

ISLAND RESOURCES FOUNDATION

Caribbean Headquarters
6296 ESTATE NAZARETH NO. 11,
ST. THOMAS
U. S. VIRGIN ISLANDS 00802—1104
TEL: (809) 775-6225
FAX: (809) 779-2022

Washington, D. C. Office
1718 "P" STREET NW, NO. T—4
WASHINGTON, D.C. 20036
TEL: (202) 265-9712
FAX: (202) 232-0748
INTERNET: iresources@aol.com

Caribbean Program Office
Post Office Box 103
St. John's, ANTIGUA
TEL: (809) 460-1740
FAX: (809) 463-7740

(ISLAND RESOURCES FOUNDATION OCCASIONAL PAPER NO. 45A)

CASE STUDY REPORT

ST. LUCIA - RODNEY BAY/GROS ISLET (1968 - 1984)

Prepared By:

Dr. Edward L. Towle, President
Island Resources Foundation

Prepared For:

Caribbean Conservation Association's
Environmental Impact Assessment (EIA) Workshop
Barbados, 1985

*The technical counsel of Mr. H. Walters, Mr. S. Koester, Mr. R. Devaux,
Mr. M. Williams, and the fishermen of Gros Islet is gratefully acknowledged.*

1. Introduction: The Caribbean Region

Development projects, resource planning efforts and environmental management strategies have, in recent decades, had an uneven history in island systems, with fewer real successes than disappointments. The reasons behind this pattern of development and technical assistance failures lie buried in the experiences of those involved and in the historical web of changing circumstances, options, constraints, events, choices, and impacts. Post-audits can be helpful.

Stretching between the atypical, oil-rich coastal island of Trinidad (adjacent to the Venezuelan coastline) and the island of Puerto Rico (the easternmost and smallest of the Greater Antilles group), there exists an extended chain of smaller islands known generally as the Leeward and Windward Islands or, collectively, as the Lesser Antilles. Within this 600-mile arcuate-shaped linear assemblage of islands, islets, and cays, there are approximately 300 insular entities of varying types, dimensions, shapes, and levels of development. The largest is Guadeloupe at 710 square miles, but most are much smaller. Some are emergent volcanic, high and wet; and some are raised carbonate, low and dry. A few are combinations of both geomorphic types, and many are simply cays or rocks.

Within the archipelago, there are seven independent island countries (Antigua-Barbuda, Barbados, Dominica, Grenada, St. Christopher-Nevis, St. Lucia, and St. Vincent). Most of these have significant satellite or peripheral islands and cays, some of which are habited but most are not, at least on a permanent basis. Interspersed among the seven island

nations are eight other non-independent islands or clusters politically linked to France, the Netherlands, the United Kingdom, and the United States.

Taken together, their cultural, linguistic, historical, ecological, developmental, and human and natural resource endowment characteristics vary enormously. All of the Lesser Antillean islands, however, are small, have lost a disproportionate share of endemic species, and most have been greatly modified by external influences (i.e., the colonial experience, the plantation system, contemporary tourism, and imported technologies).

As vestigial colonial ties began to weaken in the 1950's and island political systems gradually became more self-governing, local governmental bodies were faced with the difficult task of balancing competing pressures for change. On the one hand, expanding populations, growing unemployment, and rising social, economic, and nationalistic expectations created demands for development, employment, and services. On the other hand, a marginal natural resource base, weak monocultural export earnings, and a primitive infrastructure suggested other forms of intervention and growth were needed. Some islands, like Barbados, sought a way out of the dilemma by opting early on for independence. Others waited, seeking time and external multilateral and bilateral assistance as a "holding action." Still others took the opposite route altogether by strengthening ties with parent countries in order to obtain needed investment capital, grants-in-aid and technical assistance.

Regardless of the strategy selected, when the pace of development activity quickened markedly in the 1960's, critical land and coastal resource allocation questions arose regarding the landscape -- what and where to develop or to preserve (and how), what constraints to apply, and how to optimize growth in employment, income, exports, and earnings using the indigenous resource base in company with external involvement and capital, both public and private.

As a result, the period from 1960 to 1984 has been one of dynamic change in the Lesser Antilles--witnessing several new oil refineries and transshipment terminals, a dozen new seaports and airports, scores of new marinas, hundreds of new hotels, thousands of new cruise ship calls, hoards of tourists in the millions, tourism receipts in hundreds of millions of dollars, and petroleum production, refining, and transshipment of roughly a billion dollars. Since these are all coastal water-dependent activities and all island cities and urban centers are seaports, it is obvious that the coastal zone is the primary nexus of economic growth in the Lesser Antilles. Less obvious is the environmental price being externalized or deferred.

2. The "Island System" Concept

Although some islands are more "open" than others, all are bounded by the sea, and the smaller they are, the shorter the time frame for interactions between human and natural ecosystems (and component terrestrial and marine ecosystems), especially when external forces induce change.

For this study, development and its associated impacts are considered within the framework of an "island system" construct, a flexible label that applies principally to islands or island groups and their associated natural, social, economic, and political systems. The "island system" concept calls attention to the following facts.

- It affirms that an island, even though it is small, is not an homogenous, discrete entity, but rather an assemblage of diverse subaerial and subaqueous ecosystems in upland, littoral, sublittoral, and outer-shelf zones; most of these, in the case of small islands, are included in the coastal zone.
- It stresses the importance of the interdependent linkages among island ecosystems: impacts in one ecosystem will have repercussions in another. Further, their areal extent will not conform to convenient geographical or political boundaries, like "land" or "sea". The concept also requires perception of each island's relationship to and within associated island groups, wherein artificial international boundaries and the downstream pollution effect create resource management problems.

3. Understanding the Difference

Failure to understand distinctive differences between island and continental systems has often had unanticipated and undesirable results for both private developers and public sector funding agencies engaged in island development activities. Evidence of mistaken, ill-advised, inappropriate, sometimes naive development schemes abound in the island world. Most failed, even though similar approaches had worked well in continental systems, because of insufficient adaptation to insular conditions and constraints, and reflect an antecedent conceptual failure to see islands as different--and then to define those differences. Several examples are illustrative of this point.

- Costly groin, pier, dock and jetty facilities have been literally washed away by "unanticipated" seasonal storms (not even hurricanes). They were simply sited or designed wrong for an island environment.
- Costly sewage treatment plants, desalination plants, and diesel/electric power plants not designed for island environments have deteriorated and failed prematurely.
- Costly enclave-type tourism efforts, especially those designed as sequestered, centralized, high-rise, "Miami Beach-style" facilities, have failed to meet island development needs. They overlook local employment, ownership, cultural exchange and integration with other island economic development possibilities, and many are under increasing pressure to "decentralize" and become more integrated into island development planning strategies.
- Costly coastal zone management programs extrapolated from continental models have simply not measured up to island expectations or requirements.
- Costly beach improvement/nourishment strategies have failed for design reasons, based on an assumption that what worked elsewhere would work in islands.
- Standard sand and coral mining efforts have seriously damaged adjacent beaches, coral reefs, and coastal environments and adversely affected other sectors like fisheries and tourism.
- Natural disaster relief activities, because of poor planning and inappropriate scales and styles of intervention vis a vis island areas, have often had a greater negative long-term impact on the island system and its capacity for survival than the cyclone, hurricane, flood or drought itself.

Most of these "failures" will resurface in more detail in later sections of this report.

*The tidal wave devours the shore
There are no islands any more.*

(Edna St. Vincent Millay, 1940)

In everything, respect the genius of the place.

*(Alexander Pope,
Essays on Man, 1733)*

Bay Development, St. Lucia (1968-1984)

Setting

Independent island state since 1977, St. Lucia is situated in the Windward Islands of the Lesser Antilles (between Martinique and St. Vincent). It has a total land area of 238 square miles (616 km²), a population of approximately 124,000 persons, and in 1980 it had a gross domestic product of US\$80 million or \$210 million Eastern Caribbean currency (EC\$2.6 = US\$1). Over 30 percent of these revenues were derived from the marine sector (sand mining, fishing, transportation, and tourism) (Mitchell and Gold, 1982). It is a rugged, lush island with steep mountains, mainly volcanic in origin. Relief is broken only by a small plain in the south, eroded hills in the north, and several deep embayments and harbors on the central leeward (westerly) coast. A new international jet airport occupies the extreme southern tip at Vieux Fort and a second older, lesser air facility is located at Vigie, adjacent to the capital city of Castries.

The island possesses a relatively narrow nearshore, submerged shelf area and several coastal islets. Maria Island (12 ha), a nature reserve on the southern coast, and the former Pigeon Island (20 ha) off the northwestern coast opposite the Village of Gros Islet, some seven miles north of the capital, are especially noteworthy.

Since St. Lucia was formerly settled by the French and was captured, lost and recaptured several times by the British during the eighteenth and early nineteenth century colonial period, a French "patois" is spoken widely (although the official language is English), and customary

place names are mostly French.

Traditionally, the people of St. Lucia have depended heavily upon agriculture (mostly bananas), forestry and fisheries for a livelihood. In more recent times there has been rapid growth in other sectors which draw heavily upon various marine resources, especially port-related industry, sand mining, shipping, and tourism. Growth in tourism since about 1970 has brought it from a relatively non-existent sector to one contributing approximately 18 percent of the Gross Domestic Product. St. Lucia has approximately 2,000 fishermen, although some are only part-time participants, with over 400 boats producing an artisanal catch valued at EC\$45 million in 1981 and virtually all of which is consumed locally. Village units of artisanal fishermen are common along the leeward and southerly, more protected coastlines (Figure 1).

In the early 1960's, when the Government of St. Lucia sought to define a share of the Eastern Caribbean tourism traffic for itself, one of the areas selected for resort hotel development was the Bay of Gros Islet on the northwestern coast opposite Pigeon Island. At the time, the islet and its associated shallow reef at the northern end of the Bay created a superior, semi-enclosed and protected anchorage of considerable ecological diversity, historical significance, and importance as a net, lobster and conch fishing area used by fishermen of the nearby Village of Gros Islet. Pigeon Island, the namesake of the village, was studded with historical forts, batteries, and buildings dating back to the era of Admiral George Rodney.

Reduit Beach, approximately one mile long, forms the southern half of the Gros Islet Bay coastline with the fishing village of Gros Islet located at the northern beach limit. North of the village, the rugged coastline is formed by low cliffs and pebble beaches. Between Reduit Beach and the volcanic peaks well to the east, a flat swampy area of about 250 acres was maintained by surface water drainage from the surrounding hills. Natural drainage to the sea was restricted by Reduit Beach and its associated berm (Figure 2).

During World War II the United States leased and occupied the area as a seaplane base for anti-submarine patrols, and some construction and

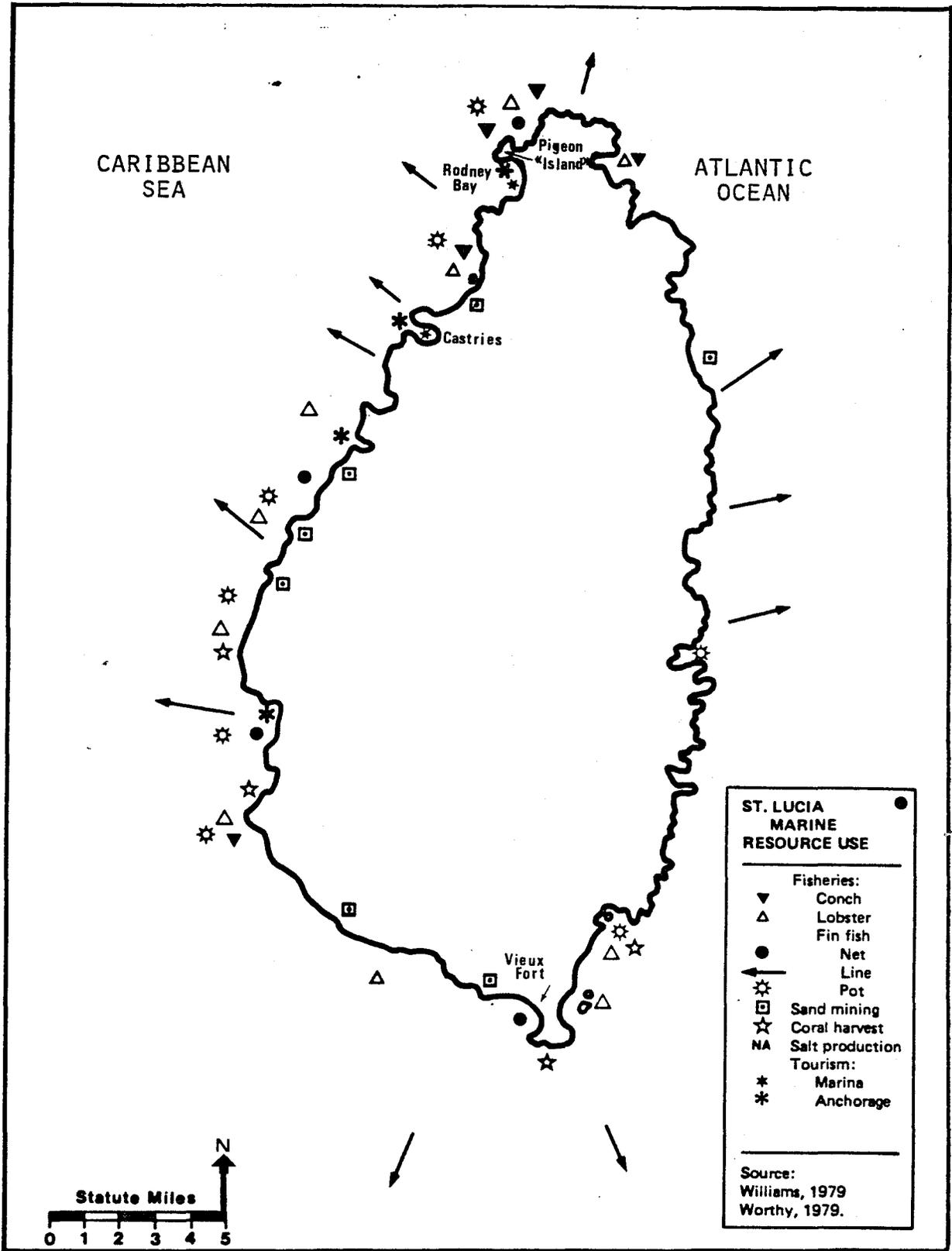


Figure 1. St. Lucia marine resource use. (Adapted from Eastern Caribbean Natural Area Management Program Resource Data Maps, 1980.)

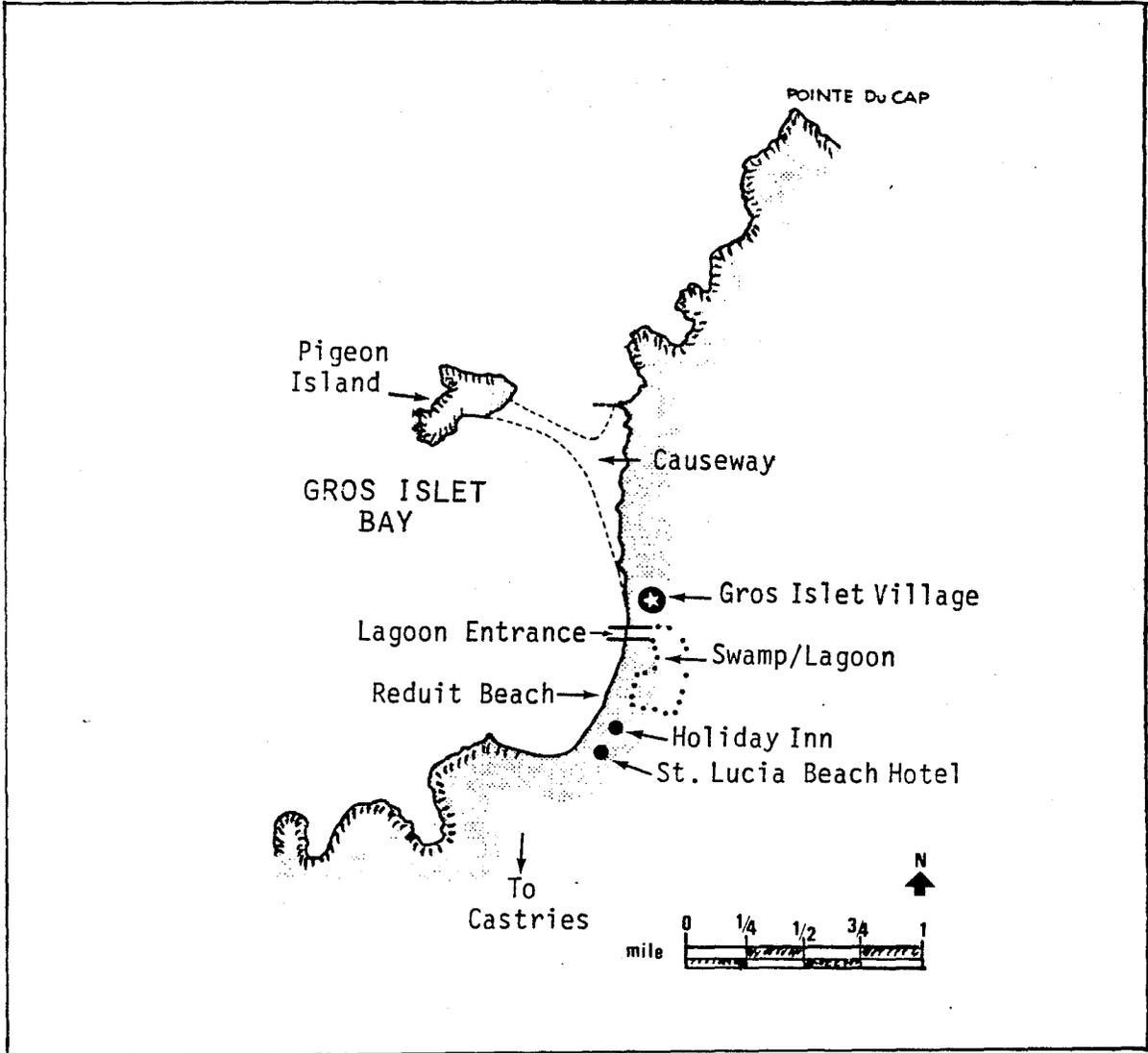


Figure 2. Location map: Rodney Bay development project at Gros Islet Bay/Pigeon Island area, St. Lucia.

considerable dredging were carried out at the site. The U.S. Navy attempted to fill the swamp with about 200,000 cubic yards of sand hydraulically dredged from an area immediately offshore at the southern end of Reduit Beach. The deep borrow pits are still visible forty years later. Because of the amount of soft silt that had built up over the years in the swamp bed, the dredging strategy did not work as the heavy sandy fill material compressed the underlying silt and gradually sank. By 1960, the area was once again a swamp.

4.2 The Rodney Bay Development Project

The attractiveness and development potential of Gros Islet Bay (later unofficially renamed Rodney Bay) captured the attention of a group of Canadian investors. In 1961, with government blessing, they commenced construction of the St. Lucia Beach Hotel on the palm fringed extreme southern end of Reduit Beach, as far from the Village of Gros Islet and as near to Castries and the airport as possible. The new facility was ready to open by 1962. Six years later a second Canadian-owned resort hotel (Holiday Inn) was planned for Reduit Beach--even larger than the first--just north of the existing St. Lucia Beach Hotel (Figure 2).

However, there was a problem that delayed construction of this second facility: tiny but bothersome, bloodfeeding insects known locally as sand flies or "no-see-ums." Both the St. Lucia Beach Hotel management and the prospective Holiday Inn developers complained to Government that something had to be done about the swamp to the east, thought to be the source of the sand flies. Their bites plagued visiting tourists in the early morning and late afternoon to early evening hours, causing occupancy rates to suffer. Insecticide fogging and spraying had not worked. The option of draining the swamp was raised in order to eliminate the breeding habitat of the pesty "no-see-ums" (Island Resources Foundation files; Devaux, 1983).

The Government gave firm assurance to the hoteliers that something would be done to alleviate the problem. But what and how and who would pay for it remained to be established.

Nature may abhor a vacuum, but so, apparently, do engineering con-

tractors. By a mysterious process akin to osmosis a well-known Jamaican entrepreneur, who owned a large marine dredging and construction firm, appeared on the scene with an offer that "could not be refused." He proposed a private sector solution to the government's "bug" problem at Reduit Beach, one that would generate profits but only if his grandiose scheme was accepted in its totality (Devaux, personal communication, 1983). That plan evolved as the Rodney Bay Development Corporation with a projected investment capital requirement of EC\$17,089,000. It included the following development components:

- To dredge the core of the swamp, filling border areas with sea sand and open up the new "lagoon" to the sea with a channel for yachts through Reduit Beach.
- To create 88 acres of new flat land with a new mile-long beach for additional tourist facilities by dredging seabed sand from Gros Islet Bay and emplacing it as a "causeway" on top of the shallow reef between Pigeon Island and the main island, thereby doubling the linear dimensions of Reduit Beach available for "development."
- To create and sell or lease marinas, residential and condominium units on the newly filled "waterfront" lots on the filled areas in the new lagoon (i.e., ex-swamp).
- To accomplish the above through a three-way partnership between the Government of St. Lucia, the [British] Commonwealth Development Corporation (which would cover the up-front capital costs as an "investment"), and the Jamaican entrepreneur, who would provide the expertise and dredging, road building, and other services (for which he would be paid).
- The project would comprise 1,311 acres (1,243 of which had to be purchased), consisting of 650 acres of single residential vacation/retirement housing units, 52 acres of hotels, 80 acres of condominium/apartment units,

7 acres of commercial tourist "boutiques," 10 acres of yacht club/marina facilities, 440 acres of green land, lagoon, public beaches and roads, and 72 acres for "extension" of the Village of Gros Islet.

- The project would require two years of site modification and five to seven years of lot sales and development.

The Government of St. Lucia accepted the proposed scheme; engineering studies and plans were completed by June of 1969; shortly thereafter work commenced, i.e., temporarily surcharging or covering the swamp with sea sand to compress the silty bottom, installing a rock/boulder barrier from the mainland to Pigeon Island (behind which dredged sand could later be safely deposited), opening up the swamp/lagoon by a channel cut through Reduit Beach and re-routing the existing north-south road system. But not everything went according to plan.

In 1970, as part of the attempt to create access from the sea to the swamp behind the beach berm at Reduit, an effort was made to excavate the entrance channel between the former St. Lucia Beach Hotel and the new Holiday Inn. This, however, had to be abandoned when it was discovered a ridge of hard rock extended underneath the beach berm. Blasting was unfortunately ruled out, and in 1971 an alternative strategy was selected which involved the dredging of a channel immediately south of the Gros Islet Village. The siting of the channel south of the Village ended up requiring the elimination of the bridge over the old swamp drainage outlet between the Village and its cemetery, thereby cutting the Village off from both its traditional burial ground and from direct access to the existing hotels and the new "development area." The initial rock barrier placed between Pigeon Island and the mainland, as an antecedent protective mechanism for the causeway dredge and fill activity, caused the beachfront at the Village to collapse, thus requiring "nourishment" with additional dredged material--a remedial strategy which, it will be demonstrated below, failed over time (Stevenson and Hardtke Associates, 1973; Devaux, 1983).

However, the final phases of the site preparation, including the

dredging of over 2.5 million cubic yards of Gros Islet (Rodney) Bay seabed coral sand to construct the 88-acre causeway, were completed by the end of 1972. All that remained for the project to succeed was to sell or lease the newly created or "enhanced" waterfront properties to amortize the investment and generate new revenue. But, some fourteen years later, this has not yet occurred. Not one sale, lease or option has been finalized for the causeway area. Not one new hotel has been built. There has been no deluge of buyers or leaseholders for the residential sites in the new "lagoon", which is fairly attractive. Additional capital investment (for further site improvement and remedial environmental interventions), development, and marketing costs have mounted, and the total is close to three times the original estimate. There has been no appreciable return on invested capital, and carrying costs are estimated at about US\$2,000 per day.

There were other recurring costs of a different nature accruing to the project and its environs. From an environmental impact perspective, the development scheme for Rodney Bay is a rather classic case of both good intentions gone astray and of "Murphy's Law" ("If anything can go wrong, it will"). The following section summarizes a sequence of unanticipated environmental impacts that help explain the failure.

4.3 The Short-Term Impacts

As part of a larger series of Eastern Caribbean investigations focusing on coastal processes, erosion, sand mining, and regional beach control, Deane et al. (1973) undertook a detailed study of the Reduit Beach area in St. Lucia from 1970-1973. In the subsequent report documents, Deane reported that the most significant event that had occurred in this area was the closure of the Pigeon Island passage which had resulted in the following major changes in the littoral climate: 1) almost no new sediment is supplied to Reduit Beach; 2) there has been a significant reduction in the wave climate along the stretch of coastline between St. Lucia Beach Hotel and the lagoon entrance near Gros Islet Village; and 3) waves now approach the beach at almost right angles and consequently southerly littoral transport, formerly driven by waves passing through

the Pigeon Island passage, has ceased. "One result of the first change is that in the long term, erosion will be experienced over the entire stretch of beach. As a result of significant changes in the direction of wave approach in the medium term major losses will be experienced in the southern half of the beach during periods of severe wave attack" (Deane et al., 1973).

In 1973 the consulting firm which had prepared the original engineering and design study for the Rodney Bay project was employed by Rodney Bay, Ltd., of St. Lucia to examine the post-construction beach stability situation at Rodney Bay. The study was prompted by various complaints about modifications that were occurring to beaches and other marine features in the area. The report by Stevenson and Hardtke Associates (1973) noted that the causeway beach will "tend to change to some degree over the next five to ten years, but this is not likely to create a problem, provided the change is allowed for in planning." Concurrently, they indicated that "regular surveys of all Rodney Bay beaches are recommended in order to insure that unexpected changes are noticed." Shore erosion problems at the southern end of Reduit Beach, according to the consultants, were solely the result of the offshore dredging carried out in 1941 and the mining of sand from the beach during the 1960's for aggregate and the removal of the sheet piling (installed by the U.S. Navy in 1941) from in front of the southern part of the Holiday Inn in 1970. The report concluded that any existing erosional problems were "not caused by the Rodney Bay construction, ... although it has markedly influenced conditions in the area" (Stevenson and Hardtke Associates, 1973, emphasis added).

What the consultants were saying, in effect, was that the previous extraction of perhaps a total of 200-400,000 cubic yards of sand and the removal of a forty-year-old sheet pile wall had more influence than the closure of the Bay entrance, the removal of 2.5 million cubic yards of sand for the causeway fill, plus the removal of more than a million cubic yards for the surcharge and fill strategies for the swamp area.

The most interesting part of the study is its endorsement of the need for costly remedial actions, involving the installation of a gabion

blanket near the St. Lucia Beach Hotel costing EC\$100,000, the installation of an offshore breakwater near the southern end of the Bay costing EC\$300,000, possible installation of two stone groins at the point where the causeway beach and Pigeon Island connect in order to attempt the restoration of the former Pigeon Island natural beach. The study also supported the need (given the modifications in Bay circulation caused by the installation of the causeway) for any new sewer outfall serving future tourist facilities to extend at least 2,000 feet from the nearest shoreline. The outfall recommendation was deemed necessary to take account of the new flow conditions, new bathymetry, and new wave regime--yet no cost estimates were cited (Stevenson and Hardtke Associates, 1973).

By 1975 the beach at the Village of Gros Islet had deteriorated, causing the village council to protest to the Town and Country Planning Unit, suggesting that the existing lagoon entrance south of the Village was "an eyesore." The Council complained that the encroachment of the sea on the bay front created a hazard, and that the sandy beach which was expected had not materialized. In the opinion of the council, these problems were a direct result of the works carried out in the creation of the causeway (Devaux, 1983).

Changes were not limited to the main island. For more than three hundred years the westerly side of Pigeon Island had a rather beautiful 1,000-foot-long, 40-foot-wide yellow sand beach. The foundations for a rock pier constructed by military engineers in 1782 still survive and, until the causeway was built, produced a minor widening of the beach area at the point where the 1782 stone dock was constructed. In 1969, two years after a new timber-pile jetty was constructed on the eastern side of Pigeon Island as a dock for visiting boats, the rapid build-up of sand to the south rendered the jetty more or less unuseable. Rapid shoaling occurred at the extreme outer edge, indicating a sand deposition phenomenon and slow littoral sand transport from south to north in the area. By 1970 when construction activity began for the causeway, Reduit Beach began experiencing serious erosion problems. Pigeon Island was not affected by these events until the closure of the gap. However, when the gap was closed in 1971, the sand on Pigeon Island

beach began to shift noticeably toward the east. At that time, accurate measurement profiles of the Pigeon Island beach were taken for the first time (Devaux, 1983). By 1972, when the causeway was completed (almost a year later), a yellow sand strip or streak began to appear along the white coral sand on the artificial causeway beach, matching the color of the sand at Pigeon Island. Within six months it had traveled 1,000 feet along the causeway toward the mainland; Pigeon Island was apparently losing its only beach to the causeway beach.

The St. Lucia National Trust, a quasi-governmental body responsible for developing Pigeon Island as an historic site and national park, was properly concerned. By 1976, however, the beach had virtually disappeared and, despite sequential protective and remedial engineering strategies (e.g., gabion baskets, groins, and armor stone emplacements), all at great expense to the National Trust, only the northerly segment of the former beach had stabilized (Devaux, 1983).

In the meanwhile, the causeway itself has been "stabilizing" (to use the consultant's term)--or eroding (to use the disinterested observer's term)--at a loss rate of 14 feet per year since 1974. The original 88 acres are now down to perhaps 75 acres. When and if it will truly "stabilize" is an unknown. Whether investors can be attracted to build hotels or condominiums on a dynamic, not yet stabilized, artificial tropical island beach is also an unknown. What has happened as a result of the causeway and associated Rodney Bay dredging activity to the adjacent artisanal fishing Village of Gros Islet, however, is not an unknown. It is a matter of record and a cause for concern.

4.4 Impacts on the Coastal Fishing Community at Rodney Bay

Gros Islet, St. Lucia, is a small fishing village for which there are dozens of replicates within St. Lucia and hundreds in the Caribbean region. Before the Rodney Bay project, Gros Islet bore a resemblance to coastal fishing villages on all inhabited oceanic islands, such as those in the Lau group of Fiji described in detail by Brookfield and others (MAB, 1977). To illustrate how this has all been changed, we have elected to explore in some detail the metamorphosis of the village-based

fishery at Gros Islet.

Prior to the Rodney Bay project, Gros Islet had three seine nets exploiting the resources of the nearby reef and coastal environment. Each seine had a full-time crew of four to six men responsible for casting the net and maintaining it. In addition, between 15 and 20 people regularly accompanied the crew to pull. Another shifting group of approximately 15 to 20 villagers would pull on a given day in exchange for at least a substantial portion of their families' daily food requirements. A crew member's share served as his daily wage, and the shares distributed to the regular pullers were also essential sources of income. In theory, the distribution of a day's catch was: 1/4 to 1/3 to the net owner, 1/4 to 1/3 to the permanent crew and 1/2 to 1/3 distributed among those who pulled. In all, each net had between 40 to 50 people working on it daily in exchange for varying amounts of income and subsistence. The size of the work force fluctuated with the seasons, the quality of the previous day's catch, and weather and sea conditions (principally wind and swell).

With the advent of Rodney Bay Development, this fairly stable system was undermined and destabilized. Dredging the Bay, digging the lagoon channel, and building the causeway destroyed the usefulness of the seine fishermen's two principal beaches. The causeway cut the Gros Islet Beach area in half. The dredging left borrow pit edges or underwater cliffs that would snare large beach seines when cast. It also released mud and sediments into the water, destroying sea grass and coral fish habitats. The causeway also blocked off the current and, according to the fishermen, a main "path" for schools of jacks and mackerel which they previously caught.

All three seine owners abandoned fishing as a result of this drastic environmental alteration, and their cotton nets all spoiled. Eventually, one of the three experienced seine fishermen bought a nylon net and began casting at the Caribblue Beach some distance to the south. He was followed by two net owners from Anse La Raye (south of Castries) who also began fishing there.

This new arrangement left three nets (from two villages) sharing one

beach and resulted in a reduced daily catch from the seines and a reduced demand for labor. Instead of three separate groups of people pulling each seine daily, only one group was needed. In addition, because the Caribblue Beach is located outside the village, a large portion of the catch no longer comes through Gros Islet but is instead shipped directly to Castries by van. Before, with three nets being used close to the village, fish were more plentiful and, with over 100 people (sometimes 150) getting a share daily, the catch was efficiently and widely distributed to meet local needs.

Gros Islet's seine fishing was also an important source of fresh bait for fishermen trolling the banks northeast of the island, especially during the bottom fishing seasons, July to November. It was common before the development to sell bait to over 20 canoes a day during the bottom season. As seine fishing has diminished in Gros Islet, these fishermen had to find more direct alternative sources for bait.

A still unfolding further development illustrates the current predicament of Gros Islet's seine industry. Until recently, one local fishermen with a "ti-seine," (small [*petite*] seine) had been casting his net on beaches that the larger seines cannot use, including the remaining part of the Gros Islet Beach and along part of the causeway. But even he has emphasized that net fishing was much better before. "Before we were a fishing village, everyday we were taking kawang (carang) and jacks especially in this season now but the barricade blocks off the fish" (Koester, 1983).

Rodney Bay development destroyed or eliminated the most productive parts of the seine fishermen's environment, cutting their daily production by two-thirds and diminishing the daily work force requirements by about the same amount. According to one of the net owners, "From the time of the causeway I haven't had a really good year. Before if I had a son I would encourage him to come and help me with my seine. Now I wouldn't do that. There is no future in it" (Koester, 1983).

The use of both wire and the more traditional bamboo fish pots was the second major fishing method employed by Gros Islet fishermen at the time of the Rodney Bay Development project. Some men specialized in this

single technique, others combined it with additional methods and others (like farmers, craftsmen and day laborers) set fishpots as a part-time occupational pursuit. Before the development about 30 Gros Islet fishermen relied principally on setting pots inside Redit Bay, in the area of the causeway and north of the causeway up to Cap. Setting pots on the nearby reef area and in the bay provided all fishermen with a secure inshore component to their overall strategy, thereby spreading the risk. It involved the least effort and provided sustenance and income when the sea was too rough or the weather too bad for other kinds of fishing.

The Rodney Bay Development Project adversely affected pot fishing by destroying nearby areas previously used by fishermen and by impeding their access to more distant areas they previously used and continue to use, but now at a greater cost. Dredging destroyed fish habitats where men had set pots, and the mud and fine sand particles released while dredging the bay and swamp continue to hinder the efforts of pot fishermen. The causeway itself obstructed their access to fishing areas north of the village. "The causeway kept me back a lot, I used to set pots there. Before I rowed my boat and used a sail, now I have to buy a machine to go around Pigeon Island. And its not just me, its kept back a lot of fishermen," reports one village resident (Koester, 1983).

The Rodney Bay project has therefore raised the cost and effort required for Gros Islet pot fishermen, and many pot fishermen have left fishing altogether. Some sold their boats to Frenchmen, a lot left the sea and went on shore for a job. Another concludes, "Before the causeway, I never left the sea but after that I can't depend on the sea alone."

The Rodney Bay project occurred at a time when several new fishing technologies were being introduced in St. Lucia. At Gros Islet only two men had engines; the rest were still rowing and sailing. The three seines were all cotton. There were only two bottom gill nets and no trammel nets. Only one man was diving with a tank, and the use of dynamite was infrequent. Since the completion of Rodney Bay the old technologies have given way to more modern ones. Engines are used on both canoes and chaloupes, the seines are nylon, there are more bottom nets,

and diving with tanks is widespread (Koester, 1983).

When the Rodney Bay project began, some Gros Islet fishermen were able to secure jobs in its construction. For example, it was reported, "A lot of fishermen quit to work on the causeway, the whole area was white with mud, there were no fish so there was nothing else to do." This alternative, however, was short-lived. Before the Rodney Bay project over 100 Gros Islet men earned their living from the sea. Estimates of the number of active fishermen now range from 30 to 50 (and many of these are part-time). The adverse effects of Rodney Bay Development for fishing, combined with the options it offered in construction, changed the occupational focus of many Gros Islet men.

Up until the time of the development project, lobster and conch were both present in the area of the causeway and also around Pigeon Island. The Bay itself had extensive sea grass beds. The fishermen of Gros Islet and the St. Lucia fisheries office agree on this. But all three--lobster, conch, and sea grasses--have now virtually "disappeared."

Before the Rodney Bay project, tourism seems to have played a more visible and reliable role in the livelihoods of Gros Islet fishermen. Tourists were able to walk from the Reduit Beach hotels to the Village and arrange for boat tours. Somewhat nostalgically, one fisherman recalled, "We used to take tourists to Pigeon Island. We didn't have engines then so we'd row them or take them by sail. We could always make a few dollars from it. Now the tourists catch big transports [tourist buses] and drive right around us" (Koester, 1983).

Fishermen also claimed it was possible, before the project, to catch lobster nearby and sell directly to the St. Lucia Beach Hotel and the Holiday Inn. Since the development, the nearby hotels buy from all over the island because the local supply is now "unreliable."

Frequently, when discussing the causeway, the fishermen of Gros Islet Village will use the term "barricade." One fisherman reports, "Gros Islet was the net fishing center. Since after they put up the barricade the place is dead." From the perspective of the village, its cemetery has been destroyed and the channel was made in order to separate the people of Gros Islet from the tourists. "I believe they didn't want

much black people to meddle with the white people. Now we can walk to Pigeon Island but before we could walk over the bridge to the cemetery but now they've built the marina there. They didn't want the people in the midst of the whites" (Koester, 1983).

4.5 Retrospective Conclusions

The central idea of developing the Rodney Bay area as a multi-purpose (hotel, condominium, marina) site had merit. But the development plan was fundamentally flawed and produced serious problems when implemented. The project scheme did attract external investment capital, expand the tourism industry's infrastructure base in St. Lucia, provide some new employment opportunities (although primarily short-term), and is probably economically viable for the owners or investors over time. But as designed and implemented, and in the absence of any serious impact assessment or mitigation planning (even by 1970 standards), it produced a number of serious negative effects. Far too many unanticipated social, economic, and environmental costs resulted, and the project, in retrospect, was a failure, especially since the full accounting of environmental disbenefits (losses) is not yet finished. Three fairly obvious categories of failures overwhelmed the original scheme and placed it at risk. These failures are summarized below, not to be retroactively critical but because experience is still the best teacher and there are positive lessons to be learned.

1) Conceptual Failures. There was a general conceptual failure to appreciate the magnitude and complexity of the project and its aggregate consequences if done in one "fell swoop" instead of in stages. The evidence now suggests (after the fact) that the Rodney Bay tourist facility and land development project could have been accomplished without installation of the causeway and would have produced a better outcome. The causeway "component" of the scheme was costly, has returned no revenue and has induced numerous unanticipated, negative environmental effects on the natural and human ecosystems. The Gros Islet bay, beach, swamp, and village "system" was subjected to several sequential devastating modifications, almost simultaneously, with no

attempt to assess the impact of the first stage before moving ahead on later stages.

Three distinct and major ecosystem disruptions were involved:

- conversion of the fresh water swamp to a saline system by cutting a deep channel (it would have been better to cut not one but two) for enhanced flushing and to reduce the sand flies
- dredging of Gros Islet Bay sand for surcharging the swamp and then converting the core of the swamp to a lagoon marina system with filled shoreline areas and road access for residential and commercial use
- closure of the Pigeon Island passage and massive dredging in Gros Islet Bay for causeway fill emplacement which has had (and could have been predicted to have) fairly dramatic oceanographic, biological, and socio-economic impacts--mostly negative--on the ecosystem.

Had the swamp/lagoon modifications been followed by an even brief period to allow the system to stabilize and to allow for an assessment of impacts (providing feedback), it is likely that a decision would have been made to abandon the final "causeway stage". New market conditions and problems, community concerns, and environmental lessons learned in the first phases would have been evident, arguing against proceeding as planned with the causeway. Grand and complex schemes, hurriedly modifying equally complex island coastal ecosystems, are often pre-programmed routes to an economic failure, if not an environmental disaster.

The rule of thumb should be "when in doubt, stretch it out," even though this involves resisting the "can do" inclination of getting the job finished, producing immediate results, and moving the money--all very efficient and legitimate concerns under smaller, less risky coastal resource development circumstances.

A second conceptual failure by those who originated and sanctioned

the project was their inability to perceive the marine biological system at Gros Islet Bay, the artisanal fishery, and the Village itself as "resources" which were unofficially committed to the project and which would be modified by it. The traditional users of the area became involuntary, reluctant partners in the venture because they fell within the "natural boundaries" of the project, although not within its official or legal boundaries as shown on planning documents.

In the absence of any integrated development planning protocol, this narrow perception of the project led to a failure to assess the nature and value of the resources being allocated--perhaps inadvertently and irrevocably--as an investment in the Rodney Bay development scheme. For example, the former coral reef at the Pigeon Island passage, now buried under the causeway, was taken out of the St. Lucia natural resource "bank" and invested in the project. It can only be recovered in kind, and even that prospect of re-payment is in doubt -- in part, because, after the fact, one can only infer what it was worth in terms of pounds of fish, lobster, or conch, in employment, and in natural shoreline protection (i.e., as an annually renewable free input to the economy of the Village of Gros Islet and of St. Lucia).

There were also a variety of other failures, some systemic (and those can be avoided in the future only by external compensatory actions) and some technical (that can be eliminated by modifying or applying higher or different standards or using alternative methods).

2) Systemic Failures. The political decision-making process, i.e., the political system, as an ongoing process of interactions between electorates, institutions, and leaders, is inexorably inclined to optimize short-term, sectoral development aimed at generating employment, investment and income in a problem solving mode within the shortest possible time frame. This is a simple fact of life, but especially risky when the developmental "quick fix" involves the allocation of small island coastal resources, usually involving complex, closely coupled dynamic natural ecosystems with an overlay of an equally closely coupled human ecosystem, constrained by both the insular vulnerability and limited option factors characteristic of smaller islands.

There is, however, another aspect of this systemic failure of the governance process. Insular dependency on externalities, like investment capital, technical assistance, grants-in-aid, and specialized engineering expertise (particularly marine) means that political leadership must also listen to a variety of different, exogenous drummers. The conjuries of development planning schemes and tempos (generally faster in the private sector, slower to funereal in the public) resulted in a Janus syndrome of trying to look inward and outward at the same time for signals or guidelines. In the process, coastal ecosystem development planning gets short shrift--project boundaries are too constrained, planning is both hasty and narrow, schedules are too tight to allow for feedback adjustments, resources are damaged, and costly surprises are endemic. Rodney Bay presents a classic example of this particular dilemma of "getting on with it" vs. "getting it right" (i.e., minimizing losses and optimizing gains); it is a problem that can only be ameliorated, not eliminated.

3) Technical Failures. Relying on engineers and economists to design a project like Rodney Bay was akin to planning a hospital without consulting with either the medical staff or user groups. In effect, a narrow engineering/marketing solution was sought and applied to a development task that had other equally important, non-engineering dimensions, namely, severe modifications to the natural and human ecosystems. Missing was the design perspective and technical expertise of natural and social scientists who, collectively, could and should have dealt with the unfortunately unaddressed matters of natural and human resource assessment. Issues deserving attention included documentation of traditional local uses and their economic and social significance, ecosystem characteristics, and project environmental impacts.

Other technical failures or omissions included cutting the Village off from its cemetery and its customers for tours and boat trips, dredging too close to the shoreline, not fairing the edges of the dredge borrow pits, not maintaining a beach profile monitoring program (although the engineering consultant recommended one in 1973), not working out an employment strategy for the Gros Islet villagers (who were prevented

from fishing during the project), not including a proper sanitary waste water sewage outfall disposal strategy for projected tourism facilities in the planning, not anticipating the causeway erosion phenomenon, and not being responsive to obvious negative feedback signals from the disturbed ecosystem. These all were project design failures more than performance failures.

The final failure, perhaps the most significant, is really a by-product of all the conceptual, systemic and technical lacunae discussed above.

Over historical time, the Gros Islet community had struck a balance with nature. It had learned how to survive the vicissitudes of isolated island living, not just by fishing (which it did well) but also by learning to spread risk and adjust to seasonal catch cycles for various species. The community had developed ways to reduce vulnerability by internal diversification (mixing farming and fishing) and to limit dependencies on external markets by "substitution." It had developed an unwritten but proven and practical "optimum sustainable yield" resource management strategy for harvesting living marine species, which were within economic range. It embodied two or more centuries of experientially derived, collective information about the dynamics and stock of nearby coastal resources. As a West Indian community, it had come to terms with insular constraints, natural hazards (especially hurricanes and drought), and the vagaries of exogenous factors such as fish hook and net pricing, energy costs, spare parts availability, and "outside" markets for fish catch. When the St. Lucia Beach Hotel was built on the southern end of Gros Islet Bay, the community (wholly without assistance from tourism planners or commercial operators) adapted what it knew well to develop a new economic activity requiring no new capital investment, i.e., transporting tourists to historic Pigeon Island or to visit other local marine "things" within the area like the adjacent reef. Fishermen built their own boats and wove their own fish pots out of local material. In short, the Gros Islet community was a viable, fairly self-sufficient, productive fishing unit with low-level requirements for input from the state and from the external cash/market economy of St. Lucia and beyond.

Villagers had few requirements for energy, capital, and technological imports from off the island; their "dependency index" was low.

It is clear that Gros Islet was a village community which possessed its own technically autonomous culture while maintaining itself as a marine-oriented coastal society with a fairly "complex" production system. This is true, even though in a classical sense, Gros Islet was and still is a marginal and "peripheral" community vis a vis the more advanced dominant core systems in Castries or beyond. Even as a marginal or peripheral (albeit archaic) social unit, the Village was economically important (like other villages along St. Lucia's coastline) both to the national center and to other marginal units and production systems. It knew how to produce, to nourish, to sustain, to survive, and even to grow. It had established its own definition of the "rational use" of insular resources.

What the people of Gros Islet had not learned and did not know was how to deal with a Rodney Bay development intrusion. Not that they saw it as intrinsically "bad" or "good"--only that it represented a totally new threat and opportunity, frightening and promising all at once.

Island villages like Gros Islet, even in the face of development schemes like the Rodney Bay project, are not, of course, totally helpless. They may survive on their own adaptive terms as villages and as "less" productive, less efficient (more marginal) communities within the terms of national planning and development activity, but in either case they and we confront the same two questions: what of value is there already that could be lost in the process of modernization and growth, and how can the production system be sustained and losses minimized?

Failure to address these questions more often than not leads to later costly losses requiring remedial strategies and interventions. In this instance, there is no known remedial action that will recover what was lost. What was will never be again; no engineer can "fix it" or make it right. St. Lucia inadvertently sacrificed a living coastal village on the altar of tourism to exorcise a small, pesty bug. Unfortunately, there are still sand flies lurking in the bush at Rodney Bay, and the causeway remains an empty, unused expanse of sand.

5. Lessons Learned

It is important to incorporate peripheral coastal village areas and their proven "potential" within the larger island national development planning process without detracting from their character as self-sufficient island system sub-units.

- Even a simple development project, if its ecological, sociological, and economic consequences have not been carefully thought through, may have strong adverse impacts on the resource in question, on community relations and on the success of other, apparently unrelated development projects.
 - A cultural orientation is necessary not only in the choice of a coastal resource development technology but in the case of all research, planning and management activities maintaining active linkages with established practices in the communities involved.
 - Technical assistance planning efforts based on continental models by off-island entities dealing with insular coastal resources will be more effective if they are focused on local development opportunities, are integrated with existing human use systems, are less regulatory and constraining than presently available continental models, and place greater emphasis on consensus-building strategies which combine users and managers.
 - In small islands rapid, incremental growth or large-scale projects often overwhelm local institutional resource management capabilities. Compensatory training, education and institution building strategies have tended to lag behind, suggesting the need for more emphasis on strengthening local institutions and their capacities to anticipate and assess the potential environmental impacts of development activities.
-