters, and has made securing insurance much more difficult. Coastal damages from the hurricanes have also raised questions throughout the region about the adequacy of shoreline setback policies (Camber, 1996)

Increased Densities and Conversion to More Stressful Uses

High density tourist developments in the coastal zone, plus the displacement effect of such developments on other sectors of the local community, increase the overall density of coastal areas, with negative consequences for most natural systems and overall sustainability. Increased coastal land use from tourism-related activities, in already stressed coastal areas, usually generates adverse cumulative effects over time, unless countermeasures are taken to maintain a productive host environment. Development planning therefore needs to adopt a no-net-loss principle for the support of coastal ecosystems.

The Tourism Death Spiral

The analytical framework devised for this study (Section 2) discussed the possibility that tourism-dependent economies could suffer such environmental degradation that tourism would decline, reducing national income and government revenues which would worsen conditions, leading to more tourist flight and so forth. (This negative feedback loop is discussed in McEachern and Towle, 1974, and in several newer works by McElroy and de Albuquerque) In effect, this death spiral scenario contradicts the more general hypothesis that investors and the local community can cooperate to ensure the maintenance of environmental amenities in order to preserve tourism income.

In the real world it is seldom possible to separate causes and effects so neatly, but development planners and travel agents would probably agree that small areas,

such as Miami Beach from the 1960s to the early 1980s, the Condado Beach area in San Juan, and possibly other mass tourism destinations in the Caribbean have suffered from or passed through such cycles.

continued . . .

The case of the US Virgin Islands in recent years leads to the hypothesis that the tourism death spiral may be affecting the entire Territory after several decades of tourism-fueled growth. The US Virgin Islands have suffered substantial environmental degradation in addition to damages from storms and hurricanes in recent years. There are no studies which definitively link the cumulative environmental degradation of the islands to tourism, but in a territory characterized by both mass tourism and high dependency on the tourism industry (59% of GDP), tourism certainly accounts for a significant portion of the wear and tear experienced by the environment over the past 30 or 40 years.

According to the local Department of Tourism (June, 1996), from 1988 (the year before Hurricane Hugo) to 1994 (the year before Hurricane Marilyn), the number of tourists (omitting day tripping excursionists and cruiseship passengers) decreased from 555 thousand to 540 thousand. During the same period (CTO, 1995) Caribbean tourism increased at an average annual rate of 3.1%.

If the Virgin Islands had kept up with the Caribbean, tourists for 1996 would have been 666 thousand, (23% higher than actual) and government revenues would have been \$21.7 million higher, based on estimates of the 1994 economic and fiscal impact of tourism on the Territory (Department of Tourism, Val Kufel, July, 1995).

The government revenue figures are especially significant, since the government currently has a recurring annual deficit of over a hundred million dollars, it owes \$140 million in back pay to employees; it is two years late in paying \$60 million in tax refunds; and vendor payments are months in arrears.

[It should be noted that tourism officials and many Virgin Islands residents deny the implications of this analysis, citing short-term economic fluctuations, hurricane-induced reductions in tourism, and bad luck as the sources of business losses. In a front page article in the *Virgin Islands Daily News* for December 2, 1996, however, the president of the St. Croix Chamber of Commerce is quoted as saying that long-term changes in tourism growth reflected fundamental changes in the Virgin Islands attractiveness to tourists.]

Valuation of Beaches

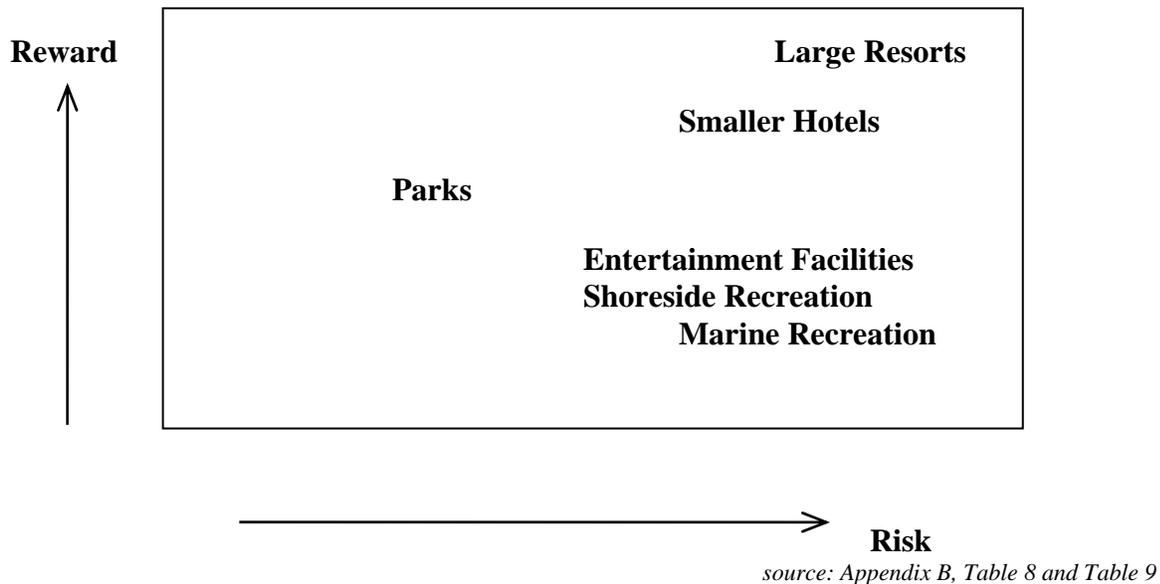
Valuation of beaches is a key element for developing costs of environmental impacts of tourism. Appendix C presents a mid-1996 list of beach valuation resources from world-wide sources as posted on the Internet.

Summary of Benefits and Costs

Table 8: Benefits from Tourism Facilities in the Coastal Zone and Table 9. Costs from Tourism Facilities in Coastal Areas, in Appendix B, provide an overview of benefits and costs of various types of tourism facility in terms of their geographic effects. At a macro level, these matrices demonstrate the alternative mixes of costs and benefits which can be developed, based on the mix of tourism facilities.

Even in the absence of the kind of detailed cost and benefit information which would permit the calculation of real rates of return and payback for various tourism investments, we can use the information in Appendix B to create a general Risk/Reward framework for evaluating public policy options for coastal tourism investments.

Figure 4. Risk/Reward Summary Diagram



This summary suggests two important facts about the cost/benefit tradeoffs of tourism in the Caribbean which are buttressed by hard-earned experience throughout the region: (1) the high risk/high gain nature of large resort complexes imposes special assessment and monitoring requirements on host governments; and (2) inadequate information about risks and rewards handicaps both governments and investors in evaluating tourism proposal trade-offs.

High Risk/High Gain from Large-Scale Tourism Development

The high rewards portrayed by potential investors and developers of major resort and hotel investments are accompanied by equally high risks in terms of environmental and socio-economic effects. The complexities of these trade-offs require detailed study by government, including public hearings and input from a variety of professional, scientific and technical

resources. In Section 4, below, several techniques, from information gathering to contracting additional consulting assistance, are discussed to ensure that these proposals are assessed with full regard for all of their potential benefits and risks.

Inadequacy of Information Base

Finally, it should be repeated that these assessments of risks and rewards are based on incomplete qualitative information on benefits and costs. The real significance of these kinds of assessments will only be useful for definitive planning and management decisions by public servants and private investors alike, when we can identify *how much of what kind* of investment generates *how much* of what kinds of benefits. For example, does a million dollar investment in an all-inclusive resort like the popular Club Med or Sandals chains generate comparable jobs, infrastructural improvements and foreign exchange earnings as a million dollars invested in creating a coastal and marine park?

4. _____ Mitigating Tourism Degradation of Coastal Areas

This Section outlines the principal tools or processes needed by regional and national planners and policy managers to determine specific impacts (plus and minus) of current and proposed tourism activities. These are tools to support *planning* to mitigate coastal degradation from tourism. The broad categories of these tools are:

- An analytical framework for addressing tourism facilities, areas of impact, and types of environmental effect;
- A win-win model for negotiating tourism development among government, the tourism industry, workers, landowners, local residents, non-governmental organizations, and other special interests;
- Adequate technical expertise;
- Improved knowledge of programs and natural resources;
- Five specific mitigation strategies.

The final part of this section, Related Programs of International Groups, page 38 below, discusses some of the international policy and strategic recommendations addressing tourism or coastal environmental policies which may provide guidance to national and regional planners.

A Framework for Analyzing Tourism and the Environment

This report has presented a broad analytical framework for assessing specific elements of environmental degradation from coastal tourism, based on the type of tourism facility and the area being impacted. Planners and managers need a refinement of this [or similar] framework to apply at the local level.

Economic Studies

As discussed in the Section on the Analytical Framework, page 8, and Section 3, immediately above, detailed economic studies (such as those suggested in the 1993 Organization of American States *Compendium of Recent Studies on Tourism Development*) are needed to identify the economic benefits that actually accrue to [what sectors of] the host country from investments in and expenditures for specific types of tourism facilities.

At the regional level such studies of economic returns could at least provide the range of probable returns from such investments for various sub-categories of the Wider Caribbean economy. Because of the wide variation in key factors such as land values, wage rates and construction costs, a Caribbean-wide analysis, however, would be less useful than smaller studies of sub-regional economic factors. Priorities should be set for studies of economic conditions in sub-regions or countries with high investments in and growth of tourism.

Win-win Coastal Planning

Tourism developments are really a subset of the general problems associated with planning and coordinating development in the coastal zone of Caribbean states. The coastal zone management model which is commonly used in the Wider Caribbean is based on an outmoded and frequently damaging assumption that development is a “zero sum game,” in which developers and government are locked in combat to win the development game. In the abstract it is now generally conceded that developers *and* government, private *and* public sectors, *must* win in order for the people to benefit from new investments. Win-win negotiating systems are especially important for sectors like tourism which depend on natural resources and high environmental amenity values (UNEP, 1996). Unfortunately, win-win concepts have not yet been widely applied to the actual processes of planning, coordinating and permitting tourism development.

Some recent experiments embodying win-win planning processes, worth studying for both their successes and their failures include:

- Major, long-term tourism development planning processes for the Soufriere area of St. Lucia, involving local residents, fishermen, hotel owners and planners, and a variety of government agencies. This project has been heavily supported by outside interests, including the USAID/ENCORE program implemented by the Natural Resources Management Unit of the Organisation of Eastern Caribbean States.
- Preliminary planning for coastal impact mitigation in the further development of the Bay Islands of Honduras.
- Organization of American States-supported planning for a marine sanctuary and wildlife reserve as part of a larger Parham Harbour Development scheme for the northeast coastal area of Antigua.

All of these planning processes attempt to provide effective participatory avenues for the stakeholders in the development process, including local residents, investors, workers, government, environmental interests, and even future consumers. It is also notable that all of the examples noted above have significant technical or management roles for non-commercial, non-governmental organizations, sometimes as formal groups of cross-sectoral interests, sometimes as representatives of specific interests, such as fishermen’s associations or environmentalists.

Adequate Technical Expertise

Tourism development planning and administration involve highly technical issues. In small developing states, such as those found in the Caribbean, it is difficult, often impossible to muster the staff talent to evaluate projections of economic and environmental effects in development proposals, or even to knowledgeably review and react to monitoring and assessment reporting conducted for construction or operation of large facilities. To address these problems in a

realistic cost and political environment requires openness and innovative use of outside resources.

The Coastal Zone Management Unit of the Ministry of Tourism, International Transport and the Environment in Barbados has developed a model for getting needed technical skills which is instructive for both national and sub-national jurisdictions throughout the region. As a matter of routine practice (and agency policy in the case of major projects), the Unit seeks a contract or memorandum of understanding with a qualified third-party institution to provide independent consultation and advice (often referred to as “peer review”) on technical matters involving the project, as they arise. In the event of encountering special technical problems, the third party (in Barbados, often one of several special institutes affiliated with the University of the West Indies) is free to seek other detailed advice and support from outside the country (Leonard Nurse, Director of the Coastal Zone Management Unit, personal communication).

In addition to being an excellent solution to the technical problem, the use of the third-party peer review organization frequently has the effect, especially in small states, of building wider knowledge and understanding of the issues surrounding large complex projects among a broader strata of local leadership. This in turn generally enhances the quality of the dialogue and the policy instruments which can be applied to the project.

Knowledge of Program and Natural Resources

Governments, investors, citizens and scientists all need to know about existing and future *programs* that can be used or adapted to support coastal tourism development in the Wider Caribbean. Similarly, there is a vast wealth of *environmental data* and information which could be better used to manage current coastal zone programs or to analyze plans for future developments. Each of these subjects is discussed separately below. In spite of the great differences in subject matter, both of these important information needs require a catalogue of information that can be assembled from existing data sources. This “re-packaging” holds the promise of substantial benefits from relatively modest investments in modern Internet and data management technologies.

This need, however, is purposely characterized as a need for increased *knowledge* of program and natural resources. In the hierarchy of knowledge, one proceeds from data to information to knowledge. The long-term goal is to build knowledge systems for both programs and natural resources which will serve as decision-support tools for private and public policy managers throughout the region. This means that while the first step in this process is to build databases and data access systems from existing information, the next steps should include the institution of specialized World Wide Web search engines, geographic information systems, other decision support and data visualization systems.

Program Resources

There is a recognized need to provide more efficient access to information about program resources which can support planning or investments to mitigate coastal degradation from

tourism (and other development pressures). Listed below are four recent attempts to catalogue some of these resources:

The World Bank's 1994 report on *Initiatives for Regional Action on Caribbean Environmental Issues*;

The "Tropical Americas Regional Report on the Issues and Activities Associated with Coral Reefs and Related Ecosystems," prepared by Jeremy Woodley, Centre for Marine Sciences, University of the West Indies, Jamaica, for the *1995 International Coral Reef Initiative Workshop*;

Notes from the "Environmental Interagency Coordinating Committee, Special Meeting on Coastal Management Activities," held at the Caribbean Development Bank, Barbados, March 5, 1996, published at <http://www.irf.org/ircdb.html>; and

The environmental project database for the Wider Caribbean, being assembled by Erik Blommestein of the UNESCO Economic Commission for Latin America and the Caribbean sub-regional office for the Caribbean.

These *ad hoc* efforts need to be systematized in improved, consolidated reporting of program resources so that developers and planners in the Wider Caribbean can assess the environmental supports which they can apply to local development planning and program implementation. The scope of such information systems should be expanded to include a *directory* of regional experts and *NGO and private industry activities*, such as the Blue Flag beach certification program in Europe, or alternative energy systems.

Natural Resources

Environmental conditions in the islands and coastal areas of continental countries of the Wider Caribbean are highly variable, which complicates planning and permitting processes for both natural resource management and development planning. Resource managers and development planners both need improved information about environmental conditions.

Metadata

Paradoxically, while environmental conditions throughout the Caribbean have been studied extensively, there is no organized process for cataloguing or providing access to these studies which may be anywhere in any of a dozen local archives, or in a large number of overseas libraries or historical files. Environmental information specialists (and consultants) have begun to recognize local decision-making needs, at the same time that international organizations are building tools which permit the cataloguing of such studies in a systematic way that can be accessed, in part, by sophisticated search tools over the Internet.

Monitoring and Assessment

Secondary to the need to catalogue existing information resources is the need to collect new information on environmental conditions using standardized or comparable monitoring and

assessment tools that accurately capture major information. Tools such as the coral reef monitoring manuals written by the United States National Park Service in the US Virgin Islands and the UNEP Regional Coordinating Unit in Kingston, Jamaica, are basic to this process.

The CARICOMP marine monitoring program is beginning to amass a wealth of standardized environmental data useful to regional planners from 25 sites around the Caribbean. The COSALC I project is accumulating a similar volume of information on the physical conformation of a number of beaches in the Eastern Caribbean. Both the data *and the methods* applied to collect this data should be widely available to potential users—for example, over the Internet or by some other open, accessible format.

Environmental Information Access Tools

Governments and developers have mutual needs for good, comprehensive access to information about environmental conditions for tourism planning. Cataloguing tools (metadata systems) are becoming widely available in forms that permit the information to be widely accessed by local and international investigators, whether these are scientific researchers, resource planners and managers, or development planners and investors.

The Conservation Data Center of the Eastern Caribbean Center of the University of the Virgin Islands, for example, has recently sponsored a training program in metadata collection procedures for geospatial biological and environmental information for environmental information specialists from across the northeastern Caribbean, including public, private, local, national and non-governmental organizations. Because this information is being catalogued in a standard format, the United States Geological Survey agrees to provide computer facilities to make this information available over the World Wide Web to students, researchers, planners, and managers from the next island or around the world.

With improved access to high quality environmental information, it becomes easier for planners and developers to incorporate environmental considerations in their development plans. This, combined with a permitting process that emphasizes environmental concerns, will stimulate competition among investors for innovative, effective and environmentally sustainable tourism developments.

Mitigation Strategies

“... merging tourism and conservation effectively is a tricky task, but one which may prove necessary for the survival of both.

Mariana Stockley, NEXUS, 1984, 6(3); pp 1-7.

This section lists five priority goals to enable regional and national planners and policy managers to mitigate the negative environmental effects of coastal tourism:

- link tourism development to the country’s integrated coastal area planning and management initiatives;

- develop sustainable, long-term tourism strategies with strong environmental protection elements;
- protect existing natural coastal areas;
- restore natural areas;
- apply voluntary tourism industry standards and training.

These strategies may overlap, but are not directly comparable to the best management practices for tourism facilities which are being assessed in another publication of the Caribbean Environment Programme.

Work within an Integrated Coastal Area Management Program

Tourism development is simply another of the myriad of investment opportunities which are competing for space and resources in the coastal zone. Tourism development needs to be fully integrated in public policy formulation and resource management programs. Because of the glamour and exoticism associated with many elements of tourism there is a tendency to separate tourism planning considerations from other coastal area planning and management. This is a major mistake in both the planning process and public policy.

Using the definition of Integrated Coastal Area Management as developed by Jens Sorensen (UNEP, 1996) as:

- a dynamic process that continues over time,
- involving a governance arrangement to establish policies for making allocation decisions,
- a governance arrangement that uses one or more management strategies to rationalize resource allocation,
- management strategies that rely on a systems approach recognizing connections among coastal and marine activities, and
- having a boundary that crosses from the sea to the interior of the shoreline,

it is clear that good tourism planning and policy management requires a framework of effective coastal area management.

Strategic Planning for Sustainable Tourism

Strategic planning for tourism is not, as implied in much of the literature, the search for a tourism “carrying capacity” for a given island. As pointed out by Paul Wilkinson (1990):

It seems clear that tourism carrying capacity—as defined by the question “how many is too many?”—is neither appropriate nor heuristic. Using the concept in this sense results in the false impression that a given situation is static and can be reduced to a measurable equation. ...

More sophisticated analytical models are required to understand the intricate phenomenon that is tourism, particularly models which focus on three components of a tourism system: the environment, the tourists, and the local community.”

To achieve progress toward a strategic plan for accommodating tourism and environmental considerations, national planners need to:

Assess the importance of tourism in terms of its contribution to total income, growth of income, and foreign exchange earnings;

Identify the stage of tourism development, or where the national tourism industry stands within an evaluation framework such as the “Limits of Acceptable Change” (*ibid.*, see also McElroy, 1991); and

Identify the unique indigenous elements of the local tourism product (Hawkins, 1995), to understand potential conflicts and complementary interests with environmental protection.

Building or reviewing a tourism development strategy provides a means to re-evaluate public attitudes and government policies for tourism development, and it also provides improved guidance for developers.

Protect Existing Natural Areas

There are many reasons for establishing protected status for existing natural areas of the coast. The best reason is based on the simple observation that there is high population density in countries with high investments in tourism—if undeveloped lands are not protected they will soon be developed. Figure 3. Tourism Impact and GDP, above, indicates that higher tourist activity is also related to higher incomes, which further increases pressures on and costs of coastal property.

This is not a recommendation to deny development at any cost, but because of inefficient property markets, it is necessary to ensure that developments of previously undeveloped areas are required to pay the *full costs* of such development. Protected area status can help to provide additional security that such costs are recovered. Examples of such protection include the 21 national parks in the Wider Caribbean, the Biosphere Reserves (five at last count) and several marine protected areas. These protection systems are becoming increasingly flexible as planners realize the benefits of exploring real multiple uses for an area, while seeking to preserve environmental amenity values. The important object lesson throughout the region has been the high land values which are evident in areas near parks and protected areas.

Apply Restoration and Rehabilitation Techniques

Nations in the Wider Caribbean need technology for restoration and rehabilitation of natural resources in the coastal zone. In part this will be adaptation to Caribbean conditions of technologies developed elsewhere, such as artificial fishing reefs or mangrove restoration programs (Sarasota Bay, 1993), but it will also require additional research to rebuild, restore or revitalize unique coastal resources such as coral reefs and salt ponds. Some ingenious recent

work in this area has been done in the Gulf Coast states of the United States, especially in association with National Estuaries Programs in areas such as Tampa and Sarasota Bays in Florida and Corpus Christi in Texas.

Use Tourism Investment to Improve Resources

Coastal land values are so high in most areas of the Caribbean (frequently over US\$100,000 per hectare) that coastal developments can afford to carry the cost of restoring many coastal habitats, which will also enhance amenity values of the property and create additional opportunities for recreation and tourist services. In other words, it's cheaper to restore the overstressed local environment than to buy and develop a new site. Such environmental enhancements range from rebuilding coral reefs to sea grass transplanting, restoring fringing mangroves, and rebuilding or rehabilitating wetlands, lagoons and salt ponds. These rehabilitation and restoration efforts need to be carefully coordinated with a broad spectrum of other private and public activities to ensure that the underlying conditions and continuing stresses (*e.g.*, continuing high levels of nutrient discharge) do not handicap the restoration effort or deter ecosystem recovery. For example, with mangrove restoration costs world wide ranging from US\$2,500 to \$25,000 per acre (much of the variation apparently depending on costs of land forming—Internet dialogue, November, 1996, Mangrove Discussion List), waterfront or residential areas throughout the Caribbean can afford to restore small patches of the important fringing mangrove habitats which contribute much to local marine biodiversity.

A recent publication in the *Biodiversity Series* of the Global Environment Facility (Brandon, 1996) endorses ecotourism as a means of linking tourism to fee generation for maintaining and improving the quality of parks and protected areas. The report acknowledges that this usually does *not* happen.

This study has tended to concentrate on the natural environment, but adaptation and upgrading of the *built environment* can increase cultural awareness and local use of tourism facilities built around established local buildings and features. These restorations also increase opportunities for interpretation and other didactic uses of tourism sites.

Develop Voluntary Standards and Training for Tourism

The tourism industry spends a great deal on training and in-service education. This is supplemented by a number of publicly-supported hotel and hospitality training schools. Much new training in the industry is directed at increasing the environmental sensitivity of the industry and demonstrating the commitment of individual hotels and resorts to a clean environment.

National tourism authorities and environmental officials should work closely with the industry to adapt generic and “green” materials being used by the in-house training programs to content which more specifically addresses the conditions and requirements of the Caribbean. Examples of source materials include the UNEP-influenced *Green Globe* training materials (Hawkins, 1995), training for national authorities to implement a *Blue Flag*-style certification program (also a UNEP initiative, together with the World Tourism Organization and the Fund for European Environmental Education), and programs of the Caribbean Hotel Association. This issue is dealt

with in greater depth in a companion study on environmental best management practices for coastal tourism.

Related Programs of International Groups

The development and application of strategies for mitigating the negative environmental effects of tourism is only one of dozens of programs which need to be coordinated by national and regional planners and development policy managers. Combining local tourism development strategies with these regional and international programs can provide additional resources and increased coherence to national planning efforts.

SIDS Review by the Commission on Sustainable Development

The May, 1996, review by the United Nations Commission on Sustainable Development of the Programme of Action for Small Island Developing States, included six points for Tourism Resources and a number of related topics. Under the Tourism Resources category, the Commission encourages small island states to pursue *sustainable* tourism development by:

- (a) diversifying the tourism product,
- (b) strengthening the linkages with other economic sectors,
- (c) collecting data on benefits and costs,
- (d) rigorous review of development proposals,
- (e) assistance for tourism infrastructure,
- (f) regional tourism standards and coordination.

The Commission on Sustainable Development has endorsed a major series of recommendations in support of integrated coastal area management, a review of linkages between natural disasters and development, promotion of telecommunications and other matters which will directly affect the conditions for tourism development.

The Commission also recommended the draft resolution of the Washington Declaration on the *Protection of the Marine Environment from Land-Based Activities* to the United Nations Economic and Social Council, including items directing UNEP to prepare specific proposals for the implementation of the Global Programme of Action, including a clearinghouse data directory and linkages to information delivery mechanisms.

The Framework for Action of the International Coral Reef Initiative

Passed at the International Coral Reef Initiative Workshop in Dumaguete City, The Philippines, in May, 1995, the Framework for Action supports a wide range of activities, including especially integrated coastal area management, tourism planning and management, capacity building, a large research and monitoring component, and specific calls on UNEP for an active role in

reviews of international Coral Reef Initiative accomplishments at the regional and international level.

Mexico City Recommendations on Sustainable Development of Tourism in the Wider Caribbean

This symposium, held in Mexico City in April 1995, by UNEP, with the assistance of the UNEP Regional Coordinating Unit and a number of regional and other international bodies, includes a wide range of recommended actions at the regional, national, and local level, with a number of specific country related recommendations. Among relevant issues are recommendations for academic studies of tourism, the assignment of responsibilities for a regional program of work to a variety of individual regional institutions, the promotion of *standards and measurement* tools, and mechanisms for the collection and *exchange of information* on sustainable tourism activities.

The Caribbean Environmental Programme

The Caribbean Environmental Programme (CEP), whose legal framework is provided in the Cartagena Convention, serves as an umbrella organization for collaboration among the many social scientific and technical organizations active in the region. The CEP is administered by UNEP through the Regional Coordinating Unit in Kingston. Together with the relevant national and regional environmental institutions, the RCU provides the institutional capabilities necessary for the implementation of regional coordination of coastal tourism development policies. In this context, two of the CEP's most important institutional networks are CEPPOL (Assessment and Control of Marine Pollution) and a program on Information Systems for Management of Marine and Coastal Resources (CEPNET).

Environmental Health Coordination

The Pan American Health Organization has a long-standing concern with the potential health impacts of tourism development in coastal areas, including implementation of a major conference related to this topic in 1992 (Pan American Health Organization). On the regional level, the Caribbean Environmental Health Institute (CEHI) of CARICOM provides technical support for assessing environmental pollution.

Other Policy Recommendations

Directorate General XXIII—Tourism Unit—of the Commission of the European Communities produced a study of the environmental effects of tourism development (“Taking Account of Environment in Tourism Development,” 1993), which includes sixteen overall objectives which should be incorporated in the tourism development strategies of the British, French and Netherlands dependencies in the Wider Caribbean. Among the most relevant recommendations are: (a) priority for resuscitating resorts in decline; (b) diffusion of tourism-environment know-how; and (c) stimulating environment competition (such as the *Blue Flag* program). This series of studies also includes a variety of operational recommendations which should be assessed for their relevance to national or local tourism development activities.

The environmental effects of tourism are part of more general regional problems of land-based marine pollution, which has been addressed in the Wider Caribbean since 1983 by the *Convention for the Protection and Development of the Marine Environment of the Wider Caribbean*, or the Cartagena Convention. Regional negotiations for reform or extension of the Cartagena Convention are being conducted to clarify the goals of the Convention with explicit terms and objectives (Hoagland, *et al.*, 1995). Specifically, the Convention needs to define the “appropriate measures” with which the Contracting Parties are charged to prevent, reduce or control land-based sources of marine pollution.

Tourism Impacts On Coastal Resource Degradation

To assist readers with a need for a reference on a specific topic, we have created a table at the back of this list of references which identifies 26 references (out of the total of 105 in this listing) which directly address specific elements of the analytical framework presented in Appendix A. For example, a reader concerned especially about chemical and nutrient loadings on estuaries, salt ponds and lagoons is directed first to references numbered 03, 04, and 14. These are books by Elizabeth Boo on *Nature Tourism*, a video by Susan Bookman on minimizing tourism environmental impacts, and a 1987 OAS publication on the preservation and development of *Natural Tourism Attractions*.

- Adams, John, 1996. "Cost Benefit Analysis: The Problem, Not the Solution." *The Ecologist*, Volume 26, number 1, January–February, 1996. Dorset, United Kingdom.
- Atlantic Center for the Environment, 1984. "Tourism and Conservation: Compatible Ideas?" *Nexus*, Vol. 6, No. 3 (Summer 1984).
- Atherley, K.A., D.A. Smttih, and L.A. Nurse, 1993. "An Integrated Coastal Zone Management Programme for Barbados," in *Proceedings for Coastal Zone '93*:2653-2667.
- Auer, Matthew R. 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 International Development, Washington, DC.
- 01 Belleville, Bill, 1995. "The Marine Conservation Challenge and Ecotourism". *The Ecotourism Society Newsletter*, Vol. 5, No. 3 (Summer 1995), pp. 1-3.
- Blommestein, Erik, 1985. *Tourism and Environment in Caribbean Development: An Overview of the Eastern Caribbean*. Economic Commission for Latin America and the Caribbean, Subregional Headquarters for the Caribbean, Port-of-Spain, Trinidad and Tobago.
- Blommestein, Erik, 1993. *Sustainable Tourism in the Caribbean: Proposals for Action (WP/93/10)*. Economic Commission for Latin America and the Caribbean, Subregional Headquarters for the Caribbean, Caribbean Development and Cooperation Committee, Port-of-Spain, Trinidad and Tobago.
- Blommestein, Erik, 1995. *Sustainable Tourism in the Caribbean — An Enigma?* In: Griffith, Mark and Persaud Bishnodat, eds., *Economic Policy and the Environment — The Caribbean Experience*. University of the West Indies, Kingston, Jamaica. pp. 208-210.
- Blommestein, Erik and Naresh Singh, 1988. *The Impact of the Climatic Changes on Tourism*. Paper presented at the XXI Annual General Meeting of the Caribbean Conservation Association.
- 02 Blommestein, Erik and Ronald A. Williams, 1993. *Critical Issues In Environmental Health and Sustainable Tourism Development in the Caribbean*. Report on Regional Conference on Environmental Health and Sustainable Tourism Development, Nassau, Bahamas (8 - 11 November, 1993). WP/93/6 (rev. 1), July 1993.
- 03 Boo, Elizabeth, 1990a. *Ecotourism: The Potentials and Pitfalls*. Volume 1. World Wildlife Fund, Washington, DC.
- Boo, Elizabeth, 1990b. *Ecotourism: The Potentials and Pitfalls*. Volume 2: Country Case Studies. World Wildlife Fund, Washington, DC.
- Boo, Elizabeth, 1992. *The Ecotourism Boom: Planning for Development and Management*. WHN Technical Paper Series, Paper #2. World Wildlife Fund, Wildlands and Human Needs, Washington, DC.
- 04 Bookman, Susan, 1993a. *Agenda For Sustainable Island Tourism Development*. Videotape (27 minutes), Version 2. Prepared under the auspices of International Institute of Tourism Studies, The George Washington University, Washington, DC.

-
- Bookman, Susan, 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, DC.
- Brandon, Katrina, 1996. *Ecotourism and Conservation: A Review of Key Issues*. Global Environment Department Paper Number 033. World Bank, Washington, DC.
- Cambers, Gillian, 1996. 1995 Annual Report. *COSALC I: 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 Tourism Organization (CTO), 1994. Caribbean Hotel Trends, 1994 Edition. CTO, Christ Church, Barbados.
- Caribbean Tourism Organization (CTO), 1995. Caribbean Tourism Statistical Report, 1994. CTO, Christ Church, Barbados.
- Caribbean Tourism Organization (CTO), 1996. Statistical News: Quarterly Review of Caribbean Tourism Trends. CTO, Christ Church, Barbados
- Center for Marine Conservation, 1995. *1994 International Coastal Cleanup Results*, Atlantic Regional Office, Hampton, Virginia.
- 05 Commission of the European Communities, 1993. Taking Account of Environment In Tourism Development. Directorate General XXIII - Tourism Unit Studies.
- Conlin, Michael V. and Tom Baum, eds., 1995. *Island Tourism: Management Principles and Practice*. John Wiley & Sons, New York, NY.
- Coral Reef Alliance (CORAL), 1995. CORAL/PATA Sustainable Diving Checklist. Presented by The Coral Reef Alliance (CORAL) 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, John and C. (Sid) Embree, eds., 1990. *Sustainable Development in the Caribbean: A Report on the Public Policy Implications of Sustainable Development in the Caribbean Region Conference, May 28-30, 1990*, Kingston, Jamaica.. Institute for Research on Public Policy, Halifax, NS, Canada.
- de Albuquerque, Klaus, 1996. "Like an Alien in We Own Land," (review of *Last Resorts: The Cost of Tourism in the Caribbean* by Patty Pattullo, 1996. London, Cassell). *Caribbean Week*, May, 1996.
- de Albuquerque, Klaus and Jerome L. McElroy, 1992. "Caribbean Small-Island Tourism Styles and Sustainable Strategies". *Environmental Management*, 16(5), 619-632.
- de Albuquerque, Klaus and Jerome L. McElroy, 1995a. Alternative Tourism and Sustainability. In: Conlin, M.V. and T. Baum, eds., *Island Tourism: Management Principles and Practice*. John Wiley & Sons, New York, NY. pp. 23-32.
- 07 de Albuquerque, Klaus and Jerome L. 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, USA.
- Douglas, Joy E., 1992. "Ecotourism: The Future for the Caribbean?" *UNEP Industry and Environment* (1992), pp. 66.
- Drabek, Thomas E., 1994. Disaster Evacuation and the Tourist Industry. Program on Environment and Behavior Monograph No. 57. University of Colorado, Institute of Behavioral Science, Boulder, Colorado, USA.
- 07 Economic Commission for Latin America and the Caribbean and United Nations Environment Programme, 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/G.180.
- Edwards, Felicity, ed., 1988. Environmentally Sound Tourism in the Caribbean. Prepared by the Banff Centre School of Management. University of Calgary Press, Calgary, Alberta, Canada.
- English Tourist Board and the Employment Department Group, 1991. *Tourism and The Environment: Maintaining The Balance*. Designed and produced by Glasgow & Associates.
- Epler, Bruce, 1993. An Economic and Social Analysis of Tourism in the Galapagos Islands. Technical Report 2051. International Coastal Resources Management Project, Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island, USA.
- 08 Farrell, Bryan H., 1986. "Cooperative Tourism and the Coastal Zone." *Coastal Zone Management Journal*, Vol. 14, Nos. 1/2, pp. 113-130.
-

-
- Frechtling, Douglas C., 1992. Annotated Bibliography on Health and Tourism Issues. Prepared for the Pan American Health Organization by International Institute of Tourism Studies, The George Washington University, Washington, DC.
- Gamman, John K., 1990. Comparative Analysis of Public Policies Affecting Natural Resources and the Environment: Interest Group Politics in the Eastern Caribbean. Prepared for the U.S. Agency for International Development by Development Alternatives under USAID's Development Strategies for Fragile Lands (DESFIL) program, Washington, DC.
- Gasparovic, Franjo, 1984. "The Development of Tourism and the Environment on the Adriatic Coast of Yugoslavia." *UNEP Industry and Environment*, Vol. 7, No. 1 (January/February/March 1984), pp. 25-27.
- GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Pollution). 1990. *The State of the Marine Environment*. UNEP Regional Seas Reports and Studies, Number 115.
- Gladfelder, Elizabeth H. and John C. 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.
- Gumbs, Barbara and Blommestein, Erik, 1996. Draft Environmental Information Management in the Caribbean. Economic Commission for Latin America and the Caribbean, United Nations Environment Programme, and International Development Research Centre, Port au Spain, 1996.
- Hawkins, Rebecca, 1995. "Tourism in the Wider Caribbean and its Impact on Marine and Coastal Ecosystems," Presented at Seminar on Sustainable Development of Tourism in the Wider Caribbean, Mexico City (18-20 April 1995).
- Hendry, Malcolm, 1991. Resource Use Planning for Beaches in Caribbean Tourism. Presented at Caribbean Tourism Organisation Conference on Ecotourism, Belize (July 9 - 12, 1991).
- Hiranyakit, Somchai, 1984. "Tourism Planning and Environment." *UNEP Industry and Environment*, Vol. 7, No. 1 (January/February/March 1984), pp. 2-3.
- Hoagland, Porter, Mary E. Schumacher and Arthur G. Gaines, Jr., 1995. Toward An Effective Protocol on Land-based Marine Pollution in the Wider Caribbean Region. WHOI-95-10. Prepared by Woods Hole Oceanographic Institution (WHOI) for the U.S. Environmental Protection Agency, Office of International Affairs. Marine Policy Center, WHOI, Woods Hole, Massachusetts, USA.
- Holder, Jean, 1987. The Pattern and Impact of Tourism on the Environment of the Caribbean. Presented at Workshop on Tourism and the Environment, Barbados (April 6, 1987).
- Holder, Jean, 1990a. "Overcoming the Socio-cultural and Environmental Impacts of Tourism — The Verdict for the Caribbean." *The Courier*, No. 122 (July-August), pp. 64-65.
- Holder, Jean, 1990b. "The Caribbean: Far Greater Dependence on Tourism Likely." *The Courier*, No. 122 (July-August, 1990), pp. 74-79.
- Hooten, Anthony J., and Hatzilolis, Marea E, Editors, 1995. Sustainable Financing Mechanisms for Coral Reef Conservation, Proceedings of a Workshop held at the World Bank, Washington, June 23, 1995. Environmentally Sustainable Development Proceedings Series No. 9, The World Bank, Washington DC.
- Houston, James R., 1996. The Economic Value of Beaches. Extracted from the Internet. Point of contact: j.houston@cerc.wes.army.mil.
- International Hotel Association (IHA), International Hotels Environment Initiative (IHEI), United Nations Environment Programme (UNEP), and UNEP Industry and Environment (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.
- 09 Jackson, Ivor, 1986. "Carrying Capacity for Tourism in Small Tropical Caribbean Islands." *UNEP Industry and Environment*, Vol. 7, No. 1 (January/February/March 1984), pp. 7-10.
- Jackson, Ivor, 1988. Integration of Tourism and Environment Through Resource Planning and Management. In: Edwards, Felicity, ed., *Environmentally Sound Tourism in the Caribbean*. Prepared by the Banff Centre School of Management. University of Calgary Press, Calgary, Alberta, Canada.
- 10 Jackson, Ivor, 1990a. "Links Between Tourism, Agriculture and the Environment." *The Courier*, No. 122 (July-August), pp. 66-67.
-

-
- 11 Jackson, Ivor, 1990b. Tourism and Sustainable Development in the Caribbean. In: Cox, John and C. Embree, Sustainable Development in the Caribbean. A Report on the Conference on Public Policy Implications of Sustainable Development in the Caribbean Region, Kingston, Jamaica (May 28 - 30, 1990). The Institute for Research on Public Policy, Halifax, Nova Scotia, Canada. pp. 127-138.
- Jones, Barbara and Tanya Tea, 1995. "Australia's National Ecotourism Strategy." *UNEP Industry and Environment*, Vol. 18, No. 1 (January - March 1995), pp. 56-57.
- Lawrence, Wendell, 1991. Financing Ecotourism Development. Presented by the Deputy Director, Infrastructure Division, Caribbean Development Bank, to the Ecotourism Conference, Belize (July 9 - 12, 1991).
- Lestrade, Swinburne, 1987. "Economic Issues Affecting the Development of Small Island States: The Case of the Caribbean." *The Courier*, No. 104 (July - August 1987), pp. 78-84.
- Lindberg, Kreg, 1991. Policies for Maximizing Nature Tourism's Ecological and Economic Benefits. International Conservation Financing Project Working Paper. World Resources Institute, Washington, DC.
- 12 Lorah, Paul, *in press* 1996. An Unsustainable Path: Tourism's Vulnerability to Environmental Decline in Antigua. *Caribbean Geography*.
- McEachern, John and Edward L. Towle, 1974. *Ecological Guidelines for Island Development*. IUCN, Gland, Switzerland.
- McElroy, Jerome L., 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 (November 17 - 20, 1991).
- McElroy, Jerome L. and Klaus Albuquerque, 1994. "Island Tourist Profiles across the Destination Life Cycle." in *INSULA: International Journal of Island Affairs*, Year 3, Number 1.
- McElroy, Jerome L. and Angelique 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 (October 11 - 12, 1991).
- North Carolina Sea Grant, 1995-1996. *Marine Debris WORLDWIDE*, Faris, Jeannie, Managing Editor, Raleigh, 1995-1996, Volumes 1 & 2.
- 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 - 1 February, 1980).
- 13 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, DC.
- Organization of American States, 1985a. Final Report on OAS Regional Workshop: Improving Tourism-related Facilities in Downtown and Harbourfront Areas. St. John's, Antigua and Barbuda (September 16 - 20, 1985). Department of Regional Development, Washington, DC.
- Organization of American States, 1985b. Upgrading Tourism-related Facilities in Downtown and Harbourfront Areas in Antigua and Barbuda, Dominica, Grenada, Saint Christopher and Nevis, Saint Lucia, and Saint Vincent and the Grenadines. Technical Document Prepared for the Regional Workshop on Improving Tourism-related Facilities in Downtown and Harbourfront Areas. St. John's, Antigua and Barbuda (September 16 - 20, 1985). Department of Regional Development, Washington, DC.
- 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 (July 15 - 16, 1987). Department of Regional Development, Washington, DC.
- 14 Organization of American States, 1987b. Natural Tourism Attractions: Their Preservation and Development. Topic II.C.2. of the Agenda for the XV Inter-American Travel Congress, Kingston, Jamaica (July 22 - 24, 1987). OEA/Ser.K.III.16.1. TURISMO/9/87 (12 June 1987).
- Organization of American States, 1987c. Optimum Size and Nature of New Hotel Development in the Caribbean. Department of Regional Development, Washington, DC.
- 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, DC.
-

-
- 15 Organization of American States, 1993. *Compendium of Recent Studies on Tourism Development*. Department of Regional Development and Environment, Washington, DC.
- 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, DC.
- 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, DC.
- 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, DC.
- Pacific Asia Travel Association, 1992. *Endemic Tourism: A Profitable Industry in a Sustainable Environment*. PATA, New South Wales, Australia.
- Patullo, Polly, 1996. *Last Resorts: The Costs of Tourism in the Caribbean*. Latin American Bureau, Ltd. London.
- 16 Pearce, D.G. and R.M. Kirk, 1986. "Carrying Capacities for Coastal Tourism." *UNEP Industry and Environment*, Vol. 7, No. 1 (January/February/March 1984), pp. 3-7.
- Pizam, Abraham and Ady Milman, 1984. "The Social Impacts of Tourism." *UNEP Industry and Environment*, Vol. 7, No. 1 (January/February/March 1984), pp. 11-14.
- Poon, Auliana and Roseline Poon, 1994. *Eco-tourism Opportunity in the Caribbean*. University of the West Indies Centre for Environment and Development, Mona, Jamaica.
- 17 Price, J.L., 1991. *Coastal Tourism: A Physical and Metaphysical Perspective*. In: Miller, Marc L. and Jan Auyong, *Proceedings of the 1990 Congress on Coastal and Marine Tourism*. NCRI-T-91-010. National Coastal Resources Research and Development Institute, Newport, Oregon, USA.
- Rainey, William, 1987. *A Pesticide Impact Assessment For The Dominica (West Indies) Banana Industry Rehabilitation Project*. Island Resources Foundation, St. Thomas, 44 pp
- Richards, W.J. and J.A. Bohnsack, 1990. "The Caribbean Sea: A Large Marine Ecosystem in Crisis." In K. Sherman, L. Alexander and B. Gold. *Large Marine Ecosystems: Patterns, Processes, and Yields*. American Association for the Advancement of Science, Washington, DC.
- 18 Rogers, Caroline, 1991. *Balancing Adverse Effects of Marine-based Tourism with Marine 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 (August 23 - 25, 1991). British Virgin Islands National Parks Trust, Tortola, BVI.
- Romero, Gilberto, Jr, 1996. "Cuba, Crisis Del Medio Ambiente," from *Contacto Magazine*, September 1996, as quoted in its entirety by <JJValdes@ix.netcom.com> in a post on the Internet mailing list "Environment In Latin America Network" <elan@csf.colorado.edu>, and posted 8 September, 1996.
- Romeril, Michael, 1984. "Coastal Tourism — The Experience of Great Britain." *UNEP Industry and Environment*, Vol. 7, No. 1 (January/February/March 1984), pp. 4-7.
- Sarasota Bay Natinal Estuary Program, 1993. *Comprehensive Cooperative Management Plan for Sarasota Bay*, Sarasota.
- 19 Salm, Rodney V., 1986. "Coral Reefs and Tourist Carrying Capacity: The Indian Ocean Experience." *UNEP Industry and Environment*, Vol. 9, No. 1 (January/February/March 1986), pp. 11-14.
- Seward, Shirley B. and Bernard K. Spinrad, eds., 1982. *Tourism in the Caribbean: The Economic Impact*. International Development Research Centre, Ottawa, Canada.
- 20 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*. Prepared for Caribbean Tourism Organization, Barbados.
- Sorensen, J., 1993. "The International Proliferation of Integrated Coastal Zone Management Efforts." *Ocean and Coastal Management*. Elsevier Science Publishers, Ltd., England.
- Stankey, G.H., 1990. *Conservation, Recreation and Tourism in Marine Settings: The Good, The Bad and the Ugly?* In: Miller, Marc L. and Jan Auyong, *Proceedings of the 1990 Congress on Coastal and Marine Tourism*. NCRI-T-91-010. National Coastal Resources Research and Development Institute, Newport, Oregon, USA.
- Stockley, M., 1984. "Tourism and Conservation: Compatible Ideas?" In: *NEXUS*, Volume 6, Number 3, Summer, 1984. Atlantic Center for the Environment, a division of the Quebec-Labrador Foundation, Montreal, 1984.
-

-
- 21 Thomas, P., 1990. Coastal and Marine Tourism: A Conservation Perspective. In: Miller, Marc L. and Jan Auyong, Proceedings of the 1990 Congress on Coastal and Marine Tourism. NCRI-T-91-010. National Coastal Resources Research and Development Institute, Newport, Oregon, USA.
- Towle, Edward, 1985(a). *The Island Microcosm*. Island Resources, Foundation, St. Thomas, U.S. Virgin Islands.
- 22 Towle, Edward, *et al.*, 1985(b). 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.
- Towle, Edward, J. Towle, 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.
- Trigano, Gilbert, 1984. "Tourism and the Environment: The Club Méditerranée Experience." *UNEP Industry and Environment*, Vol. 7, No. 1 (January/February/March 1984), pp. 20-21.
- United Nations Commission on Sustainable Development, 1996(a). 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(b). 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).
- 23 United Nations Commission on Sustainable Development, 1996(c). 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 (18 April - 3 May, 1996).
- 24 United Nations Environmental Programme, 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.
- United Nations Environment Programme, 1994. Ecotourism in the Wider Caribbean Region — An Assessment. CEP Technical Report No. 31. UNEP Caribbean Environment Programme, Kingston, Jamaica.
- United Nations Environment Programme, 1994a. *Regional Overview of Land-Based Sources of Pollution 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.
- United Nations Environment Programme and Advisory Committee on Protection of the Sea (ACOPS), 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.
- United Nations Environment Programme, 1996. *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.
- United Nations Environment Programme, World Tourism Organization, and Foundation for Environmental Education in Europe, 1996a. Awards for Improving the Coastal Environment: The Example of the Blue Flag. Prepared by UNEP, Industry and Environment, Paris, France; World Tourism Organization, Madrid, Spain; and Foundation for Environmental Education in Europe, Copenhagen, Denmark.
- United States Congress, Office of Technology Assessment, 1992. Science and Technology Issues in Coastal Ecotourism — Background Paper. OTA-BP-F-86. Washington, DC.
- United States Environmental Protection Agency, 1995. Economic Benefits of Runoff Controls. EPA 841-S-95-002. Office of Wetlands, Oceans and Watersheds, Washington, DC.
- 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.
- van der Pol, Theo, 1991. The Future of the Cruise Ship Industry: Opportunities and Constraints. Occasional Paper No. 9. Marine Affairs, Program, Dalhousie University, Nova Scotia, Canada.
-

- 25 Vlugman, A.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).
- Wilkinson, Paul F., 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).
- World Bank, 1972. Tourism Sector Working Paper. Washington, DC.
- 26 World Bank, 1992. *Coastal Zone Management: Case Studies from the Caribbean*. Latin America and the Caribbean Technical Department, Regional Studies Program, Washington, DC.
- 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." *UNEP Industry and Environment*, Vol. 7, No. 1 (January/February/March 1984), pp. 30-36.
- World Tourism Organization and World Meteorological Organization, 1996. Handbook on Natural Disaster Reduction in Tourist Areas. Forthcoming in 1996.

Table 6: Documents Related to Environmental Degradation

	PHYSICAL CHANGES AND HABITAT DAMAGE	GROUNDWATER DEPLETION AND CONTAMINATION	SEDIMENT LOADING	CHEMICAL AND NUTRIENT LOADING	SOLID WASTE DISPOSAL	VISUAL IMPACTS	DISPLACEMENT OF TRADITIONAL USERS
Upland Areas	05		10, 14	10, 14			08
Coastal Plain* - <i>tourism complexes</i> - <i>small/large hotels</i> - <i>entertainment/restaurant facilities</i> * also impacted by facilities/activities in upland areas	04, 06, 07, 11, 13, 15, 17, 21, 23	02, 05, 13, 14, 21	01, 06, 08, 17	01, 02, 05, 06, 07, 08, 09, 11, 12, 13, 14, 15, 17, 20, 21, 22, 24, 25	02, 04, 08, 11, 12, 15	05, 08, 15	05, 08, 09, 17
Estuaries, Salt Ponds, Lagoons* - <i>recreational facilities</i> - <i>parks and protected areas</i> * also impacted by facilities/activities in upland areas and the coastal plain	01, 02, 06, 07, 10, 12, 13, 14, 17, 21, 22, 23, 24, 26	03, 22		03, 04, 14	13		12
Beach and Shoreline* - <i>entertainment/restaurant facilities</i> - <i>recreational facilities and activities</i> - <i>parks and protected areas</i> * also impacted by facilities/activities in upland areas and the coastal plain	02, 04, 05, 06, 07, 09, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 26			07	02, 04, 06, 11, 20, 22	11, 13	08, 09, 15, 17
Near Coastal Waters and Reefs* - <i>recreational facilities and activities</i> - <i>parks and protected areas</i> * also impacted by facilities/activities in upland areas and the coastal plain	02, 03, 05, 07, 09, 10, 13, 14, 15, 17, 18, 19, 20, 21, 22, 24			01, 02, 05, 08, 11, 13, 14, 17, 20, 21, 22, 23, 24, 25, 26	13, 17	13	9, 11
Marine Offshore Environment - <i>marine tourism support facilities</i> - <i>recreational facilities and activities</i> - <i>parks and protected areas</i>	01, 03, 06, 09, 15, 16, 24, 26			01, 06, 13, 20, 23	01, 02, 06, 11, 20, 23		11

Appendix A: Analytical Framework

Detailed Matrix: Degradation from Tourism

Table 7: Overview of Environmental Degradation from Tourism Facilities in the Coastal Zone provides a summary of the analytical framework discussed in Section 2 of this paper, as well as a visual representation of the major relationships between the types of environmental impact, the nature of the tourism facilities and the coastal area most likely to be affected.

Table 7: Overview of Environmental Degradation from Tourism Facilities in the Coastal Zone

FACILITIES IN THE COASTAL ZONE:	UPLANDS	COASTAL PLAIN	SALT PONDS AND ESTUARIES	BEACH AND SHORELINE	NEAR COASTAL WATERS AND FRINGING REEFS	OFFSHORE WATERS
Tourism Complexes and Large Resorts	<i>Physical Change</i> <i>Groundwater Pollution</i> <i>Visual Impacts</i> <i>Displacement</i>	Physical Change (fill) Groundwater Pollution Solid Waste Visual Impacts Displacement	Physical Change (fill) Sediments Toxics & Nitrification Solid Waste Displacement	Physical Change <i>Groundwater Pollution</i> Toxics & Nitrification Solid Waste (litter) Displacement	Physical Change Sediments Toxics & Nitrification Visual Impacts Displacement	<i>Groundwater Pollution</i> Sediments Toxics & Nitrification Displacement
Small Hotels and Resorts	<i>Displacement</i>	<i>Physical Change</i> Groundwater Pollution Solid Waste Displacement	<i>Physical Change</i> <i>Sediments</i> Toxics & Nitrification Solid Waste Displacement	Physical Change <i>Groundwater Pollution</i> Toxics & Nitrification Solid Waste Displacement	Physical Change Sediments Toxics & Nitrification Displacement	[Few identified impacts]
Parks and Protected Areas	<i>Displacement</i>	[Few identified impacts]	Physical Change (anchoring)	Solid Waste	Physical Change (anchoring)	Physical Change
Entertainment & Restaurant Facilities	Displacement (noise)	<i>Physical Change</i> Groundwater Pollution Solid Waste <i>Displacement (noise)</i>	Physical Change Sediments Toxics & Nitrification Solid Waste Displacement	Physical Change Groundwater Pollution Toxics & Nitrification Solid Waste	Sediments Toxics & Nitrification Visual Impacts Displacement	[Few identified impacts]
Shoreside Recreational Facilities	Displacement (noise) Visual Impacts	<i>Physical Change</i> Solid Waste <i>Displacement</i>	Toxics & Nitrification Solid Waste	Physical Change Toxics & Nitrification Solid Waste Displacement	Physical Change <i>Groundwater Pollution</i> Sediments Toxics & Nitrification Visual Impacts Displacement	Physical Change Displacement
Marine Recreational Facilities	<i>Visual Impacts</i>	<i>Physical Change</i> Solid Waste <i>Displacement</i>	Physical Change Sediments Toxics & Nitrification Solid Waste Displacement	Physical Change <i>Groundwater Pollution</i> Toxics & Nitrification Solid Waste Displacement	Physical Change Sediments Toxics & Nitrification Solid Waste Visual Impacts Displacement	Physical Change Solid Waste Displacement

In this table:

- *italics* identify *indirect effects* (e.g., displacement of traditional users in upland areas);
- regular type indicates some level of effect; and
- **bold** type indicates a **major impact** on the area.

Sources: A synthesis of information presented in de Albuquerque and McElroy, 1995b. Hawkins 1995, Hoagland, et al., 1995; UNEP 1989, UNEP 1994a, Woodley, 1995; World Health Organization 1994, and professional experience of Island Resources Foundation staff.

Appendix B: Matrices of Benefits and Costs

Table 8: Benefits from Tourism Facilities in the Coastal Zone and Table 9. Costs from Tourism Facilities in Coastal Areas, on the following pages provide an overview of benefits and costs of various types of tourism facility in terms of their geographic effects. At a macro level, these matrices demonstrate the alternative mixes of costs and benefits which can be developed, based on the mix of tourism facilities.

These tables also provide strategic assistance in identifying issues which can improve benefits or diminish costs. For example, if jobs are a significant benefit of marine facilities, and a country or a region has no tradition of sailing, fishing or other marine activity, then marine support development proposals should require extensive training and mobility guarantees to move local workers into the higher-paying specialized marine jobs.

These general tendencies are also summarized in Section Three.

Table 8: Benefits from Tourism Facilities in the Coastal Zone

FACILITIES IN THE COASTAL ZONE:	UPLANDS	COASTAL PLAIN	SALT PONDS AND ESTUARIES	BEACH AND SHORELINE	NEAR COASTAL WATERS AND FRINGING REEFS	OFFSHORE WATERS
Tourism Complexes and Large Resorts	Jobs Infrastructure	Income Jobs For. Investment Infrastructure	[Small or no benefit]	Income Jobs For. Investment Infrastructure	Income Jobs Support for Env. Infrastructure	[Small or no benefit]
Small Hotels and Resorts	Jobs	Income Jobs	[Small or no benefit]	Income	[Small or no benefit]	[Small or no benefit]
Recreation & Restaurant Facilities	Jobs	Income Jobs Infrastructure	[Small or no benefit]	Income Jobs	[Small or no benefit]	[Small or no benefit]
Parks and Protected Areas	Support for Env.	Income Jobs Infrastructure Support for Env. Less Stress	[Small or no benefit]			
Shoreside Recreational Facilities	[Small or no benefit]	Income Jobs Infrastructure	[Small or no benefit]	Income Jobs Support for Env.	Income Jobs Support for Env.	[Small or no benefit]
Marine Recreation Facilities	[Small or no benefit]	Infrastructure	Income Jobs Infrastructure	Income Jobs Infrastructure	Infrastructure	Income Jobs For. Investment Infrastructure Support for Env.

Source: Table 8 and Table 9 are a synthesis of several sources including: Bookman, 1993a; Hawkins, 1995; Hoagland, et al., 1995; Holder, 1987; McElroy, 1991; United Nations Commission on Sustainable Development, 1996(c); UNEP 1994 and 1994(a).

Table 9. Costs from Tourism Facilities in Coastal Areas

FACILITIES IN THE COASTAL ZONE:	UPLANDS	COASTAL PLAIN	SALT PONDS AND ESTUARIES	BEACH AND SHORELINE	NEAR COASTAL WATERS AND FRINGING REEFS	OFFSHORE WATERS
Tourism Complexes and Large Resorts	<i>Water Supply/Quality Sewage and Solid Waste Social Tension Stimulate Imports Increased Density More Stressful Use</i>	Water Supply/Quality Sewage, Solid Waste Loss Non-Renewables Overharvesting Social Tension Stimulate Imports Increased Density More Stressful Use	Water Supply/Quality Sewage, Solid Waste Overharvesting Increased Density More Stressful Use	Water Supply/Quality Sewage and Solid Waste Loss of Non-Renewables Overharvesting Social Tension More Stressful Use	Water Supply/Quality Sewage and Solid Waste Overharvesting Increased Density More Stressful Use	Overharvesting
Small Hotels and Resorts	[Small or no cost]	Water Supply/Quality Sewage and Solid Waste Loss of Non-Renewables Stimulate Imports Increased Density	Water Supply/Quality Sewage and Solid Waste Overharvesting Increased Density More Stressful Use	Sewage and Solid Waste Overharvesting Social Tension Increased Density More Stressful Use	Water Supply/Quality Sewage and Solid Waste Overharvesting Increased Density More Stressful Use	Overharvesting
Entertainment Facilities	[Small or no cost]	Water Supply/Quality Sewage and Solid Waste Overharvesting Social Tension Stimulate Imports Increased Density More Stressful Use	Water Supply/Quality Sewage and Solid Waste Overharvesting Increased Density More Stressful Use	Water Supply/Quality Sewage and Solid Waste Overharvesting Social Tension Stimulate Imports Increased Density More Stressful Use	Water Supply/Quality Sewage and Solid Waste Overharvesting Increased Density More Stressful Use	Overharvesting
Parks and Protected Areas	[Small or no cost]	Sewage, Solid Waste Social Tension Increased Density	Sewage, Solid Waste Social Tension Increased Density	Sewage, Solid Waste Social Tension Increased Density	Sewage, Solid Waste Social Tension Increased Density	[Small or no cost]
Shoreside Recreational Facilities	[Small or no cost]	Sewage, Solid Waste Social Tension Increased Density More Stressful Use	Sewage, Solid Waste Overharvesting Social Tension Increased Density More Stressful Use	Sewage, Solid Waste Overharvesting Social Tension Increased Density More Stressful Use	Sewage, Solid Waste Overharvesting Social Tension Increased Density More Stressful Use	[Small or no cost]
Marine Recreational Facilities	[Small or no cost]	[Small or no cost]	Water Supply/Quality Sewage, Solid Waste Social Tension Stimulate Imports Increased Density More Stressful Use	Water Supply/Quality Sewage, Solid Waste Stimulate Imports Increased Density More Stressful Use	Sewage, Solid Waste Overharvesting Stimulate Imports Increased Density	Sewage, Solid Waste Loss of Non-Renewables Overharvesting Social Tension Stimulate Imports

Appendix C:

References for Beach Valuation

These untested references on Beach Valuation were gathered by Donna Milligan, a graduate student at the Virginia Institute of Marine Sciences, Gloucester Point, VA, based on a query she put to several mailing lists on the Internet in the summer of 1996. Used with permission.

- Anderson, et al. 1977. *Environmental Improvement Through Economic Incentives*. John Hopkins University Press, Baltimore.
- Basco, D., 1993. On the loss of estuarine bay areas due to landward migration of barrier islands. *Shore and Beach*, (Oct. 1993): 16-23.
- Bell, F.W. and V.R. Leeworthy, 1986. *An Economic Analysis of the Importance of Saltwater Beaches in Florida*. Florida Sea Grant College, Report Number 82.
- Bell, F.W. and V.R. Leeworthy, 1990. Recreational demand by tourists for saltwater beach days. *J. Environmental Economics and Management*, 18: 189-205.
- Block, Walter E. ed. 1990. *Economics and the Environment: A Reconciliation*. The Fraser Institute, Vancouver.
- Canadian Society of Environmental Biologists (Alberta Chapter). *Economy and Ecology: A symposium*. February 19 and 20, 1985, University of Alberta, Edmonton, Alberta.
- Dixon, J.A., L.F. Scura, and T. Van't Hof, 1993. Meeting ecological and economic goals: Marine parks in the Caribbean. *AMBIO*, 22(2-3): 117-125.
- Edwards, Steven F. 1987. *An Introduction to Coastal Zone Economics: Concepts, Methods, and Case Studies*. Taylor and Francis, New York.
- Finkl, C.W., 1996. Editorial: What might happen to America's shorelines if artificial beach replenishment is curtailed: A prognosis for southeastern Florida and other sandy regions along regressive coasts. *J. Coastal Research*, 12(1): iii-ix.
- Freeman, A. Myrick. 1979. *The Benefits of Environmental Improvement: Theory and Practice*. Johns Hopkins University Press, Baltimore.
- Houston, J.R., 1995. Beach nourishment. *Shore and Beach* 63(1): 21-24.
- Houston, J.R., 1995. The economic value of beaches. *The CERCular*, CERC-95-4.
- Houston, J.R., 1996. International tourism and U.S. beaches. *Shore and Beach*, (April 1996): 3-4.
- Johnston, Douglas M. ed. 1976. *Marine Policy and the Coastal Community: The Impact of the Law of the Sea*. Croom Helm, London.
- Kaufman, W., 1983. *The Beaches are Moving - The Drowning of America's Shoreline*. Duke University Press.
- Lindsay, B.E., J.M. Halstead, H.C. Tupper and J.J. Vaske, 1992. Factors influencing the willingness to pay for coastal beach protection. *Coastal Management*, 20: 291-302.
- Miles, E., Pealy, R., and Stokes, R. 1986. *Natural Resource Economics and Policy Applications: Essays in Honour of James A Crutchfield*. University of Washington Press, Seattle.
- Oates, Wallace E. ed. 1992. *The Economics of the Environment*. Edward Elgar Publishing Limited, Vermont.
- OECD Documents. 1994. *Project and Policy Appraisal: Integrating Economics and the Environment*. Head of Publications Service, OECD, Paris.
- Shaw, W.D., 1991. Recreational demand by tourists for saltwater beach days: Comment. *J. Environmental Economics and Management*, 20: 284-289.
- Smith, A.W.S., 1995. Beaches and tourism - An example of the results of a dramatic beach erosion episode: Gold Coast, Queensland, Australia. *Shore and Beach* 63(3): 7-8.
- Stronge, W.B., 1994. Beaches, tourism and economic development. *Shore and Beach* 62(2): 6-8.
- Terchunian, A.V. and J. A. Smith, 1995. An economic snap shot of Long Island's barrier island system. Consulting Report.

Appendix C:
References for Beach Valuation

Van den Bergh, J. and P. Nijkamp, 1994. An integrated dynamic model for economic development and natural environment: An application to the Greek Sporades Island. *Annals of Operation Research*, 54: 143-174.

van Herwerden, L & Bally, R. 1989. Shoreline utilization in a rapidly growing coastal metropolitan area: the Cape Peninsula, South Africa. *Ocean & Shoreline Management* 12: 169-178.

van Herwerden, L., Griffiths, CL, Bally, R, Blaine, M & du Plessis, C. 1989. Patterns of shore utilization in a metropolitan area: the Cape Peninsula, South Africa. *Ocean & Shoreline Management* 12: 331-346.

Vig, Norman J. and Kraft, Michael E. ed. 1990. *Environmental Policy in the 90's*. CQ Press, Washington, DC

Williams, A.T. and R. Morgan, 1995. Beach awards and rating systems. *Shore and Beach*, 63(4): 29-33.

Donna A. Milligan Virginia Institute of Marine Science
Marine Scientist College of William and Mary
Dept. of Physical Sciences Gloucester Point, VA, USA 23062
Ph:(804)642-7276 Fax:(804)642-7250
email: milligan@vims.edu

as posted 16 July, 1996