

Environment and Tourism:

Examining the Relationship between Tourism and the Environment in Barbados and St. Lucia.

This report was prepared by **Reginald I Burke** on behalf of the **Caribbean Policy Development Centre (CPDC)** as a background paper to the **Sustainability Impact Assessment (SIA) of the EU-Africa-Caribbean-Pacific (ACP) Economic Partnership Agreements** conducted for the European Commission (DG-Trade) under Framework Contract EC TRADE 02-F3-02, Specific Agreement No. 2 by a consortium lead by **PricewaterhouseCoopers (PwC)**.

For more information about the PwC Consortium and this project, please visit our website:

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Executive Summary

Tourism is the most important economic activity for Barbados and St. Lucia as well as the Caribbean. In fact the region is four times more dependent on tourism than any other region in the world. The Governments of Barbados and St. Lucia have clearly enunciated their intention to develop tourism as a means of diversifying the economic base beyond agriculture and industry. The Caribbean receives 2.9% of the world's stay over tourists and on average around 50% of the world's cruise ship passengers. In 1999, travel and tourism accounted for 40% of jobs in Barbados and 51% of Jobs in St. Lucia. Visitor expenditure as a percentage of GDP on Barbados and St. Lucia were 36 and 55 percent while the contribution of the combined industries of travel and tourism were estimated at 51 and 69 percent respectively. Travel and tourism capital investment were recorded as contributing 76.8 percent of the economy of Barbados and 60.7 percent in St. Lucia. The industry is clearly the major foreign exchange earner and projections predict that by 2010, Caribbean travel and tourism is expected to produce US\$77.5 billion in economic activity and 3.7 million jobs.

The tourism industry relies on its natural resources base and cultural resources. However, despite this dependence, the industry has the potential to impact this natural resource base in an adverse manner. In this study gives several examples are identified where tourism activity threatens or has undermined the natural resource base. The report outlines antagonistic relationship between tourism and the natural environment and goes on to detail the environmental challenges that the tourism industry faces. Tourism and the supporting infrastructure that it requires pose threats to the environment particularly, the marine, coastal and terrestrial ecosystems as well as potable water resources. The major impacts come from the improper management of liquid waste or waste water. Research has determined that package sewage treatment and waste water treatment plants are the major perpetrators of this type of pollution. Seventy five (75) percent of these plants do not function efficiently enough to protect the environment. Consequently, near shore marine water quality has been significantly degraded and coral reefs impacted to the extent of reef death. Governments have responded to mitigate these impacts, all be it after the fact, by establishing sewage and waste water treatment plants particularly in heavily populated tourist areas like the south and west coasts and Barbados and the Rodney Bay area in St. Lucia.

The tourism industry also impacts the environment in the areas of solid waste generation, physical damage to corals from divers and from boat anchors, as well as sand compaction from the heavy usage of beaches by tourists and vehicles. Building tourism facilities in ecologically sensitive areas (land use planning) is also a concern as is the usage of potable water. In fact tourists use significantly more water than residents. In St. Lucia the average resident uses on average 50 gallons per person each day. Hotel residents use up to 150 gallons per person daily. Comparatively, Barbadians use 73 gallons per person daily and the average tourist 179 gallons per person per day.

Traditional tourism in Barbados and St. Lucia is typical sun-sea-sand tourism, ecotourism, nature-based mass tourism and heritage tourism are new and emerging tourism areas that need to be carefully monitored maintained to ensure minimum environmental impacts and by extension the sustainability of the industry.

While, the environmental impacts and potential impacts of the tourism are fairly well documented but not well scientifically research, little priority seems to have been placed, outside on the economic realm, on the positive impacts of tourism on the environment. However, positive impacts do exist and are identified in this study. Some of these include:

- The contribution of Nature heritage tourism to the conservation of natural areas and biodiversity.
- Development and use of new and appropriate technologies that minimise the impact of tourism activities on the environment and the extended conservation of natural resources.
- Establishment of management of regulatory and certification bodies to manage tourism-environment issues.
- The promotion and use of Environmental Management Systems, environmental impact assessment and similar environment management tools.

Background

The European Union (EU) and the countries of CARIFORUM are expected to negotiate a new economic partnership agreement by 2008. Phase one of the preparatory negotiations started in April 2004 and currently the EU is undertaking a Sustainability Impact Assessment (SIA) to ensure that vital sustainability issues are reflected in the negotiation process and that appropriate policies are put in place to avoid any negative impacts that may be derived from such economic partnership agreements and to promote positive impacts. The second phase of the Sustainability Impact Assessment focuses on sector studies, including one on tourism services in the Caribbean region. This sector study is expected to lead to recommendations to address opportunities and challenges for the development of sustainable tourism service industry. The Phase two SIA inception report calls for the full liberalization of tourism services between the Caribbean (ACP countries) and the EU. This paper presents some concrete examples of the positive and negative impacts of tourism development as a contribution to this effort.

Methodology

Information for this study was primarily compiled using secondary research. Particular detail was paid to available government documents that specifically review the tourism sector and environmental matters. Research was also undertaken on germane work undertaken by the University of the West Indies (UWI), the Inter-American Development Bank (IDB), the Caribbean Tourism Organisation (CTO), the Pan American Health Organisation (PAHO), as well as studies undertaken by independent researchers. Dialogue was also undertaken with tourism and environment practitioners.

Situational Analysis

1. Tourism and its associated travel elements is one of the world's largest economic activities. In 1999 tourism accounted for 11.7% of the world GDP (US\$3,549.9 billion) and spending by international visitors amounted to 8% of world exports. An estimated 8.2% of all jobs worldwide depend on tourism and travel and it is projected that over the next five years tourism will create about 5.5 million jobs per year.¹

¹ World Travel and Tourism Council

2. The Caribbean is the most tourism dependent region in the world. Tourism experts calculate that the Caribbean is four times more dependent on tourism than any other region in the world.² The continued decline of the agricultural sector over the past two decades has seen the emergence of tourism and ex-patriot remittances become the main source of foreign exchange earnings for the region. Currently, tourism accounts for one in four jobs and most hard currency earnings being from this sector

3. Predictions are for continued growth in hotel construction and a commensurate growth in stay over visitors. By 2010, Caribbean travel and tourism is expected to produce US\$77.5 billion in economic activity and 3.7 million jobs.

Table 1

Visitor Expenditure as a Percentage of GDP ³	
Anguilla	75
Cayman Islands	60
St. Lucia	55
Antigua & Barbuda	49
Aruba	41
Barbados	36
St. Kitts & Nevis	31
Grenada	28
St. Vincent & G'dines	28
Jamaica	25

This study examines tourism in the islands of Barbados and St. Lucia and specifically focuses on the relationship between tourism industry and environmental impacts but identifies examples where tourism development has been sustainable. The selection of these two islands states is interesting since although they are both heavily dependent on tourism. Geographically the countries are very dissimilar with St. Lucia being mountainous and of volcanic origin while Barbados is a comparatively flat and

² www.caribbeanmediaexchange.com

³ Silva M. 2002

is predominately composed of sedimentary rocks and coral limestone. Beyond this Barbados is relatively mature tourism destination with related development activity occurring since the 1960s. St. Lucia on the other hand is a comparatively immature destination with government policy thrusts only making significant shifts in the mid 1980's.

Table 2 International & Caribbean Visitor Arrivals³

Region	Tourists (Stay Over) (million arrivals)		Cruise Passengers (million bed days)	
	1989	2000	1989	2000
World	426.0	698.8	24.7	53.1
Caribbean	12.38	20.3	14.7	25.7
Share of Caribbean in World (%)	2.9	2.9	59.0	48.4

Table 3 Projected growth in world and Caribbean tourism³

Region	1995 (million arrivals)	2000 (million arrivals)	2010 (million arrivals)	Average annual % change
Caribbean	14.7	20.3	28.4	4.6
World	567.0	698.8	937.0	3.6
% Share	2.6	2.9	3.0	

4. The Governments of Barbados (GOB) and St. Lucia (GOSL) have a strong interest in developing tourism as a means of diversifying the economic base beyond agriculture and industry. The GOSL Medium-Term Economic Strategy (1996 – 1998) clearly states the objective of developing the tourism sector as the leading force in the economy, while strengthening its linkages with agriculture, manufacturing and services. The Government of Barbados has clearly outlined its thrust towards the development of a sustainable tourism product in its Tourism Development Programme (Sub-programme C) of 1997. The importance of tourism to the Economies of Barbados and St. Lucia are clearly outlined in Table 4 below.

Table 4 Tourism contributions to the Economy⁴

Country	Travel and Tourism GDP (1999)		Travel and Tourism Employment (1999)		Travel and tourism Capital Investment (1999)		International Tourism Arrivals (1997)
	% of total	growth	% of total	growth	% of total	growth	(000)
Barbados	51	2.2	40	1.0	76.8	-0.7	472
St. Lucia	69	3.7	51	1.3	60.7	3.6	248

5. The linkage between tourism development and environmental degradation is well documented. The economic potential of tourism makes the industry a potent weapon in the battle against poverty and a cornerstone of national development processes. Despite this however, many Caribbean governments have not devised progressive policies that fuel environmentally sustainable tourism growth through addressing the empowerment of local communities, artisans, entertainers, farmers and the like.⁵ Instead, there has been a move towards the marketing of eco-tourism ‘green tourism’ and mass nature tourism to take advantage of the growing world-wide interest in nature, pristine environments and personal health. According to the World

⁴ Adapted from Tourism and the Environment in the Caribbean: An Economic Framework

⁵ www.caribbeanmediaexchange.com

Travel Tourism Council (WTTC), eco-tourism is growing more rapidly than all other forms of tourism, a trend that is expected to continue well into the future. Whether mass eco-tourism will adhere to the original intent to exist without unduly impacting the environment is unclear. The Eco-tourism trend is expected to expand rapidly and become a major source of revenues in our region.

The Relationship between Tourism and the Environment

6. The natural resource base of the Caribbean is the fundamental fabric upon which the tourism industry is based. Whether tourism is land-based or in the cruise ship sector, the Caribbean relies on its natural environment as the main attraction to visitors. The industry brings comparatively large numbers of people to the host nation. It is these tourists and the supporting infrastructure that they require that pose numerous threats to the environment particularly, the marine, coastal and terrestrial ecosystems as well as potable water resources. It must be understood also that tourism activity can directly lead to environmental degradation but it is possible also for tourism activity to contribute to an existing situation of environmental degradation caused by undertakings of the resident populations. This is at times grossly under-represented as the populations in the Caribbean seek to attain a lifestyle similar to that of more developed countries. Sweeting et al (1998) document that the magnitude of the threat to the environment can be so severe that at times entire classes of resources may become unusable as was the case in Negril in Jamaica. Beyond this the industry itself in Barbados and St. Lucia is evolving from the traditional sun-sand-sea tourism to include attractions like mountains, other forms of land-based nature tourism and cultural heritage tourism.⁶ This developing diversification within the industry is a strategy developed to capture growing international demand for such activities and by extension an effort to increase tourism revenues. This unfortunately, is beginning to expose previously pristine or relatively untouched areas to environmental degradation. The Pitons in St. Lucia and Harrison's Cave in Barbados are excellent example of such. The later having to be closed during the mid 1990s to address the high levels of environmental degradation that occurred as a result of the large number of visitors.

Pollution

⁶ Crompton 1999

Solid Waste

7. Tourism generates substantial amounts of solid waste and this has direct and indirect impacts on the environment. This problem has special significance for both Barbados and St. Lucia owing to the difficulty that these small islands face in sighting solid waste disposal facilities, and which are too small to be able to support economically viable re-cycling programs.⁷ A 1999 University of the West Indies study determined that tourists in St. Lucia generate twice as much solid waste per capita than local Caribbean residents. Similarly Campbell 1999 deduced that cruise ship passengers produce up to four times more solid waste per day than Caribbean residents. However, one needs to be very guarded when using such figures as the average tourist is only present on the island for eight to nine days and residents are present year round. In reality the total waste generated by tourists, 3,600 tons per year is significantly less than the 47,500 tons per year produced from domestic sources and the 30,000 tons per year produced by the commercial sector. It is obvious therefore that solid waste produced by the tourism sector only adds to an overall waste disposal problem that needs to be addressed. Consideration must be given to the fact that given the seasonality of tourism, tourist-generated solid waste could account for the bulk of waste being generated at the peak of the season.

8. The solid waste generated by the tourism sector also includes ship-generated garbage. The Caribbean Sea is an area of high volume area of cruise and commercial ship traffic and solid waste generated from such vessels pose a potential pollution threat to sea and all of the coastal areas that it washes. This was the rationale behind the development of the Caribbean Sea being designated a special area under Annex V, on ship-generated garbage, of the MARPOL 73/78 Convention. This convention regulates operational discharges from ships and the result lead to the trans-regionally coordinated Ship Generated Solid Waste Project in which St. Lucia was integrally involved. The regional simultaneous and coordinated approach was required because pollution travels with sea currents and would threaten the coastal zones of Caribbean nations. To be effective the project established the development of port reception and waste management facilities. As with land based tourism the solid waste produced from marine based tourism also ends up in landfill facilities.

⁷ A.A. Vlugman 1994

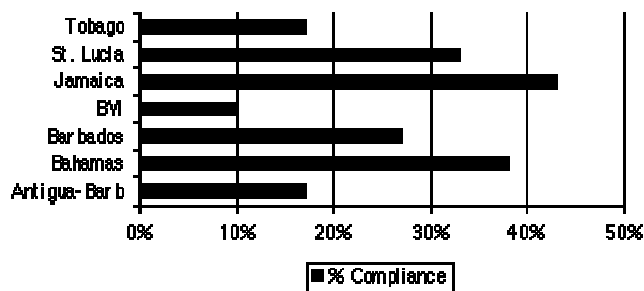
9. The negative impacts of solid waste on the environment are numerous. However, it must be kept in mind that improper solid waste management is not a sole function of the tourism sector. The sector, inclusive of the cruise and yachting sectors, contribute to the challenge that solid waste management poses to the islands in this study. Both Barbados and St. Lucia currently use sanitary land fill technology for the disposal of solid waste. Very little is done in the areas of large scale recycling, composting or incineration. However, closed landfills and dumps may currently provide threats to both ground water quality and marine coastal water quality through generation of leachate. Although information and reliable data does not exist for the islands under study, leachate is toxic and is capable of impacting the near-shore marine flora and fauna. Additionally it can affect human health through ingestion if the leachate gets into potable ground water or surface water resources. The former landfill site at Choc Bay, located in the north west of St. Lucia may now pose a health threat to the adjacent beaches that are now heavily used by tourists. Besides the issue of leaking landfills, solid waste pollution in coastal and inland areas negative aesthetic impact. In the marine and coastal environments, role of plastics in the death and maiming of marine animals shore birds has been recorded. Anecdotal evidence also exists of tourists receiving injuries from broken glass bottles and improperly disposed can on beaches. In terrestrial environments however, improper disposal of containers can provide breeding grounds for mosquitoes that can spread diseases like dengue fever.

Liquid Waste

10. Liquid waste has been identified as one of the main impacts that the tourism industry has on the environment. The sea is a repository for liquid waste including waste generated from tourism activity. The tourism industry generates significant amounts of largely untreated liquid waste from the activities of hotel or restaurant kitchens, raw sewage, the presence of increasing quantities of oil and other waste from recreational vehicles (including cruise ships) along with herbicides, pesticides, and fertilizers from resort landscaping and golf course management. The increased percentage of concreted areas, roads and other impervious surfaces normally associated with hotel and resort development aids in the level of rainwater runoff to

coastal areas. In Barbados, the location of hotels mainly in the coastal belt has contributed significantly to the degradation of coastal water quality and ecosystems. Studies conducted on water quality and the health of coral ecosystems in the Carlisle Bay area as well as the south coast and the west coast of the island were the impetus behind the development of the Bridgetown sewage treatment plant and the on-going development of sewage treatment facilities for the south and west coast. Similarly, studies conducted at the Rodney Bay Marina and adjacent beaches, which have a heavy clustering of tourism facilities, have culminated in the installation of a sewage treatment facility in this area. Hotel waste water plants operating below optimal capacity is critical and is probably the single greatest source of waste water pollution from the hotel belts in Barbados (south and west coast) and in St. Lucia (Rodney Bay). Surveys by PAHO (1994)⁸ have indicated that non-existent or improperly operated sewerage systems at hotels, resorts, and vacation condominiums are major contributors to this problem. Three-quarter of these plants do not comply with a basic effluent criteria of 30 mg/l for BOD and SS or 85% removal of BOD and SS. (See Figure 1)

Figure 1 Hotel Wastewater Treatment Compliance⁹



11. St. Lucia's Biodiversity Country Study Report (1998) outlines a number of environmental impacts related to waste water effluent polluting the near shore environment. Negative effects include the introduction of pathogens into the marine

⁸ Also recorded by A.A. Vlugman, 1994.

⁹ Tourism and Coastal Resources Degradation in the Wider Caribbean. A Study by Island Resources Foundation. St. Thomas, Virgin Islands. December 1996

aquatic environment in raw or inadequately treated sewage. This is a potential health hazard to tourists and residents using coastal recreational resources but in addition introduces bacteria and viruses that can attack corals thereby inhibiting their growth. The introduction of nitrogen and phosphorus containing effluent hastens the process of eutrophication. In such cases the explosion of the growth of algae has implications for levels of dissolved oxygen and light penetration, which, in turn, govern fish numbers, species composition and growth rates as well as aquatic plant and other marine animal life. The levels of toxicity in waters increase from the petrol used in recreational vehicles and coupled with the effects of detergents and trace elements from the decomposition of tins and bottles are harmful to aquatic plants and wildlife. The increased level of water runoff from concreted areas adds to increased sediments being introduced to the marine environment. This coupled with increased algal growth reduces the level of sunlight that normally reaches corals and results in stressed and decreased growth. Needless to say when eutrophication, sedimentation and such matters are evident, coastal recreational waters are not aesthetically attractive and the resource is visually perceived as degraded.

Air Emissions and Noise

12. Air emissions and noise are not reported in the literature as major pollutants produced from the tourism sector that impact the environment. However, the construction of coastal tourism facilities and roads into ecologically sensitive areas can lead, all be it for short periods, to the generation of dust and particulate matter that may cause stress in the marine environment when dust settles on coastal waters. Dust from construction also has the potential to impact plants in sensitive ecological areas. Tourism related construction itself can generate problems with high noise levels. Interestingly, in Barbados the emergence of adventure tourism from 2003 is presently leading to the construction of dirt roads for the use of all-terrain vehicles in the last remaining virgin forest areas in the island. This area, Turner's Hall in St. Andrew and the immediate surrounding areas remained forested because of the hilly and unstable terrain and the presence of gullies. Thus the area was not suitable for agricultural uses or for housing development. The Turner's Hall area is an important area for biological diversity in Barbados. Therefore the noise and dust stirred up by the

increasing number of vehicles traversing this area could have significant environmental implications.

Natural Resources Issues and Land Use

13. Tourism developments in Barbados and St. Lucia are in the main located within eight hundred metres of the coastline. The concentration of large infrastructure and resort complexes along delicate coastlines has destroyed mangroves and beaches and caused lagoon pollution from sand mining, dredging, and sewage dumping (Wilkinson, 1989). The ecological impact of coastal tourism is a complex problem because the coastal environments of Barbados and St. Lucia characterised by inter-relationships between ecosystems. Tourism facilities have in the past, been constructed and have impacted the mangrove/wetland, sea grass and coral ecosystems. Traditionally little importance has been placed on mangrove forests. They were often cut down or dredged for the development of hotels or marinas. Attention was not paid to the fact that these systems were inter-dependant and that the destruction of one would lead to significant ecological degradation of the others. For example, wetland areas and mangroves remove nutrients from and restrict the rapid flow of freshwater into the marine environment. Thus this type of ecosystem creates the conditions that are ideal for the development of coral reefs, that clear, nutrient free water. Thus the removal of wetlands will not only disrupt the nesting and feeding habitat of birds and marine species but the coral reefs will also be affected. The result will be a loss of marine and aquatic species and a reduction of beach sand production, as sand is produced from the physical erosion of coral. The St. Lawrence Gap area in Barbados is a typical example where a wetland area was sacrificed for hotel development. The Rodney Bay Marina in St. Lucia exists because of the destruction of a mangrove area. Planners are currently aware of the value of such ecosystems but in most cases very little or no re-engineering mitigative action can be taken. Physical alterations are now generally thought to increase susceptibility to natural hazards.

14. Most of the effects of tourism on coastlines have been negative due to inadequate planning. These effects include sand-mining for construction coastal erosion from coastal engineering works. The construction and maintenance of jetties, groins, piers and wharves, dredging and spoil disposal. One of the most outstanding

constructions for tourism was the Pigeon Island causeway in St. Lucia. The construction of the causeway altered coastal water flows and processes so drastically that the near-shore fishing industry in the northern town of Gros Islet was virtually wiped out. Conversely, the Needhams Point development on the south western coast of Barbados is an example where coastal engineering has led to the extensive beach accretion.

15. The negative effects of the built environment have been identified to include the clearing of land for construction which has led to slope instability, erosion and sedimentation. In the Caribbean, the scarring of mountains with condominium developments and road networks has caused widespread erosion and wildlife extinction (McElroy and others, 1990). The impacts from inappropriate physical changes can be resolved by improvements in land use planning, construction practice, engineering, architecture, and design processes. In Barbados Coastal Zone Management Unit (CZMU) and in St. Lucia the Northwest Coastal Zone Project, were designed to correct physical changes from decades-old tourism development projects. The CZMU has undertaken successful work in beach restoration at Accra Beach and coral habitat restoration on the reefs of the west coast of Barbados.

16. An interesting example of the impact of the impact of tourism on the natural resource base can be found at the town of Soufriere, whose population stands at 8,500 and includes about 150 fisher-folk operating just over 100 fishing vessels. Soufriere fisher-folk have traditionally engaged in near-shore fishing, including pot and seine fishing around the adjacent near shore areas and coral reefs. However, the past two decades fisher-folk have seen a rapid growth in tourism. Yachting, divers, snorklers and coastal sightseers have found themselves in conflict and competing for the use of marine space for both anchoring and seining activities. In fact, it has been recorded that divers were often accused of deliberately damaging fish pots found during dive expeditions. (Pierre 2000) With the influx of tourists economic benefits derived from the use of the natural resource base (coral reefs) started to accrue to the local restaurateurs, hoteliers, taxi operators (water and land based), dive operators, charter boat companies and sightseeing operations. Fisher-folk complained of declining economic revenues and no direct benefit from the tourism expansion. The resource use conflict was quelled by the formation of the Soufriere Marine Management Area

(SMMA) in 1994¹⁰ and subsequently the Soufriere Regional Development Foundation (SRDF). The SRDF is a community-based organisation, to which power has been devolved from Government for the purpose, among others, of developing and managing the coastal area of the town; and SMMA, which is responsible for coordinating management activities and guiding the formulation of a comprehensive management plan. (Renard 2001) The involvement of the fisher-folk has brought with it several benefits. These include, representation on the SMMA's technical advisory committee, adjustment of marine reserve boundaries and the establishment of more fishing priority areas catering to the seine fishing activities. This interaction is an excellent example of a tourism and resource user conflict being resolved to the benefit of all parties. In addition an investment fund, been set up to assist fishermen in obtaining loans for engaging in activities other than coastal fishing, for example, deep sea fishing for tourism, has assisted the process.

Potable Water and Energy

17. The tourism industry consumes considerable amounts of energy and potable water. A 1998 study undertaken by Pantin established that in St. Lucia the average daily consumption of water by hotel guests ranged between 80 to 150 gallons per person. Residents use around 50 gallons daily. The study also determined that similarly hotel guests use more energy per person than the national average but such usage of energy may have relatively insignificant impact on the environment. Comparatively, the average Barbadian uses between 60 and 63 gallons of water per day while hotel guests use on average 179 gallons per day.¹¹ This heavy use of potable water perhaps has greater environmental consequences for Barbados than St. Lucia. Barbados depends almost entirely upon ground water for its potable water supply. Over extraction of this resource will lead to saline intrusion of the aquifers which will render them virtually useless as a source for potable fresh water. St. Lucia

¹⁰ The final agreement on the SMMA was the creation of a marine management area comprising 11 km of coastline and the adjacent marine area, to include marine reserves, fishing priority areas, multiple use areas, recreational areas and yacht moorings.

¹¹ Extracted from the Magazine of the Inter-American Development Bank, Monday, January 17, 2005

on the other hand depends on surface water for its potable water supply. The only environmental concern related to potable water extraction would be connected to a decreased amount of water being available for the use of natural fresh water ecosystems that exist in rivers.

18. Barbados is taking action on almost all of these fronts. It has built two desalination plants since 2000 and has leased a third one that is mounted in a trailer, although this supply solution is subject to controversy because of its expense. The Barbados Water Authority plans to recycle wastewater and to upgrade the distribution system to reduce leakage and other sources of waste. A new wastewater plant to be situated on the island's west coast will include a facility to reprocess wastewater for agricultural use and for reinsertion into underground aquifers. The government estimates that it can recover through new investments in treatment and recycling up to 5 million gallons of wastewater a day for non-potable uses. (Drosdoff 2005)

Threats to Specific Resources

Beaches

19. The main tourism related environmental threats to the resources of the beach and the sea come from congestion, pollution and erosion. While it should be noted that pollution and erosion may be exacerbated by tourism activities they may not be solely be the consequence of the tourism industry. Congestion on the other hand is. Congestion or beach over crowding can lead sand compaction which can have impacts on back-beach vegetation and may also impact turtle nesting sites. Significantly, lights used by tourism facilities on beaches provide a major problem to turtle hatchlings. Hatchlings tend to move towards these lights and away from the ocean. Consequently, beach lights act as pollution and affect the level of survival of turtle hatchlings. Beach sand compaction can also be caused by recreational vehicles and this is not unknown in either Barbados or St. Lucia. Beaches are also subject to tourism related pollution, as previously discussed in this document as well as erosion.

Coral Reefs and Wetland Areas

20. Coral reefs provide the white sand beaches that the Caribbean is so famous for. It is also an important tourism resource for diving and provides protection for the shoreline during storms. Coral reefs can be physically damaged by divers and by boat anchors. Tourism impact on wetland areas has been previously discussed in this paper.

Inland areas, historic and cultural resources

21. Inland areas, such as national parks, as well as historic areas and cultural resources are increasingly becoming important to tourism. The sustainable use of these resources brings their own challenges. For example Harrison's Cave in Barbados was opened without the recognition of a carrying capacity for visitors. After several years of operation the caves had to be shut. The use of lights and the increased level of carbon dioxide generated by visitors allowed algae to grow and discolour the stalactites, stalagmites and other limestone formations.

Positive Developments Derived from the Tourism/Environment Interaction

22. Greater recognition by Caribbean Governments of tourism's importance to their national economies has speeded up improvements in product enhancement safety and security, marketing and promotion, and has created the basis for greater public-private sector cooperation.¹² This recognition has been the basis for a number of positive developments related to the improvement of environmental management within the tourism sector.

23. With the growing importance of tourism, management systems are being explored to ensure that the environmental resources required for tourism are sustained. One instrument in achieving this integration is the implementation of Environmental Management Systems (EMS). This approach was adopted by the St. Lucia Heritage Tourism Programme, who in 2001, collaborated with the OECS-

¹² www.caribank.org/downloads/Panel1_ArleySobers.pdf

NRMU and the Heritage Tourism Association of St. Lucia (HERITAS), to initiate the implementation of EMS at HERITAS member sites and attractions. This is a tangible example of how tourism has positively impacted the environment. Other clear examples include the use of Environmental Impact Assessments and Environmental Site Assessments for tourism projects.

24. Regulatory and monitoring bodies such as the Coastal Zone Management Unit (CZMU) in Barbados largely owe their existence to the impacts that the tourism sector had on coastal environments. The CZMU has now been firmly established and undertakes research, drafts policy, regulations and legislation that help in the sustainable development of the tourism sector. The tourism industry has caused the development of tourism authorities and these have introduced administrative and planning controls which have been adopted in order to maintain the quality of the environment and to ensure the provision of satisfying tourist experiences.

25. The use and development of new and appropriate technologies is also a benefit developed from the tourism-environment interaction. This is being driven in the main, by industry certification schemes such as Green Globe and Blue Flag. In order to achieve certification tourism plant operators have had to re-engineer or change traditional, less environmentally, modes of operation to meet international environmental standards. These standards, unquestionably, have had an impact on the development of beach cleaning operations of the National Conservation Commission in Barbados and the National Conservation Authority in St. Lucia.

26. Revenues derived from tourist related activities and port taxes provide resources for the protection and preservation of the natural resources base.

27. Tourism can sometimes provide the impetus for the conservation of natural resources. An excellent example of this is the development of the Graeme Hall Bird Sanctuary in Barbados. This is a private sector driven tourism project that carefully uses the biodiversity in the last remaining mangrove swamp in the island as an attraction.

28. Nature heritage tourism can contribute to conservation of natural areas and promote the social and economic advancement of local communities. This may lead to engendering a sense of ownership and empowerment among nationals.

Conclusion

29. The impact of the tourism sector on the environment is well documented at the international level. Yet given the importance of the industry to the national development of Barbados and St. Lucia concern must be raised about the level and amount of targeted research that is being undertaken. Governments of these island nations are acutely aware of the fragility of island ecosystems but very little research exists to clearly separate tourism impacts and threats from those posed by residents. In other words, it is unclear, in some cases, whether the environmental problems originate with the tourism sector or originate outside of the sector.

30. The establishment of standards for environmental performance for all new tourism developments is a must and a stringent system of zoning and land use planning particularly in coastal areas is vital. Planning strategies such as appropriate building set back from high water marks, the conservation of wetlands and the elimination of structures that disturb coastal water flows and disrupt the transport of sand must be encouraged.

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