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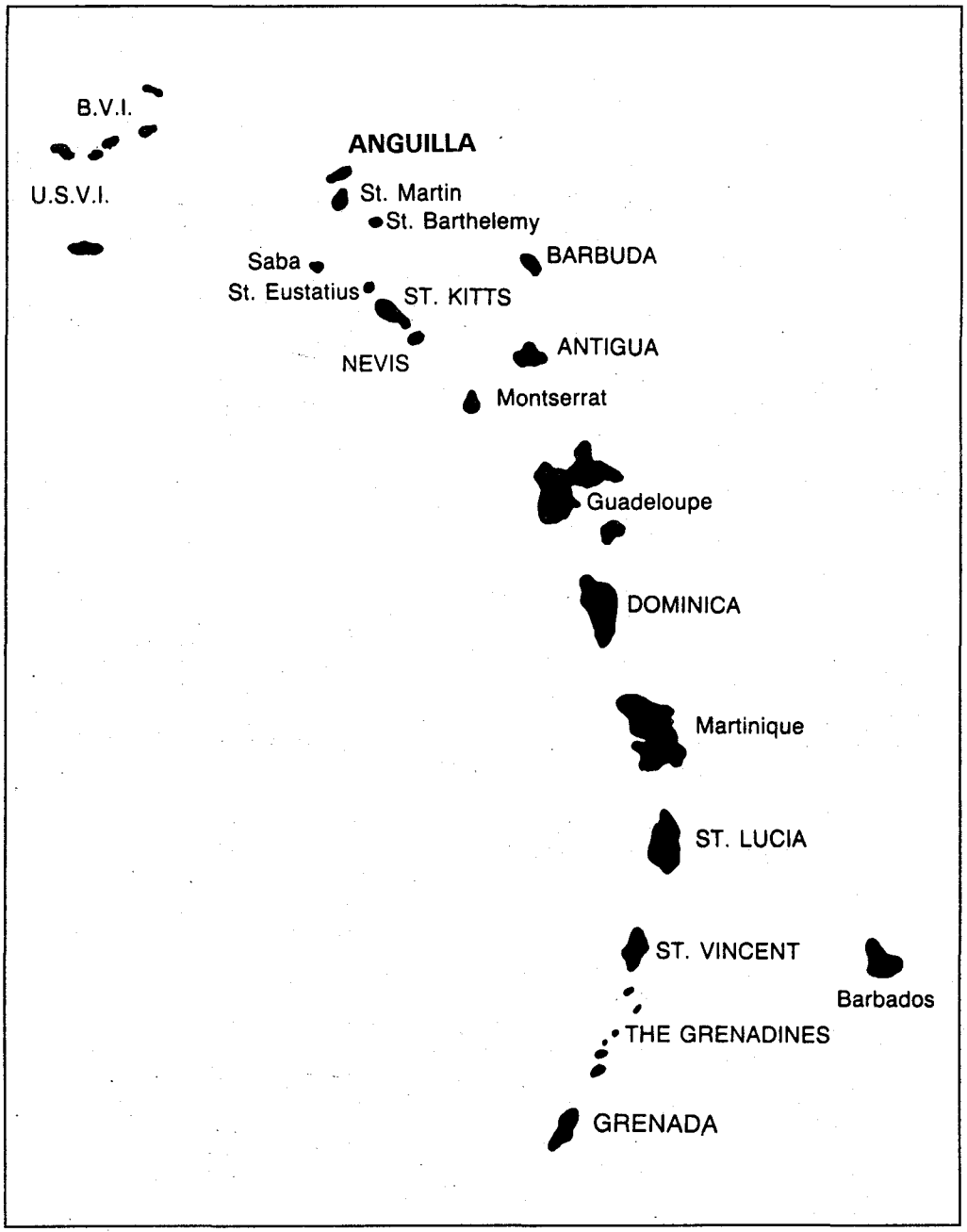

Environmental Profile

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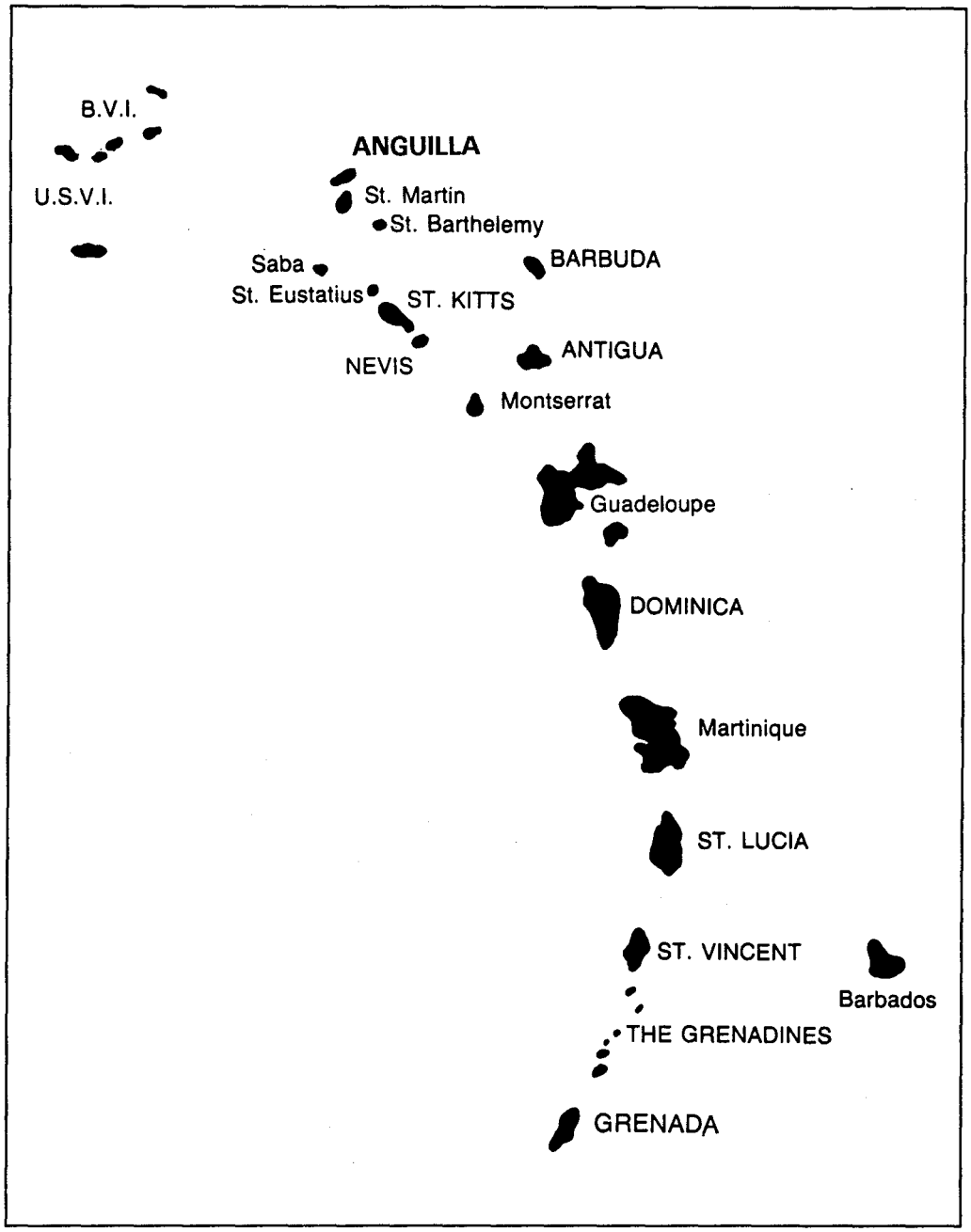

Environmental Profile

A N G U I L L A

ENVIRONMENTAL PROFILE

PART I: A RESOURCE MANAGEMENT FRAMEWORK

An Assessment of the Critical Environmental Issues Facing Anguilla

Prepared For:

THE GOVERNMENT OF ANGUILLA

(Under UNDP Project No. ANL/92/002/A/01/99)

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ACRONYMS and ABBREVIATIONS

ACRONYMS

AAHS	Anguilla Archaeological and Historical Society
ANT	Anguilla National Trust
BDD	British Development Division
CARDATS	Caribbean Agricultural Rural Development Advisory and Training Service
CARDI	Caribbean Agricultural Research and Development Institute
CCA	Caribbean Conservation Association
CIDA	Canadian International Development Agency
DFMR	Department of Fisheries and Marine Resources
DPW	Department of Public Works
ECNAMP	Eastern Caribbean Natural Area Management Program
EIA	Environmental Impact Assessment
FAD	Fish Aggregation Devices
FNPDC	Fountain National Park Development Committee
GDP	Gross Domestic Product
GOA	Government of Anguilla
ICBP	International Council for Bird Preservation (renamed Bird Life International)
IRF	Island Resources Foundation
IUCN	The World Conservation Union
LDCC	Land Development Control Committee
NHS	Marine Heritage Society
NGO	Non-governmental Organization
ODA	Overseas Development Administration (UK)
OECS	Organization of Eastern Caribbean States
SLR	Sea Level Rise
UK	United Kingdom
WTO	World Tourism Organization

ABBREVIATIONS

ac	acre
cm	centimeter
cu yd	cubic yard
ft	foot
ha	hectare
in	inch
m	meter
mg/l	milligram per liter
mm	millimeter

1. INTRODUCTION

ENVIRONMENTAL SETTING

Anguilla anchors one end of an elongated, fringing archipelago in the Eastern Caribbean known collectively as the Lesser Antilles (see Figure 1.1). The most northerly of the "Leewards" (the northern end of the Lesser Antillean chain), the island of Anguilla is about 25.5 km (16 mi) long and 5.5 km (3.5 mi) wide (see Figure 1.2), with its long axis running in an east-northeast to west-southwest direction. The island is located 8 km (5 mi) north of French St. Martin (a 20 minute ferry ride) and 113 km (70 mi) northwest of St. Kitts, to which it was once linked administratively. A number of uninhabited islets -- including Dog Island, Scrub Island, Sombrero Island, and the Prickly Pear Cays -- also form part of its territory.

Within the Antillean Archipelago, Anguilla is one of three Leeward Islands lying slightly eastward of the main "inner" insular arc that sweeps gracefully from the Virgin Islands in the north to Grenada in the south. The three -- Anguilla, Antigua and Barbuda -- form an "outer" arc that is well-positioned as the first vanguard of insularity against the impact of Atlantic wind and waves.

Together, the three have been referred to as the "limestone Caribbees," and indeed there is a pronounced visual contrast between the three "outer Leewards" and the main "inner" volcanic arc. The three limestone islands are lower, more arid, less rugged, and their more exposed position is evident in a common display of wind-sheared vegetation and in the spray-pitted, wave-washed limestone of their exposed windward (easterly) shores.[1]

Anguilla has a low karstic (weathered coral) structure, with 91 km^2 (35 sq mi) of land and a maximum elevation of 65 m (213 ft). It is formed of limestone and marls developed on deep, older volcanic rocks. The soil is thin and a significant portion of the land surface is bare (or almost bare) rock; it primarily supports dry evergreen woodland and low-lying scrub, with some cacti. The island is sheltered by extensive reefs off the north coast and fringing reefs along most of the south coast (Figure 5.3), which provide superb diving and snorkeling as well as important protection for the inshore environment.

The south coastline is low with sandy bays, while there are cliffs in the north. White or light pink sandy beaches occupy approximately 19 km (12 mi) of shoreline. There are no surface streams or standing bodies of fresh water, and the island's "wetlands" consist primarily of a number of salt ponds (see Figure 5.3 and Table 5.1). Most of Anguilla's ponds probably resulted from the closure of former embayments.

An early report on the geology of Anguilla described the island as follows:[2]

> *The surface of the island is undulating, rising to a maximum height of [just over] 200 feet above Crocus Bay. Speaking generally, the island shows a ridge of high ground to the north-west, terminating in an escarpment on the northern shore, and sloping gently towards a long central valley but little above sea level, and succeeded to the south by a minor escarpment sloping gently down to sea level everywhere on the southern shore. There is thus a striking contrast between the two coast lines, the northern one consisting for the most part of steep sea cliffs up to 100 feet high, the southern one of a shelving rocky shore with sandy coves protected by coral reefs.*

Anguilla's climate is dry, sunny and subtropical. A cool breeze sweeps across the island for most of the year as it lies in the path of the northeasterly trade winds. Winds blow normally from the east-northeast, shifting seasonally as east-southeasterlies, at velocities faster than in most Caribbean islands[3]. The average monthly high temperature is 27° C (81° F), with little variation throughout the year. Temperatures dip to as low as 18° C (64° F) during the December to February period. The normal range of annual

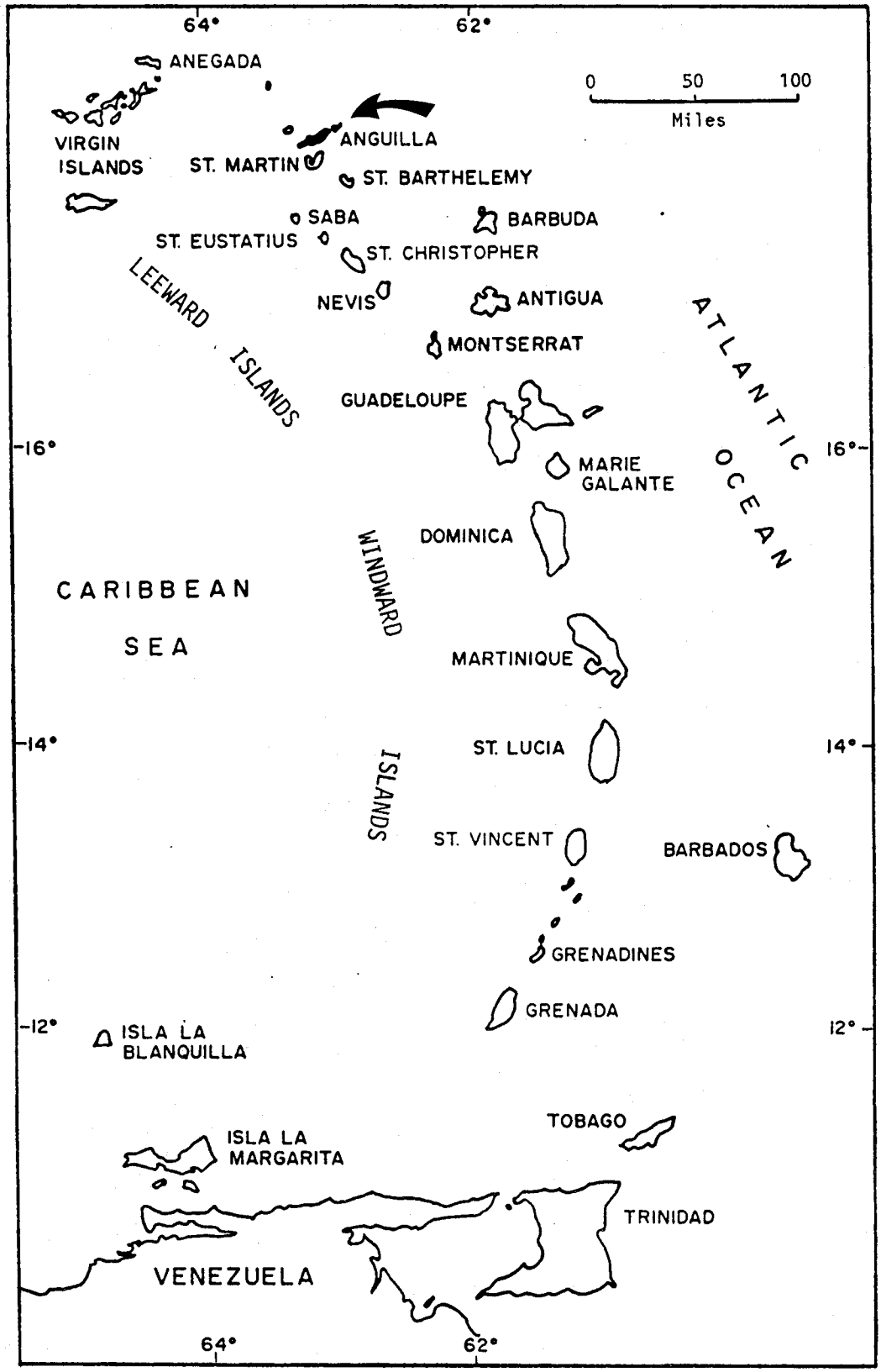


Figure 1.1. General map of the Eastern Caribbean, showing the location of Anguilla.

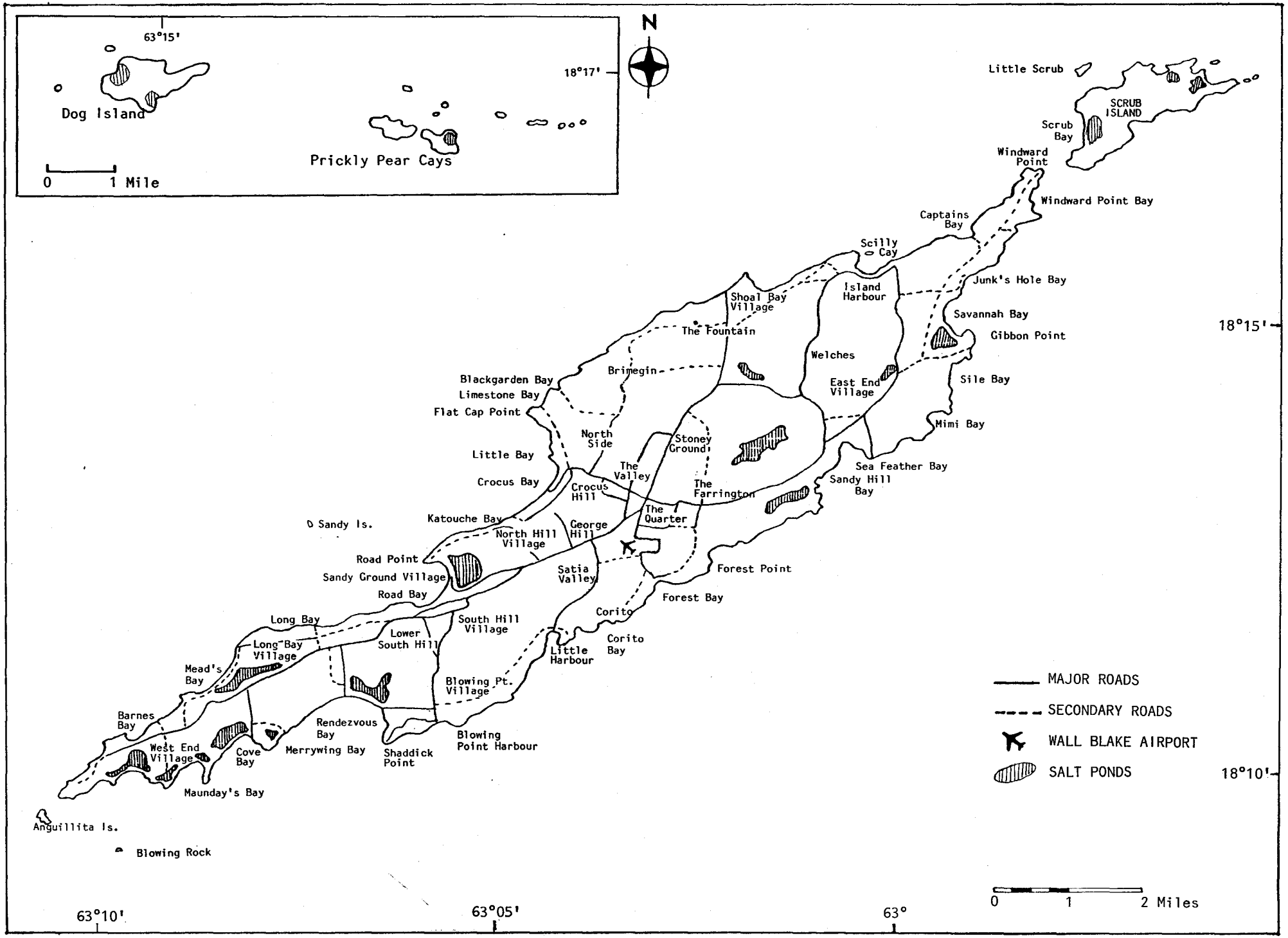


Figure 1.2. General location map for the island of Anguilla.

rainfall is about 90-103 cm (35-40 in), with a dry season generally from about January to April and a "wet" season from approximately September to December. Perhaps as much as half of the island's rain falls during the "wet" months, with extended drought periods during the rest of the year.

HISTORICAL OVERVIEW

Anguilla is first mentioned in historical records in 1564 when a French expedition passed by en route from Dominica to Florida. It is speculated that Spaniards may also have visited in the sixteenth century and that the island's name is derived either from the Spanish word *anguilla* or the French word *l'anguille* (for "eel") -- a reference, in both cases, to the island's long and narrow shape. The Carib Indians, who inhabited the island from about 1200 AD, called it Malliohana.

The Dutch showed a passing interest in Anguilla as a source of salt in the 1620's and built a fort, probably at Sandy Hill on the south coast.[4] But it was the English who first colonized the island in 1650, and despite several attempted invasions -- by Caribs from Dominica in 1656 and by the French in 1745 and again in 1796 -- it remained a British colony.

The island has had its share of a colorful and roguish past. It was raided in the later part of the seventeenth century by many adventurers -- Frenchmen, Irishmen, Spaniards -- while, at the same time, it served as a haven of sorts for pirates and buccaneers, including Captain Bartholomew Sharp (one of Henry Morgan's lieutenants) and the notorious Captain Kidd.

The early European settlers of Anguilla attempted to establish a plantation economy similar to the export-based agricultural system put in place throughout the West Indies. But Anguilla's poor soil and erratic rainfall made development of a "cash crop" economy very difficult (see also Chapter 4). Plantation owners soon began a practice of out-migration labor, which even to this day is an important element of the Anguillian economy. Initially, slaves were allowed to search for work in the nearby British Virgin Islands and Antigua, or even as far south as Trinidad. They were then permitted to purchase their freedom with remittances earned abroad. Most returned to Anguilla to settle on lands that eventually were abandoned by the discouraged plantation owners.

By the time of emancipation in 1834, the island's population consisted of free people and independent landowners, most of whom practiced subsistence agriculture. The economy was dependent on salt production, fishing, boat-building, inter-island trading, and remittances sent home by Anguillians working overseas -- and so it essentially remained until the late 1970's.

A predominant influence of Anguilla's historical past has been its link with the sea and with an era, dating to around 1895, that has been termed by one local writer as "Anguilla on the sea".[5] It was a time when the cruel hardships of drought and famine as experienced by Anguillians on the land, combined with the successful economic model provided by Nova Scotia schooners calling at Anguilla to collect salt for the Canadian fishing industry, convinced many that the island's survival lay with the sea and trade.

> *Schooner after schooner and sloop after sloop slide off the beaches in Sandy Ground, Blowing Point, the Forest and Island Harbour. Anguilla rapidly became famous for its shipwrights and vessels .... These vessels of all shapes and sizes began to trade up and down the Lesser Antilles, down the Greater Antilles to Santo Domingo and Haiti and later across the Caribbean Sea to Curacao and Aruba. This era bred men of remarkable character and skill and brought the Anguillian passion for boat racing to a fever pitch. Schooners and sloops raced not for hours [as is done today] but for days, from San Pedro de Macoris and La Romana in the Dominican Republic, to Anguilla .... The Santo Domingo trail brought out the best in boat-building skills and seamanship which [Anguillians] continue to foster.*[6]

ANGUILLA's VITAL STATISTICS

LOCATION	Latitude: 18 degrees 10 minutes North Longitude: 63 degrees 5 minutes West
AREA	91 km^2 (35 sq mi), excluding several small offshore islets which are essentially uninhabited 25.5 km (16 mi) long; 5.5 km (3 mi) wide
POPULATION	8,960 (1992 Census)
CAPITAL	The Valley (population: 268)
CLIMATE	Mean monthly temperature of 27 degrees C (81 degrees F), moderated by northeast trade winds; the average relative humidity is a pleasant 75 percent
RAINFALL	Median annual rainfall is 103 cm (40 in); the dry season is generally from January to April and the wet season from September to December (Department of Agriculture)
PHYSICAL FEATURES	A flat, low-lying, coral-limestone island sheltered by a number of healthy coral reefs; many salt ponds that have at times been used for commercial endeavors such as salt production and shrimp cultivation; about 19 km (12 mi) of white or light pink sandy beaches, several of which are regarded as among the finest in the world; also a number of inland caves
VEGETATION	Vegetation is generally either sparse or stunted, due to low and erratic levels of rainfall, and consists mainly of low-lying xerophytic plants
ECONOMIC ACTIVITIES	Tourism, fishing, construction and offshore finance
TOURISM	Primarily "upscale" luxury hotels, in addition to small inns and villas
AIRPORT	Wallblake Airport, with a runway length of 1,098 m (3,600 ft)
SEAPORTS	Blowing Point (ferries from St. Martin); Sandy Ground (all bulk materials, private boats); Corito (Shell facilities for oil and petrol)

Politically, Anguilla has been a British Colony since the mid-seventeenth century. However, because administration of islands as small as Anguilla was difficult for colonial rulers in London, a system of "federations" was often established to make governance more efficient. In Anguilla's case, this meant that in 1871 the island was linked in a federation with St. Kitts, with Nevis later added in 1882. Like most "satellite" islands, Anguilla historically felt itself to be distant from and neglected by the administrative center in St. Kitts. Twice it petitioned for direct British rule (in 1875 and 1958) and finally took more direct action by rebelling and then ceding from the tri-island grouping in 1967, rather than become a part of the new state then being proposed for the St. Kitts-Nevis-Anguilla federation.

Following this "revolutionary" turn of events on the part of determined Anguillians, Britain sought to reimpose its authority in a rather bizarre invasion by English paratroopers and London policemen in 1969. A British Commissioner was installed, but formal separation from St. Kitts-Nevis did not occur until 1980 when Anguilla again became a Crown Colony in the form of a Dependent Territory. Most Anguillians would consider the events launched in 1967 as the most momentous in Anguilla's 300 year old history, for they wrought fundamental change in the entire island community.[7]

The Anguillian Government today consists of a Governor, representing the British Crown, and a Chief Minister and other ministers appointed from the elected members of the legislative assembly (see also the introductory section to Chapter 2). The administrative structure of government and the legal system are based on those of Great Britain.

DEMOGRAPHICS

The population of Anguilla grew rapidly between the census years of 1984 and 1992, at a rate just under four percent a year. This growth for an eight year period was probably one of the highest in the world. Natural increase (births over deaths) accounted for approximately one and a half percent of the increase, while just under two and a half percent was due to immigration.[8] A major factor in altering the previous demographic pattern (i.e., one of small increases with emigration common) has been the significant growth in tourism which attracted the immigration of non-nationals and a significant return home of nationals.

Anguilla's population now stands at 8,960 according to the 1992 census figures reported by the Government's Statistical Department (Table 1.1). The vast majority of the population (over 75 percent) includes persons who are Anguillian

Table 1.1. Anguilla census figures, 1960 - 1992.

CENSUS YEAR	TOTAL POPULATION	GROWTH RATE
1960	5,810	
		+ 0.83 %
1974	6,519	
		+ 0.49 %
1984	6,848	
1992	8,960	

Sources: Mokoro, 1993. *Anguilla Strategic Review Interim Report* (February 1993) for 1960, 1974, and 1984 data; Government's Statistical Department for 1992 figure.

by birth. Just under 15 percent of the population comprises persons from other Caribbean islands, primarily the Commonwealth Caribbean; while the remainder (under 10 percent) are expatriates from the United States, the United Kingdom and elsewhere. While the exact number is unknown, there may well be more Anguillians living overseas than residing in Anguilla.

Population growth scenarios generally focus on the rate of natural increase (i.e., births over deaths) and immigration/emigration patterns. In Anguilla, growth projections are more likely to depend on the amount and type of immigration and the level of return migration of Anguillians who have been living overseas since the rate of natural increase appears to be declining. During the last five years (1988-1992), both fertility and mortality rates have fallen. By 1992, the population growth rate from natural increase had dropped to 1.22 percent (as opposed to a total of 1.45 percent for the entire five-year period). These declining figures seem to indicate that any continued expansion in the population growth rate will to a large extent depend on the Territory's immigration policies and return migration patterns.[9]

THE ECONOMY

Anguilla, one of the smallest of the inhabited Caribbean islands, had produced some of the region's highest economic growth rates by the end of the 1980's. This occurred despite significant constraints to growth -- e.g., the island's small size, limited population, and narrow natural resource base -- and despite the fact that historically-important industries, like fishing, salt production, and boat-building, had never developed a strong revenue base that inhibited a steady outward migration of Anguillians seeking more dependable incomes elsewhere.

A significant development in the 1980's, which accounted for remarkable growth in the island's economy, was the establishment of several up-market hotels that, in turn,

- led to the rapid development of the Territory as an upscale tourism destination (see Chapter 7),
- fueled a local construction boom,
- reduced unemployment from about 26 percent in the middle of the decade to a point where labor was being imported by the end of the decade,
- substantially improved the standard of living of most Anguillians, and
- encouraged overseas nationals to return home.

In the final half of the 1980's, real GDP rose at over ten percent a year (albeit, it began from a low base), producing significant increases in Government revenues and making possible reduced dependency on UK financial assistance (the final recurrent budgetary grant-in-aid from the United Kingdom was received in 1985).[10]

The rapid economic growth of the late 1980's slowed appreciably in the first years of the 1990's, due in part to global factors (the Gulf War, the recession, and a decline in the number of American tourists) and in part to local factors (for example, most of the prime sites for hotel investment had been developed to some extent by the end of the 1980's). However, partial data for the last half of 1992 suggest that the downturn may have been arrested, with estimates of real growth in GDP for the second half of the year now placed at about seven percent. This is lower than the rate of growth experienced in the late 1980's but still high by regional standards.[11] To compensate for fluctuations in the tourism industry (such as those experienced from 1990-1991), development of Anguilla's professional service sector -- in particular, offshore financing -- was highlighted in a recent *Strategic Review* exercise as one area offering considerable potential for the Territory.

A RESOURCE MANAGEMENT FRAMEWORK FOR THE FUTURE DEVELOPMENT OF ANGUILLA

The recently initiated *Anguilla Strategic Review* (Interim Report, February 1993) discusses both primary constraints and key opportunities for future growth in Anguilla. The developmental limits posed by the Territory's natural resource base are highlighted in the *Strategic Review*, where, among other constraints, it is pointed out that:

> *In tourism the prime development sites have already been developed, and the remaining sites that could potentially be developed will require larger investment to overcome natural deficiencies .... Anguilla is very small, and the lack of undeveloped land constrains the development of any land-intensive activity. Rainfall is less than 37 inches annually. That, combined with the land constraint and the poor quality of the soil (the island is based on very porous limestone coral), means that agricultural activities are limited. The porosity of the soil means that there are no rivers or streams ... and the country's aquifers produce brackish water. The production from these aquifers is limited and the establishment of any water-intensive activity requires expensive desalination units.*
>
> *The environment of Anguilla is very fragile, requiring that any economic development should be carefully controlled to ensure its sustainability. The marine resources on the shelf around Anguilla have already been overexploited in some cases, for example lobster, and the further development of the country's fishing industry will require careful planning. The island depends greatly upon its beaches and the natural surroundings.*

The *Strategic Review* report goes on to point out specific pressures on natural resources:

- increased numbers of tourists using beaches and the coastal environment;
- conflicting uses of marine resources, for example at Sandy Ground;
- the need for upgrading solid waste disposal practices;
- lack of control over livestock grazing;
- overfishing of inshore waters; and
- the need for better management of the marine environment.

It is therefore both timely and opportune that in late 1992, the Government of Anguilla entered into a three-year project agreement with the United Nations Development Program (UNDP) for execution of a program dealing with the "Management of Natural Resources and the Environment" in Anguilla. The first phase of the project calls for the preparation of an *Environmental Profile* for Anguilla, similar to documents prepared for six OECS countries and published by the Caribbean Conservation Association and the Island Resources Foundation in 1991.

In Anguilla, the *Environmental Profile* has been prepared in two phases, the first being this document and the second -- an "*Environmental Manifesto*" -- which will draw on the information in this report but will present it in a format directed at a wider audience of Anguillians.

This document provides a resource management framework for the subsequent *Environmental Manifesto*. Its focus is on those critical resource issues facing Anguilla as it makes the difficult choices necessary for environmentally-sound growth and development as the Territory moves toward the twenty-first century. Seven key sectors -- where environment/development issues inter-face -- are highlighted:

(1) the institutional dimensions of environmental management (including education);
(2) land use planning and growth management;
(3) the relationship between plants, animals, the land and Anguillians;
(4) Anguilla and its marine/coastal environment;
(5) water quality, waste management, and pollution control;
(6) tourism; and
(7) Anguilla's historical and cultural heritage.

Within each of the seven environment/development sectors, important resource issues or problems are discussed to inform the reader of the dimensions of the issue, followed by specific recommendations -- some short-term and some needing long-term attention -- to guide Anguillians in managing their environment during times of change and accelerating growth.

An important theme influencing the thrust of this document and which Anguillians -- like all islanders -- must address is:

> ***how can a very small place with very limited resources, a small government and a small private sector adequately deal with the management of commonly-shared resources.***

What has been the traditional, and classical, view of any island's environment -- consisting of water and wildlife, scenery and soil, forests and fish, rocks and reefs, fruits and flowers -- is simply not good enough anymore, now that there are more of us competing to use finite resources in these small places.

The old inventory approach of managing singular resources is being replaced by a new, more holistic perception of hundreds of interconnected goods and services made available to the community as a whole by what we traditionally referred to as "mother nature" and now call functional ecosystems. These "interconnections" are the reason why there are so many cross-references and some repetition in the document which follows -- put quite simply, clean and stable beaches are not unrelated to robust and flourishing reefs or the abundance of fishery stocks. Such things that we have long taken for granted as useful, as desirable, and as "free", we are beginning to see in a new, more informed light -- an ecological light.

Anguillians, like people everywhere, are beginning to understand that there are limits to what we can take out as "free goods and services" from the natural environment and what we can put back in the way of pollution and other insults. This balancing act, this reasoned public search for fairness and an enhanced awareness of ecosystem needs as well as human needs is what environmental policy, environmental planning, and environmental management are all about. They are also about Anguilla's future -- which begins tomorrow.

REFERENCE NOTES - CHAPTER 1
INTRODUCTION

1 Harris, D., 1965. Plants, animals, and man in the outer Leeward Islands, West Indies. *Publications in geography*, vol. 18. University of California Press. Berkeley, CA.

2 Earle, K.W., 1923. Report on the geology of St. Kitts-Nevis, BWI and on the geology of Anguilla, BWI. Crown Agents for the Colonies. London.

3 Archer, A., 1991. Report on consultancy services for wastewater management and improvement of Environmental Health Department. UNDP/PAHO environmental health development project, Anguilla.

4 Mitchell, D., n.d. Anguilla, from the archives 1650-1750. Anguilla Archaeological and Historical Society. The Valley, Anguilla.

5 Carty, D., 1985. Address given to the Anguilla Archaeological and Historical Society by the President (31 May).

6 See note no. 5.

7 See note no. 5. See also:

(a) Petty, C., 1983. Anguilla: Where there's a will there's a way.

(b) Petty, C. and N. Hodge, 1987. Anguilla's battle for freedom, 1967-1969. PETNAT Publishing Co. Ltd.

8 Mokoro Limited ... Consulting Services for the Third World, 1993. Anguilla strategic review. Interim report (February). Prepared for Government of Anguilla.

9 See note no. 8.

10 See note no. 8. Also:

Taylor, J., ed., 1992. Caribbean 1992 business directory: international edition. Caribbean Publishing Company Ltd. Grand Cayman, Cayman Islands.

11 See note no. 8.

2. INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

IN OTHER WORDS -- WHO'S IN CHARGE ?

Anguilla became a British Dependent Territory in 1650 and, for administrative purposes, was associated with St. Kitts and Nevis from 1871 to 1980. Following the dissolution of the Federation of the West Indies in 1962 and subsequent negotiations on the status of the Commonwealth Caribbean Territories, St. Kitts-Nevis-Anguilla (along with five other Territories) became States in Association with the United Kingdom (UK) under the terms of the West Indies Act of 1967. Each Territory gained internal independence and the right to amend its own Constitution, including the power to terminate the association with the UK and eventually to declare itself independent.[1]

Anguilla, however, opposed the Associated State arrangement with St. Kitts and Nevis and almost immediately repudiated government from St. Kitts. A breakaway movement resulted which made world headlines when British forces invaded the island in 1969 following a breakdown in negotiations with Anguilla. From 1971 to 1980, the island operated under a *de facto* separation from St. Kitts, with legal separation finally occurring in December of 1980 under the (UK) Anguilla Act of 1980 (see also Chapter 1). A constitution was adopted two years later which set in place the structure of the new Anguilla Government; this was followed by establishment of a Constitution Review Committee in 1986 and adoption of an amended Constitution in 1990.

Today, Anguilla is a British Dependent Territory with a Westminster Parliamentary style of government. It is headed by a Governor who represents and is appointed by the British Crown. The Governor consults with the Anguilla Executive Council on all matters except defense, external affairs, international financial affairs, internal security (including the police), and appointments to or dismissals from public office. The six members of Council comprise the Chief Minister, three other ministers, and two ex-officio members who are the Deputy Governor (appointed by the Governor) and the Attorney General. The Chief Minister is appointed by the Governor; other ministers are appointed from among the popularly elected members of the House of Assembly, with the advice of the Chief Minister. The Governor and the Chief Minister may also appoint a Parliamentary Secretary (or junior minister) from among the elected or nominated Assembly members. Ministerial responsibilities are assigned in the same way. The House of Assembly consists of 12 persons: the Speaker, two ex-officio members (the Deputy Governor and the Attorney General), seven elected members (one of whom becomes the Chief Minister), and two nominated members appointed by the Governor.

At the present time, the Government of Anguilla is organized as follows:

(1) **Chief Minister's Office:**
- tourism
- labor
- information and broadcasting
- immigration
- agriculture
- fisheries and marine resources.

(2) **Ministry of Finance and Economic Development:**
- treasury
- customs
- post office.

(3) **Ministry of Social Services and Lands:**
- social services:
  - health, community development and welfare
  - education and environment
- lands and surveys:
  - physical planning.

(4) Ministry of Communications, Works, and Public Utilities:
- airport and seaports
- public works
- water and electricity.

During the 1980's, environmental matters were considered the responsibility of the Department of Agriculture and Fisheries, which was then housed within the Ministry of Tourism and Natural Resources. In 1990, the portfolio was moved to the office of the Chief Minister, and the Department of Agriculture and Fisheries was split into two separate units, the Department of Agriculture and the Department of Fisheries and Marine Resources. In 1990, as provided for under the new Constitution, the first nominated member of the House of Assembly was named Parliamentary Secretary and given responsibility for Education and the Environment.

Environmental responsibilities, broadly defined, also reside in several other units of Government, including:

- *The Department of Lands and Surveys* (incorporating the Physical Planning Unit and the Land Development Control Committee), with responsibility for land use planning and development control (see Chapter 3).

- *The Department of Public Works*, responsible for building regulation and the potable water supply (see Chapter 3 and Chapter 6).

- *The Department of Environmental Health*, charged with implementation and enforcement of public health legislation, with specific responsibilities for solid waste management and disposal, vector control, and human waste disposal (see Chapter 6).

- *The Department of Tourism*, with an interest in the development of tourism attractions and amenities (currently there is a proposal before Government to replace this department with establishment of a Tourist Board; see Chapter 7).

Table 2.1. Government agencies that share responsibility for the management of Anguilla's environment.

CHIEF MINISTER'S OFFICE
1) TOURISM
2) AGRICULTURE
3) FISHERIES AND MARINE RESOURCES

MINISTRY OF SOCIAL SERVICES AND LANDS
1) EDUCATION AND ENVIRONMENT
2) LANDS AND SURVEYS
   i) PHYSICAL PLANNING UNIT
   ii) LAND DEVELOPMENT CONTROL COMMITTEE
3) ENVIRONMENTAL HEALTH

MINISTRY OF COMMUNICATIONS, WORKS, AND PUBLIC UTILITIES
1) PUBLIC WORKS
   i) WATER SECTION

It is clear that authority and responsibility for environmental management in Anguilla is not centralized but is dispersed among a number of GOA departments. "Environmental" functions can be identified in the Chief Minister's Office, the Ministry of Social Services and Lands, and the Ministry of Communications, Works, and Public Utilities (see Table 2.1). Additionally, there is a considerable body of "environmental" legislation already enacted in Anguilla (see Table 2.2), but some legislation is undergoing revision (e.g., planning laws), some is outdated and needs revision (e.g., public health legislation), and some has not been implemented (e.g., antiquities law).

Several characteristics related to the Territory's small size mark the manner in which the Anguillian Government functions. All should be kept in mind when reviewing the environmental responsibilities and capabilities of Anguilla's public sector:

(1) As in most small countries, a single minister in Anguilla has responsibility for several portfolios, which are not always distributed in a way that maximizes administrative efficiency (see Issue One below).

(2) The capacity of the public sector to deal with a large number of priority issues at any one time is seriously limited. Thus, reversals of political leadership can mean abrupt changes in those priority issues targeted by Government at any given point in time.

(3) The distinction between the political leadership of Government and the Civil Service is one that is blurred in Anguilla more than it is in larger countries. There is a good deal of movement of individuals between the two as well as a relatively high proportion of appointed rather than elected membership in the legislative body. In short, the pool of available talent is relatively fixed and limited not only by the island's small population but also by the significant number of citizens who emigrate seasonally or for extended residency elsewhere.

Table 2.2. Primary resource management legislation in Anguilla.

PLANNING and DEVELOPMENT CONTROL	Land Development (Control) Ordinance (No. 15, 1966) Land Development Control (Amendment) Ordinance (No. 9, 1991) Land Acquisition (Amendment) Ordinance (No. 223, 1967) Aliens Land Holding Regulation Ordinance (No. 12, 1976) Aliens Restrictions Ordinance (Amendment) (No. 9, 1991) Condominium Ordinance (No. 11, 1982) Town and Country Planning Ordinance (No. 223, 1967) Town and Country (Amendment) Ordinance (No. 9, 1991)
COASTAL RESOURCES	The Fisheries Protection Regulations (No. 12, 1988) The Fisheries Protection Ordinance (No. 4, 1988) Fisheries Protection (Amendment) Regulations (No. 4, 1990) Turtle Ordinance (No. 6, 1984) Beach Control (Amendment) Ordinance (No. 9, 1991) Beach Protection Ordinance (No. 10, 1988) Cruising Permit Ordinance (No. 3, 1980) Cruising Permit Regulations (No. 5, 1990) The Marine Parks Ordinance (No. 10, 1982)
AGRICULTURE	Agricultural Small Holdings Act (No. 3, 1963) Fumigation of Plants Ordinance (No. 11, 1972) Animals (Disease and Importation) Ordinance (No. 11, 1972) Fruit Trees Destruction Prohibition Ordinance (No. 8, 1977) Markets and Meats Ordinance (No. 11, 1972) Plant Protection Ordinance (No. 11, 1972)
WATER	Watercourses and Waterworks Ordinance (No. 8, 1962)
WASTE MANAGEMENT and POLLUTION	Merchant Shipping (Oil Pollution) Act (No. 11, 1972) The Litter (Abatement) Ordinance (No. 9, 1987) Public Health Act (No. 22, 1969) Sound Amplification (Restriction) Ordinance (No. 5, 1991)
PROTECTED AREAS	Antiquities Ordinance (No. 13, 1983) National Trust Ordinance (No. 7, 1988) Public Parks Regulations Ordinance (No. 11, 1972)
WILDLIFE	Wild Birds Protection Ordinance (No. 11, 1972) Protection of Animals Act (No. 8, 1977)

Source: Office of the Attorney General, Government of Anguilla.

ISSUE ONE:

The present organization of Government operations needs to be re-structured to make the administration and execution of environmental policy more efficient and to create a system for environmental management that helps ensure more sustainable economic development.

The fundamental problem with respect to how the public sector of Anguilla currently handles environmental management responsibilities can be best described biblically:

The left hand knoweth not what the right hand doeth.

This basic problem occurs at both the political/policy-making level and at the administrative level, and has much to do with the unquestioning acceptance of an inherited bureaucratic way of doing things. Influenced by the Westminster style of Government, the administrative system is one in which portfolios are often distributed based more on the forte of a Minister's individual abilities and less on what is more rational in the pooling of portfolios that are closely intertwined.

Therefore, apart from the urgency of defining a vision and a plan of action for sound environmental management in the years ahead (a task which the *Environmental Profile* should make easier), a "re-invention" of Government operations within the framework of existing constitutional provisions is needed. What is required is a structure that will not only serve the cause of making the administration and execution of environmental policy more efficient, but will also lay the groundwork for a more "entrepreneurial" attitude *vis a vis* the environment -- that is, an operational structure for managing the environment in ways that ensure sustainable economic development.

POLITICAL CONSIDERATIONS

A look at the current distribution of portfolios underscores the problem at the political and policy-making level. As the Government now stands in 1993, the crucially important portfolio of "Lands", which includes physical planning, is coupled with the portfolio of "Social Services" to form the Ministry of Social Services and Lands. Social Services is itself so large, relatively speaking, that it is divided between "Health, Community Development and Welfare", on the one hand, and "Education and Environment" on the other.

The very recent addition of the portfolio of "Environment" to "Education" had more to do with the need to form comprehensive environmental policies and plans for the future and to identify a focal point in Government for environmental action, and less to do with the execution of environmental policies and responsibilities by Departments charged with environmental management. A primary example of this deficiency is the fact that the Ministry of Education and Environment has no direct line authority over the Department of Fisheries and Marine Resources or the Department of Lands and Surveys (see Table 2.1).

The other Ministry which is crucial to environmental management holds portfolios for Tourism, Agriculture, Fisheries, Immigration and Labor. Without doubt, the first three are vitally important to environmental management, especially within the Anguillian context. But the anomaly here from an environmental standpoint is clearly the inclusion of "Immigration" and "Labor", which, within the present development mode of the economy, are crucial portfolios by themselves. Indeed, they consume considerable ministerial effort, somewhat to the detriment of "Agriculture" and "Fisheries" in particular.

Clearly there is a need to harmonize and rationalize the distribution of portfolios to provide greater ministerial focus on the telling issues of environmental management and to help ensure a more coordinated administrative machinery.

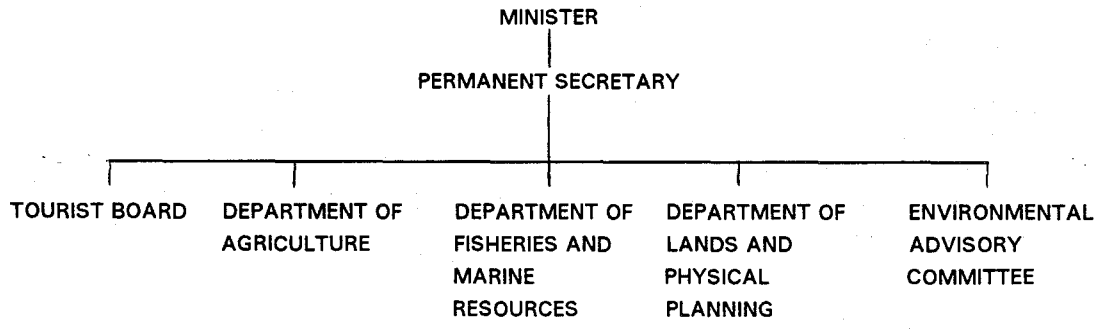
RECOMMENDATION:

2.1 The major portfolios related to environmental management should be included within the ambit of a single "Ministry of Tourism, Natural Resources and the Environment". Figure 2.1 outlines the basic structure of the Ministry.

The crucial Departments excluded from this new clustering of responsibilities are Environmental Health, Water and Education. Because of the specialized and very focused public health mission of the Department of Environmental Health, this Department should remain linked with the Ministry holding the "Health" portfolio, although its Director should sit on the proposed Environmental Advisory Committee (see Recommendation 2.2).

With respect to Education, it is envisaged that once the environmental education curriculum is properly established as part of the education reform process now in motion (see Issue Two below), Education will need to only touch base with the Ministry of the Environment from time to time via the Environmental Advisory Committee. Water should, for economic and technical reasons, remain with the Ministry of Communications and Works, but it too, like Environmental Health and Education, should be represented on the Environmental Advisory Committee.

Figure 2.1. Organizational structure of proposed Ministry of Tourism, Natural Resources and the Environment.



ADMINISTRATIVE CONSIDERATIONS

The lack of adequate coordination between critical Departments in Government charged with environmental management also needs attention. The isolation of the "right hand from the left hand" is even more acute at an administrative level than it is at the political or policy-making level, where at least the forum of Executive Council provides an opportunity for inter-agency discussion.

At the administrative level, there is no formal mechanism for either joint planning, consultation or observation on matters that should be addressed holistically. For example, the Department of Tourism's concern over too much traffic from yachting at a particular cay is voiced in isolation from the concern of the Department of Fisheries and Marine Resources over the same subject. No coordination procedures are formally available or required for both Departments to share ideas, to plan cooperative strategies, or, most importantly, to agree on implementation of joint policies. The same is true for physical planning with respect to tourism or agriculture (see also Chapter 3, Issue Two).

This situation was less critical from 1977 to 1980 when the then small Ministry of Tourism and Natural Resources had regular bimonthly meetings of the Directors of Agriculture and Fisheries, Lands and Surveys, and Tourism, along with the Minister and what was then the post of Administrative Secretary. These sessions, which were informal and at times resembled just an "old talk", gave the Administrative Secretary a valuable overview of what was occurring in the various Departments and provided insight on the need for joint planning on those matters which were common to all. It also provided an opportunity to thoroughly brief the Minister on issues that were environmental in nature and consequence.

It was during this Administration, and largely as a result of this low-keyed interchange, that critical initiatives of far-reaching environmental consequences were "hatched", including:

- the low density, up-market Tourism Policy;
- the first Cruise Permit Control Ordinance;
- the first survey of dive sites and potential protected areas;
- the first archaeological survey that was responsible for the discovery of the Fountain Petroglyphs (see Chapter 8); and
- the first attempt to introduce aesthetic control in architecture (which was never formalized; see also Chapter 8).

Much of what took place during those years that could be termed "progressive" was simply a result of the regular interchange and close working relationship between Departments charged with environmental management. It occurred during a time when the subject of the environment was not demanding "agenda attention" the way it now is -- which makes the need for better coordination procedures even more important today.

RECOMMENDATION:

2.2 Within the proposed Ministry of Tourism, Natural Resources and the Environment, an Environmental Advisory Committee should be established, officially charged with the coordination and implementation of a National Environmental Policy (see also Chapter 3, Issue One). The Committee should be established along the lines of Figure 2.2.

The Environmental Advisory Committee should be represented at the highest level (i.e., Director), and it should be mandatory that it convene at least once a month. The attendance of the Minister and the Permanent Secretary should also be required, as the Committee will review monthly the progress of programs and activities undertaken by all relevant Departments and will trouble shoot problems and issues that may arise. This forum would also provide an opportunity for review of environmental

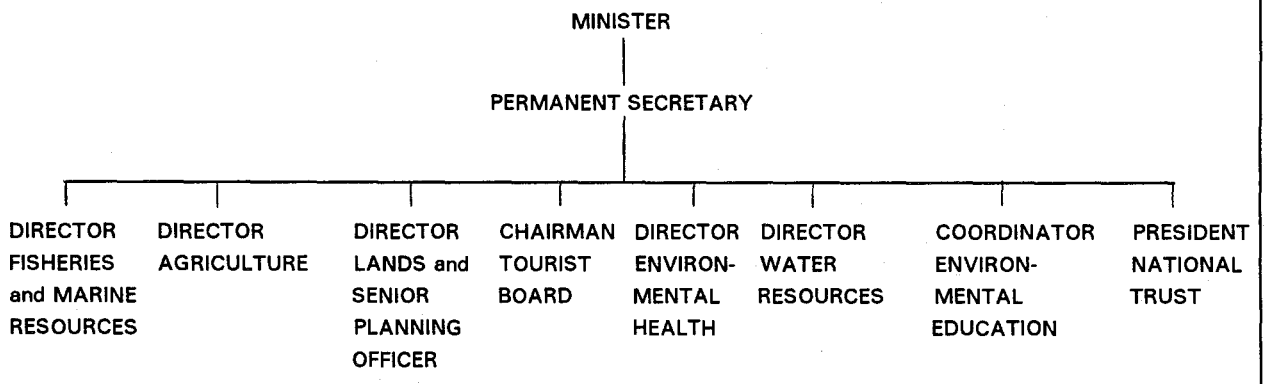
impact assessments (EIAs); implementation of EIA legislation will be far more effective if all "environmental" Departments are in a position to share information and participate in the review of EIA reports (see also Recommendations 3.7, 3.8, 3.9 and 5.18).

The Minister or Permanent Secretary should act as Chairperson of the Committee, and monthly position papers should be prepared for presentation and discussion. The objective is simply to teach both left and right hands to clap to the same music.

To facilitate the process of drafting, reviewing, revising and updating policy ideas or initiatives made within the Committee structure, all Departments represented on the Environmental Advisory Committee should be linked by computer, in an effort to do away with the cumbersome and antiquated "file dance" now more common between Departments. The objective will be to work towards linking Directors and the Permanent Secretaries, desk top to desk top.

2.3 It is important that the Anguilla National Trust be represented on the Environmental Advisory Committee in order to complete a necessary loop from the public sector to the private sector. A partnership between a few key branches of Government and the private sector can produce results far more easily and effectively in a state the size of Anguilla than might be done in a more populous country. The effectiveness of such a coalition of public/private sector interests in ensuring the formation of more enlightened public policies should never be underestimated (see also Chapter 8, Issue Three).

Figure 2.2. Organizational structure of proposed Environmental Advisory Committee.



Some have expressed the viewpoint that during the 1970's, the Government of Anguilla had provided more effective leadership for the environment than did the private sector; more recently, non-governmental organizations (NGOs) have assumed much of this leadership position.[2] Anguilla's environmental NGOs are discussed in Chapter 8 (Issue Four), including the National Trust which, although established by statute, is likely to function very much like an NGO. The important point is that Anguilla's Government and environmental NGOs need to aggressively seek opportunities for promoting joint initiatives and partnerships in the pursuit of resource management objectives.

ISSUE TWO:
Broader-based, long-term community support for resource management and the environment will require a change in attitudes which can best be achieved through the implementation of both formal and non-formal environmental education programs.

Since the majority of the citizens of Anguilla earn their livelihood, either directly or indirectly, from tourism or fishing, it is becoming increasingly important that educational and training activities -- in the schools and in the community -- focus on expanding awareness about the environmental implications of these key economic sectors and about the marine environment which supports both. It is encouraging, therefore, that UNDP funding, as part of a two-year natural resource management project in Anguilla, will be specifically allocated for the development of a formal environmental education program as part of the school curriculum.

At the present time, there is no overall strategy or curriculum for environmental education in Anguillian schools. However, certain aspects of environmental education are already infused into some primary and secondary subjects, such as sciences, geography, and social studies. Additionally, the Hotel Trades syllabus includes a component on the environmental impact of tourism, and the Adult and Continuing Education Program recently identified environmental education as a subject area to be integrated into its curriculum. The Albena Lake-Hodge Comprehensive School has established a student Environmental Club which is networking with the Caribbean Conservation Association and the Caribbean Youth Network.

The Education Department is currently identifying and reviewing environmental education initiatives by other GOA departments and by NGOs. Some of these include:

- The Health and Family Life Education Center, a unit of the Medical and Health Department, is developing a program on environmental health issues for primary schools; the Environmental Health Department also lectures at the secondary school.
- An environmental resource library is being developed and a biologist retained with UNDP funding to adapt scientific literature on Anguilla's flora and fauna for classroom teaching.
- The Department of Fisheries and Marine Resources recently coordinated publication of a brochure targeted at resident and visiting boat owners and yachtsmen, with information about local conservation laws and marine resource management areas; another booklet, entitled *Anguilla's Marine Resources: Threatened Treasures*, is targeted at tourists and residents; and a poster plus a slide presentation on coral reefs was prepared for the general public.
- The Anguilla Archaeological and Historical Society sponsors a variety of events, talks, competitions, exhibitions, and field trips which are open to the community.

Formal and informal approaches to environmental education are essential to increasing both public awareness about environmental issues and support for environmental programs. Community-focused events, such as clean-up campaigns, poster competitions, radio talk shows, news articles, speaker forums, exhibitions, and the like, can contribute significantly to the average citizen's environmental awareness. But there is also a need to include environmental information in the curriculum of the formal education system on a structured basis. Fortunately, Anguilla is doing both. The key factor is to mobilize and sustain community participation in a variety of environmental education programs and activities, whether they

are implemented in formal or informal educational settings.

RECOMMENDATION:

2.4. Anguilla has recently made a commitment to developing a formal environmental education program as part of the school curriculum. This program will augment other government and non-government activities, some of which are identified on page 20. All of these efforts are aimed at increasing environmental awareness in Anguilla -- in the schools and in the larger community. To maximize the benefits to be derived from these programs, Anguilla should:

- continue its contact and expand dialogue with regional networks of environmental educators and environmental education organizations;
- earmark an annual allocation of funding for environmental education in the schools (following completion of the UNDP-funded project), including monies for the continued development and acquisition of teaching materials and for ongoing teacher training;
- expand the role of the private sector in supporting environmental education by enlisting the sponsorship of NGOs, the National Trust, and hotels and other businesses for specific activities and projects;
- consider establishing a national Environmental Education Coordination Committee comprised of key organizations and GOA agencies engaged in environmental education (see discussion under Issue Two, page 20), for the purpose of focusing resources and talent in a coordinated and cooperative effort to reach all segments of the Anguillian community.

KEY THEMES OF CHAPTER 2

- Authority and responsibility for environmental management in Anguilla is not centralized at the present time but is dispersed among a number of GOA departments. "Environmental" functions can be identified in the Chief Minister's Office, the Ministry of Social Services and Lands, and the Ministry of Communications, Works, and Public Utilities.

- The fundamental problem with respect to how the public sector currently handles environmental responsibilities can be best described biblically: *"The left hand knoweth not what the right hand doeth."* This basic problem affects public sector activities at both a policy-making level and an administrative level.

- To address this problem, and to make the administration and execution of environmental policy more efficient, a "re-invention" of Government operations is needed. At the policy-making level, the major portfolios related to environmental management should be included within a single Ministry of Tourism, Natural Resources and the Environment. This new Ministry would include Government departments and boards responsible for tourism, agriculture, fisheries and marine resources, and lands and physical planning. Departments excluded from this new clustering of responsibilities would be Environmental Health, Water, and Education, which would, however, be represented on a new inter-agency advisory committee for the environment.

- At the administrative level, a new Environmental Advisory Committee should be created to provide a formal mechanism for joint planning, consultation, and information sharing by those key Government agencies charged with environmental management responsibilities. The Committee would include (at the Director level) representation from Fisheries and Marine Resources, Agriculture, Lands and Surveys, Tourism, Environmental Health, Water Resources, Environmental Education, and the National Trust. The objective of this committee structure is simply to teach both left and right hands to clap to the same music.

- Anguilla's Government and its environmental NGOs -- including the National Trust which is likely to function very much like an NGO -- need to aggressively seek opportunities for promoting joint initiatives and partnerships in the pursuit of shared resource management objectives.

- Both formal and informal approaches to environmental education are essential to increasing public awareness about environmental issues and generating community support for environmental programs. Fortunately, Anguilla is doing both, with funds recently allocated for the development of a formal environmental education program as part of the school curriculum. Other Government Departments and NGOs in the private sector are also engaged in environmental education activities, including the development of conservation education materials and sponsorship of a variety of events, meetings, competitions, exhibitions and field trips. The key factor is to mobilize and sustain community participation in a variety of environmental education programs and activities, whether they are implemented in formal or informal educational settings.

REFERENCE NOTES - CHAPTER 2
INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

1 United Nations General Assembly, 1984. Report of the United Nations visiting mission to Anguilla, 1984. Special committee on the situation with regard to the implementation of the declaration on the granting of independence to colonial countries and peoples. A/AC.109/799 (11 October 1984).

2 Strategic Review Workshop (February 11-12, 1993), convened for discussion of the Interim Strategic Review Report for Anguilla.

3. LAND USE PLANNING AND GROWTH MANAGEMENT

Land is Anguilla's greatest material asset and it must be the duty of every Government to protect it ... and to ensure that the interest of future generations of Anguillians is not jeopardized.
[Government of Anguilla, "Policy on Land Acquisition by Aliens"]

Anguilla is comprised of only 91 km^2 (35 sq mi) of land which is held in approximately 9,000 parcels. The majority of these (70 percent) are small parcels, less than two acres in size. Ownership is quite diverse, and there are few large individually-owned parcels.

The pattern of domestic settlement has generally been defined by access to the sea and to lands suitable for cultivation and grazing. A peculiar feature of Anguilla is the absence of a clearly identifiable urban area. Instead settlements occur in clusters or districts where pockets of the population have settled in mostly small villages. These include two major population areas[1] (see Figure 1.2, Chapter 1):

(1) The Valley (the main shopping, commercial and administrative center), plus Crocus Hill, North Side, The Quarter and Rey Hill Villages; and

(2) the area to the west of The Valley, embracing Sandy Ground, North Hill, South Hill, and Blowing Point Villages.

Other primary population areas include:

- in the far west, Long Bay Village and West End Village;
- George Hill and Long Ground Villages in the area of the airport;
- to the east, following the major road system, Stoney Ground to Welches;
- in the northeast, Shoal, White Hill, and Island Harbour Villages; and
- Sandy Hill to Mount Fortune in the southeast.

Anguilla is, in short, an island of numerous small settlements -- in effect, a true village society. It has no large capital town. The administrative center -- The Valley -- is located inland and lacks a harbor which facilitated the growth of other Eastern Caribbean capitals, like Basseterre in St. Kitts, Castries in St. Lucia, St. George's in Grenada, St. John's in Antigua. Where settlements have developed, the population is dispersed in mixed residential patterns with little distinction between low and high income areas.[2]

Over 95 percent of the land in Anguilla is privately owned. Public ownership is restricted to a few hundred acres scattered primarily across the western half of the island; most ponds are GOA-owned. In recent years, there has been considerable speculation in land, especially residential land developed by foreigners. This has created a dual market for land, one for foreigners and one for local Anguillians.

A widely and strongly held view among Anguillians is that each land owner is entitled to use privately-held land as he or she chooses. This determined independence of attitude is typical of Anguillians and pre-dates the Rebellion of the late 1960's. One writer[3] traces the evolution of the Anguillian spirit to the days of slavery when slave-owners made a decision with far-reaching consequences. They gave their workers four days off each week, one for the Sabbath and three to cultivate their own patches. The colonists had little to exploit in Anguilla and therefore had little work for their slaves -- hence, the four days of released labor. Eventually, after the Britons departed, the slaves who remained were already accustomed to identifying with and working on their own land -- indeed, they were somewhat familiar with the idea of freedom, even if it had only been of the four-day-a-week variety.

Thanks to this oddly-gifted freedom, Anguillians early on assumed a proprietary interest in the land, which earliest generations only tilled but later generations owned. Anguillians, perhaps uniquely among Leeward Islanders, evolved a rugged kind of independence. They proved awkward to rule, eager to mind their own business and would brook no nonsense from colonial masters. (In 1809, the British Government told the Anguillians to build a prison at The Valley; they replied they would build one -- if and when they had anyone to put in it, and not before then!)[4]

So it has evolved that today, in Anguilla, the imposition of development control measures is often resisted -- sometimes fiercely -- by the island's residents. Steps by Government to introduce regulations or guidelines to control growth or manage resources are perceived as a loss of individual rights and personal sovereignty over private property. Nevertheless, the Government is taking steps to improve the planning and development control process in the Territory and seems to have accepted the position that the right to develop private property is not unconditional and should not be at an unreasonable cost to an individual's neighbors, the community as a whole, or the environment.

These and related issues of private gain versus public cost seem to lie at the heart of many of the challenges currently faced by the Government of Anguilla. For example, protecting accessible, publicly-owned but privately-used resources is a difficult management task for any government, which can find itself providing a kind of subsidy for the use of such resources. The unregulated exploitation of beach and dune sand is a classic case in point throughout the Caribbean. Those who remove sand, often illegally, generally assume that such activities will be tacitly accepted by government with little or no controls, that no user fee will be

ANGUILLA LAND USE FACTS

Did You Know . . . ?

... Anguilla's 91 km^2 (35 sq mi) of land are allocated as approximately 9,000 parcels, the majority of which are less than 2 acres in size.

... Over 95 percent of the land in Anguilla is privately owned.

... The highest point is only 65 m (213 ft) above sea level, at Crocus Hill in the central northern portion of the island. Most of Anguilla is low lying with a gently undulating terrain -- topographic features which set it apart from most of its Eastern Caribbean neighbors with their generally mountainous and forested interior landscapes.

... Of the island's approximately 9,070 ha (22,400 ac), only a little over 1,200 ha (about 3,000 ac) are considered cultivable. The remaining portion is generally unsuitable for agriculture, comprising about 243 ha (600 ac) of saline ponds and the remainder mostly rock and thornscrub forest.[5]

... Anguilla currently has 426 hotel rooms (with another 112 under construction), 323 villas and apartment units, and 61 rooms in guest houses.[6]

... Economic activities tend to follow a natural pattern that seems to conform to the landscape, with agriculture concentrated in the more fertile valley areas and hotels and tourism focused but not restricted to the coastline.

... Approximately 34 white sandy beaches, among the finest in the Caribbean, occupy about 19 km (12 mi) of the 113 km (70 mi) shoreline and are a key feature of the island's highly water-dependent tourism industry.[7]

... There are no surface streams in Anguilla, but at least 20 ponds exist on the main island and its offshore cays. These ponds constitute Anguilla's wetlands.

... Anguilla possesses few large natural areas unaltered by agriculture or built development.

charged, and that responsibility for repairing any damaged landscape left behind falls on the public sector.

In Anguilla, these issues have emerged more recently, at the end of a decade marked not only by rapid expansion in the tourism industry but also by insufficient attention to protecting and enhancing the natural, human and cultural resources on which the Territory's quality tourism depends. Anguilla's style of tourism has been pursued more by rejecting mass tourism, than by a concerted effort to conserve and improve the environment on which its particular tourist market depends.[8] However, the need for a more aggressive, yet harmonious policy for land use planning, physical development, and environmental management is a priority which Anguillians can no longer ignore -- without placing the foundation of their economic prosperity at risk.

LANDSCAPE AS A PROTECTED RESOURCE

It is not often recognized as such, but an unspoiled or pleasing landscape is a resource of economic importance -- for an individual property owner or for a country. Unfortunately, in periods of rapid development and growth, these same landscape features tend to be taken for granted and rarely are they thought of as a resource in their own right. Yet, even a cursory inspection of tourist brochures from every island in the Caribbean makes it very clear that landscape is important to the travel industry.

Most repeat business or return tourism is based on "images". While beautiful tropical scenery alone, whether in a park setting or more generally dispersed, is not always enough to attract tourists, who tend to have a variety of options, the *absence* of it is likely to send them to another destination the second time around.

A question might be asked, therefore, about where the "landscape" fits into the scheme of things. In theory, landscape is a renewable resource, but in actuality this is only true if the scenery and its component parts are used wisely and well, according to sound land use planning and conservation management principles.

ISSUE ONE:

The development and approval of a national land use plan and environmental policy would give Anguilla a formal mechanism for evaluating and monitoring future development activities in both the public and private sector.

Land development in Anguilla has occurred largely in an *ad hoc* and unregulated manner, in the absence of an official land use policy and an established tradition of development control. This is a pattern prevalent throughout the OECS countries, where governments generally function without a formally accepted framework for planning. Therefore, decisions about changes in land use and approval of major development activities tend to be based on short-term considerations; they are generally executed on a case-by-case basis, usually at the highest levels of government, and may overlook the serious environmental, social, and infrastructure implications of development projects.

Inadequate or ineffective development planning can have serious consequences for, among others, the following resource issues:

- conserving and managing the island's limited ground water resources;
- minimizing the incidence and environmentally-damaging effects of indiscriminate sand mining;
- regulating shoreline developments to decrease coastal erosion;
- reducing the loss of scarce agricultural land to built development.

LAND USE PLANNING PROVIDES A STRUCTURE FOR ASSESSING THE PHYSICAL AND NATURAL FEATURES OF AN AREA AND FOR SUGGESTING ITS LONG-TERM SUSTAINABLE USES.

Anguilla's land use planning history dates back to 1943 when a Building Ordinance was introduced to ensure that all construction complied with stated regulations and was approved by a Building Board. Six years later, in 1949, a Town and Country Planning Act established a Planning Authority with power to prepare planning "schemes" for all or any part of the island. This occurred at the same time most islands in the British West Indies were experimenting with physical planning functions for the first time.

In 1968, an Outline Physical Development Plan for Anguilla was produced under the auspices of the United Nations. Although presented to Government, this plan was never approved and therefore was never implemented (this same pattern would occur throughout the region in the early 1970's as draft plans prepared with the assistance of UNDP were never legally mandated by island governments). A planning and development ordinance was drafted in 1966, providing for development planning functions and requiring preparation of development plans, but this legislation was also never enacted.

In 1972, the United Nations again provided assistance to Anguilla, this time for preparation of an Outline Plan for Tourism which included an overall physical development strategy and detailed proposals for nine tourism development areas. In 1982/83, the British Overseas Development Administration provided technical assistance for the preparation of a land use plan for The Valley.

At present, the land use planning function resides in the Department of Lands and Surveys and in the portfolio of the Minister of Social Services and Lands. The Department's main responsibilities are land surveys, land valuations, and land registry. The planning function, until only recently, focused on development control with no attention to forward planning, largely due the shortage of trained professional staff.

A 1977 GOA "Green Paper" identified four reasons why development plans were necessary for Anguilla:

(1) to enable an effective system of development control;

(2) to identify areas of special development potential;
(3) to conserve the natural heritage, improve amenities and create recreational areas; and
(4) to prevent congestion.

Nevertheless, current planning legislation makes no provision for the preparation of land use plans, an omission that will be re-assessed within an overall review of planning legislation scheduled for 1993. The Anguillian review is part of a wider UNDP-funded project to strengthen planning legislation in the OECS territories, and an up-dated Physical Planning Ordinance and accompanying regulations are expected as outputs of this effort in Anguilla.

There is no detailed map of current land use information available for the Territory, but the Government of Anguilla -- through its Physical Planning Unit in the Department of Lands and Surveys -- has obtained technical assistance from UNDP to prepare a National Land Use Plan for Anguilla and local plans for four important growth areas: The Valley, Blowing Point, Sandy Ground and Island Harbour. Objectives of this planning effort, which is scheduled for completion in early to mid-1994, are:

- to determine how land is to be developed and allocated among competing uses according to suitability and capability criteria;
- to formulate a coherent and comprehensive land use policy; and
- to provide a framework for evaluating, guiding, managing and coordinating public and private sector development.

As part of this larger land use planning effort, the Government of Anguilla might also want to consider a related policy planning initiataive that could strengthen overall planning objectives, namely, development of a *National Environmental Policy*. The two are complementary in that a National Environmental Policy could define the Territory's broader goals and guidelines for the environment, while the National Land Use Plan will provide the substance and detail for environmentally-sound land use decisions. Environmental and land use planning decisions, like economic ones, cannot be properly evaluated if they occur primarily as incremental responses to current circumstances. To be effective a broader context or framework -- i.e., a national policy -- is required.

This is particularly important for an island like Anguilla which is heavily dependent on the beauty and sustainability of the natural and physical environments, and their combined products and services, to support the economic well-being and quality of life of its inhabitants. The challenge of how to effectively use the environment to meet current needs while ensuring that it will be able to accommodate future demands requires careful *planning* by today's leaders. A National Environmental Policy would enhance this process in several ways. For example:

- It would help focus attention on the importance of protecting the environment in support of national economic development goals.
- It would serve as a public statement of the island's commitment to maintaining the integrity of the natural systems upon which Anguilla depends.
- It would provide broad guidelines for planning and growth management decision-making.

Additionally, the *process* of shaping, designing, and developing a National Environmental Policy for Anguilla is as valuable as the document itself. The process helps to build consensus on environmental goals among diverse resource user groups, builds support for committing the financial resources necessary to safeguard the environment, and instills accountability within Government and society for environmental responsibility.

RECOMMENDATION:

3.1 The Government should build on its existing economic investment in Anguilla's environment and move toward the prompt completion and formal approval of the National Land Use Plan.

ISSUE TWO:
Development control is not, at present, a well-established function within the Government of Anguilla.

The Land Development Control Ordinance (No. 15) of 1966 introduced a development control system modelled on the Town and Country Planning Act of 1949, but it was never put into effect. It required persons wishing to develop land to apply for permission from the Governor. The 1980 Land Development Control (Amendment) Ordinance provided for the declaration of "special development areas". Both pieces of legislation were superseded by a new Land Development Control Ordinance in 1991. (Other legislation with implications for development planning is presented in Table 3.1.)

Applications for approval to develop land are made to and evaluated by the Land Development Control Committee (LDCC). The Committee comprises five persons, four of whom are public officers:

- Director of Lands and Surveys;
- Principal Planning Officer;
- Chief Engineer (Public Works Department); and
- Permanent Secretary with responsibility for Lands, who serves as Chairperson.

DEVELOPMENT SHOULD BE BASED ON CONSERVATION. IT SHOULD PROTECT THE STRUCTURE, THE FUNCTIONS, AND THE DIVERSITY OF THE NATURAL SYSTEMS ON WHICH IT DEPENDS.

The Physical Planning Unit of the Department of Lands and Surveys provides technical support to the LDCC. Meetings of the LDCC take place every three weeks to consider applications. The Committee may refuse to grant permission or may grant such permission unconditionally or subject to specific conditions. Decisions are largely *ad hoc* and are made in the absence of established environmental guidelines.

Reorganization of the Physical Planning Unit has been proposed to integrate planning and development control functions more effectively within Government and to upgrade this section to the status of a department, thereby placing it in a more appropriate position to implement the proposed new Physical Planning Ordinance (see Issue One). The proposed department would comprise three sections: Planning and Development Control, Building Inspectorate (to be transferred from Public Works), and Development Planning. The current Principal Planning Officer would be promoted to the position of Director of Physical Planning.[9]

The proposed reorganization of land use planning, coupled with a proposed new Physical Planning Ordinance and the preparation of a National Land Use Plan, will create a considerable challenge for the Government of Anguilla in the immediate future. However, without an improved framework and national policy for development control and growth management, there is a continuing risk that land use decisions will be viewed as short-sighted, inconsistent, and even arbitrary -- particularly in the case of larger development projects.

Enforcement procedures for development control are not well-defined in Anguilla and are viewed as constraints to an effective development control system. Planning officials point to the fact that existing legislation does not provide a simple mechanism for issuing "stop work" notices for land use violations. Additionally, penalties as specified in current laws are not adequate to discourage violations and illegal development.

Institutional fragmentation of responsibility for land use decision-making has also been

Table 3.1. Development control and growth management legislation in Anguilla.

(1) Land Development Control (Amendment) Ordinance (No. 9, 1991)	Provides for present development control system
(2) Antiquities Ordinance (No. 13, 1983)	Provides for development control for listed buildings and the preservation of historical and archaeological sites and artifacts
(3) The Marine Parks Ordinance (No. 10, 1982)	Provides for a system of marine parks and marine protected areas
(4) The Land Acquisition (Amendment) Ordinance (No. 223, 1967)	Enables Government to acquire land for public purposes
(5) Aliens Land Holding Regulation Ordinance (No. 12, 1976)	Regulates land ownership by non-Anguillians
(6) The Condominium Ordinance (No. 11, 1982)	Provides for formation of horizontally-divided freehold tenure
(7) Beach Control (Amendment) Ordinance (No. 9, 1991)	Safeguards the use and development of the foreshore and adjoining areas and the seabed
(8) Beach Protection Ordinance (No. 10, 1988)	Prevents removal of sand from protected beaches

targeted as a constraint to more effective growth management. Land use decisions -- particularly for major projects -- may now bypass the Planning Unit, which can only serve to weaken or undermine the development planning and control process, with potential long-term consequences for the natural and physical environments (i.e., it is all too clear that unsound land use decisions -- particularly in small places -- will inevitably have adverse environmental consequences). Several agencies of Government are now involved in activities which either directly or indirectly affect the environment, and the absence of a formal mechanism for inter-agency cooperation and coordination is viewed by GOA planners as an institutional constraint not only to the planning and development control process but to the implementation of effective environmental management programs.

RECOMMENDATIONS:

3.2 Government should consider measures to improve coordination of development control responsibilities across departmental and ministerial lines. The land use planning project currently underway in Anguilla is an appropriate opportunity for such an assessment. In particular, consideration should be given to coordination procedures which:

- require inter-agency review of the potential environmental impacts of proposed development activities early in the planning process, and
- provide for a process of "negotiating" appropriate changes to mitigate foreseeable impacts to the human and natural environment.

3.3 As the Government of Anguilla proceeds to refine its planning and development control capabilities, attention should be given not only to long-term planning considerations, but also to a gradual and continual upgrading of the technical skills and personnel requirements critical for effective environmental planning and decision-making.

3.4 As a part of the legislative review scheduled for 1993, consideration should be given to strengthening enforcement procedures and regulations as now incorporated in the Territory's planning and development control legislation For example, sufficient authority to issue "stop work" notices should be established.

3.5 In addition to the introduction of a new planning ordinance and possible reorganization of planning and development control responsibilities, the following have been identified as key issues to be addressed in the near-term by GOA:[10]

(1) control of development by ensuring that all future construction (public or private sector) will be subject to planning permission;

(2) enforcement of existing legislation;

(3) control of building development in The Valley to protect the island's shallow aquifer and what remains of fertile agricultural land;

(4) adoption of a land subdivision policy; and

(5) elimination of retroactive planning by requiring that plans for all developments be submitted to the planning authority in advance of the issuance of alien land-holding licences or commencement of construction.

ISSUE THREE:

At the present time the process of land use planning and development control does not enjoy a wide base of public understanding, involvement or support.

Throughout the Eastern Caribbean, there are increasing examples of a bias in favor of expanded public participation in national planning efforts related to the utilization and management of natural and cultural resources.

While efforts to accommodate public participation can make the task of the government planner or resource manager more complex and time-consuming, such efforts also provide important advantages by:

- facilitating government access to a larger information base;
- providing an opportunity for governments to build coalitions or support on behalf of its projects or decision;
- allowing for discussion and possible resolution of conflicts prior to an extensive commitment of resources to a potentially controversial activity or project.

At the present time in Anguilla, meetings of the Land Development Control Committee are not advertised or open to the public, nor are major development schemes vetted in the community as part of GOA review of development proposals. Yet, at a February 1993 workshop convened by Government to review an interim Strategic Review Report, it was stated that unless Anguillians were given an opportunity to participate in the Land Use Planning Project, public support would be limited.[11]

RECOMMENDATION:

3.6 The Government of Anguilla should consider providing expanded opportunities for public consultation and participation in the planning process and in deliberations about resource development and environmental management. For example, community workshops on the limits and constraints of development and on government concerns and goals regarding economic growth and development might be useful.

ISSUE FOUR:
An important omission in Anguilla's development control system is the lack of procedures for assessing the environmental impacts of development projects.

No formal environmental impact assessments (EIAs) have been undertaken to date in Anguilla, although at least two prior studies have taken tentative steps in that direction.[12] At the present time, there are no mandated EIA requirements or guidelines for development activities.

An environmental impact assessment is designed as a *proactive* attempt to analyze the projected impacts of a specific development projects. The effectiveness of the EIA is reduced if it is applied after the project design or even the project conceptualization stage is completed. In general, the simplest and most cost-effective way of minimizing environmental damages as a result of development activities is through the upfront preparation of a design that is sensitive to the environmental implications of proposed activities from the very beginning. Remedial measures, if applied after the event, often are prohibitively expensive. Typically, the cost of the EIA is borne by the developer, but defining the scope and content of the EIA and reviewing the EIA report is the responsibility of government.

RECOMMENDATIONS:

[Note: This recommendation is repeated in Chapter 5, Issue Four, where the importance of EIAs for coastal developments is emphasized.]

3.7 The scheduled planning review should address the present omission of an EIA requirement for development activities. Enactment of such a requirement will give the planning authority a legally-mandated mechanism for assessing and evaluating the environmental, physical, social, and economic consequences of development proposals at an early stage in the development process. Legislation should require the formal preparation of environmental impact assessments for all major ("major" needs to be defined) development projects (public or private sector), especially for those:

- within the coastal zone,
- within the boundaries of designated protected areas and other environmentally sensitive areas, or
- affecting other critical areas or resources.

Minor projects should be preceded by reduced scope environmental commentary addressing a simpler list of questions.

3.8 The institutional capacity for interpreting and evaluating the technical aspects of environmental impact reports and for setting standards for review procedures needs to be created within the Government of Anguilla, most logically within the proposed new Department of Physical Planning.

3.9 An EIA inter-ministerial review committee might also be established to assist with the EIA process. Assistance from regional or international agencies is available to implement EIA procedures and to provide training for GOA technical staff.

ISSUE FIVE:
Anguilla has not yet developed a policy or established priorities for terrestrial conservation concerns, as it has for marine areas.

In a developing island like Anguilla, the trade-offs between the long-term benefits of conservation and resource protection and the more immediate, short-term benefits of resource exploitation are not always easy to balance. Yet protection of critical natural areas and other important terrestrial sites is as much a part of government's responsibility for land management as the administration of a development control system.

Anguilla possesses few large natural areas that are unaltered by agricultural or built development. Some of these remaining natural areas could still be considered for protected area status even though most are privately-owned. Protected area status merely denotes that an area has been given special management attention within a wide range of "managed uses" which can vary from a "multiple-use zone" to a "strict reserve".

Since the vast majority of land in Anguilla is held as small parcels in private ownership, future pressure to develop these lands could result in the loss of the Territory's few remaining natural areas. At present, there is no land trust fund or acquisition procedures to direct this important land management responsibility of Government. Nevertheless, where possible, remaining undisturbed natural areas should be protected and their use restricted as wildlife habitat and for ecotourism. The potential return to the tourism sector of maintaining these relatively pristine environments in their natural state will usually far exceed the return from other types of development.

RECOMMENDATION:

3.10 GOA should develop a policy and establish priorities for the designation of terrestrial sites requiring natural area protection, as it has for sites in the marine environment (see Chapter 5, Issue Two). In some cases, this will require that the Government acquire land for protection, and establish management guidelines and enforcement procedures for the kinds of land use activities that will be permitted within designated protected areas.

If land acquisition is not a viable (and timely) alternative, then GOA could explore other alternatives for controlling the type, scale, intensity, and location of future development within important conservation areas.

KEY THEMES OF CHAPTER 3

- Efforts by the Government to control development or manage resources are often perceived by Anguillians as a loss of individual rights or personal sovereignty over private property. This is a particularly important issue in Anguilla where the vast majority of land is privately-owned in relatively small parcels.

- After a decade marked by rapid economic growth and expansion of the tourism industry, the need for a more aggressive, yet harmonious policy for land use planning, physical development, and environmental management is a priority which Anguillians can no longer ignore -- without placing the foundation of their current economic prosperity (i.e., tourism) at risk.

- In the absence of an official land use policy and an established tradition of development control, land development in Anguilla has occurred largely in an *ad hoc* and unregulated manner. However, more recently, Government has begun to take steps to strengthen the development planning process, specifically, the preparation of a National Land Use Plan (scheduled for completion in 1994) and a review and assessment of extant planning legislation (scheduled for 1993). There has also been some discussion of upgrading the physical planning unit of Government to the status of a department and consolidating planning and development control functions within the new department.

- Enforcement procedures for development control are presently not well-defined, and existing legislation does not adequately specify (1) punitive measures to discourage violations or (2) enforcement procedures to control non-conforming and illegal development.

- Land use decisions -- particularly for major development activities -- may now bypass the Planning Unit, a practice which serves to weaken and undermine the development planning process. This is unfortunate, for it is all too clear that unsound land use decisions -- particularly in small places -- will inevitably have adverse environmental consequences.

- Expanded public participation in national planning efforts, particularly those related to the utilization and management of natural and cultural resources, will help to increase public understanding of and support for land use planning and development control.

- The formal preparation of Environmental Impact Assessments should be required for all major development projects, particularly those located in the coastal zone, within the boundaries of designated protected areas, or affecting other critical areas or resources.

- Anguilla has not yet developed a policy or established priorities for the protection and management of terrestrial natural areas, as it has for sites in the marine environment. Since the vast majority of land in Anguilla is held as small parcels by private owners, who face increased pressures to develop their land as built-up areas become more consolidated, Anguilla now risks losing the few remaining natural areas that are still unaltered by agricultural or built development.

REFERENCE NOTES - CHAPTER 3
LAND USE, PLANNING AND GROWTH MANAGEMENT

1 Jonah, C., 1991. Environmental health development project, Anguilla. Environmental health profile. ECA-CWA-010/81.1/2865-91. Prepared for UNDP/PAHO/WHO.

2 See note 1 above.

3 Winchester, S., 1985. The sun never sets: Travels to the remaining outposts of the British Empire. Prentice Hall Press.

4 See note 3.

5 Hodge, M., 1992. Agriculture in Anguilla. St. Kitts and Nevis Teacher's College of Further Education, Division of Teacher Education.

6 Government statistics quoted in: Mokoro Limited, 1993. Anguilla strategic review. Interim report (February). Prepared for the Government of Anguilla.

7 Pritchard, D., 1990. The Ramsar Convention in the Caribbean (with special emphasis on Anguilla). Published by the Royal Society for the Protection of Birds. Bedfordshire, UK. Also, pers. commun., D. Carty, Parliamentary Secretary for Education and Environment (Carty puts the number of beaches at 34; Pritchard cites "44 sandy beaches").

8 Mokoro Limited, 1993. Anguilla strategic review. Interim report (February). Prepared for the Government of Anguilla.

9 GOA as quoted in source cited in note 8.

10 See note 9. Also, pers. commun., Department of Lands and Surveys staff.

11 See note 8.

12 The two studies are:

(a) Adams and Associates, 1977. A preliminary assessment of the effects of an oil refinery and other development on the future of Anguilla. Prepared for Petro Caribe Group. St. Thomas, USVI.

(b) U.S. Government, Department of the Navy, 1979. Dog Island environmental reconnaissance study. Tippetts-Abbett-McCarthy-Stratton (TAMS) and Ecology and Environment, Inc.

4. PLANTS, ANIMALS, and THE LAND: AN ISLAND HABITAT

One generation passeth away, and another generation cometh:
but the earth abideth forever.

- OLD TESTAMENT: *Ecclesiastes, i, 4*

Anguilla is a low and flat island composed principally of coralline limestone overlain with a thin, irregular layer of reddish/brown, clay-type soil with alkaline properties (in the central valley areas, the soil is better and offers some agricultural potential).[1] One researcher has described the main island of Anguilla (see also Figure 4.1) as follows:

The chief topographic contrast within the island is between the cliffed northern coast and the low and irregular southern coast .... A discontinuous ridge, forming the backbone of the island, runs north-east from Isaac Cliff towards Island Harbour .... The ridge rises to over 200 feet between Road Bay and Crocus Bay and ends, along parts of the coast, in vertical cliffs over 100 feet high and gashed at the base by large sea caves. The surface of the upland, particularly between Crocus Bay and Island Harbour, consists of roughly weathered limestone which is often devoid of soil cover ....

South-west of the [north] central ridge the land slopes gently down to the coast along which sandy bays, often enclosing small [ponds], alternate with low headlands. South-east of the ridge, there is a broad lowland occupied by several enclosed depressions, the largest of which contains Caul's Pond; a minor [lower] ridge, [south of the pond] and less than 100 feet in height, separates this low [wet]land from the south-east coast ....

At its north-eastern extremity the island narrows to a rocky peninsula jutting out towards Scrub Island. Here there is maximum exposure to spray-laden trade winds and near the coast the surface of the limestone has been carved into a wilderness of deep fissures and razor-sharp ridges .... A similar rocky headland forms the south-western end of the island, but it is not directly exposed to prevailing winds and waves .... [2]

While clearance of forest cover from the rocky Anguillian landscape was relatively slow, the island's original forests have been devastated by excessive exploitation over time. This occurred even though the first European settlers -- who elsewhere in the Caribbean were intent on rapidly shaping the tropical environment into efficient production systems for cash crops -- were, in Anguilla, faced with a harder struggle to survive. To a large extent, the early Anguillians sustained themselves from the sea and from their livestock -- but from the soil only with difficulty.

Thus, the cultivation of both cash crops and a plantation-style economy never took hold on the island as it did elsewhere, with tobacco gradually abandoned during the eighteenth century and later sugar following emancipation. The island's dry climate and poor soil are the primary reasons why traditional cash crops were not grown more successfully. Over time, the export of provisions to neighboring sugar islands became a more important agricultural activity, while the people of the island became individual cultivators and landowners in their own right, thereby developing distinctive Anguillian characteristics of individualism and self-reliance.

Subsistence farming, with supplementary export of provisions and salt and remittances sent home by seafaring Anguillians, continued to be the mainstay of the population until well into the twentieth century. From about 1920, however, governmental attempts to develop permanent agriculture in place of shifting cultivation met with some success, and cotton was successfully raised as an export crop, both on small plots and on the remaining large estates. In the 1940's,

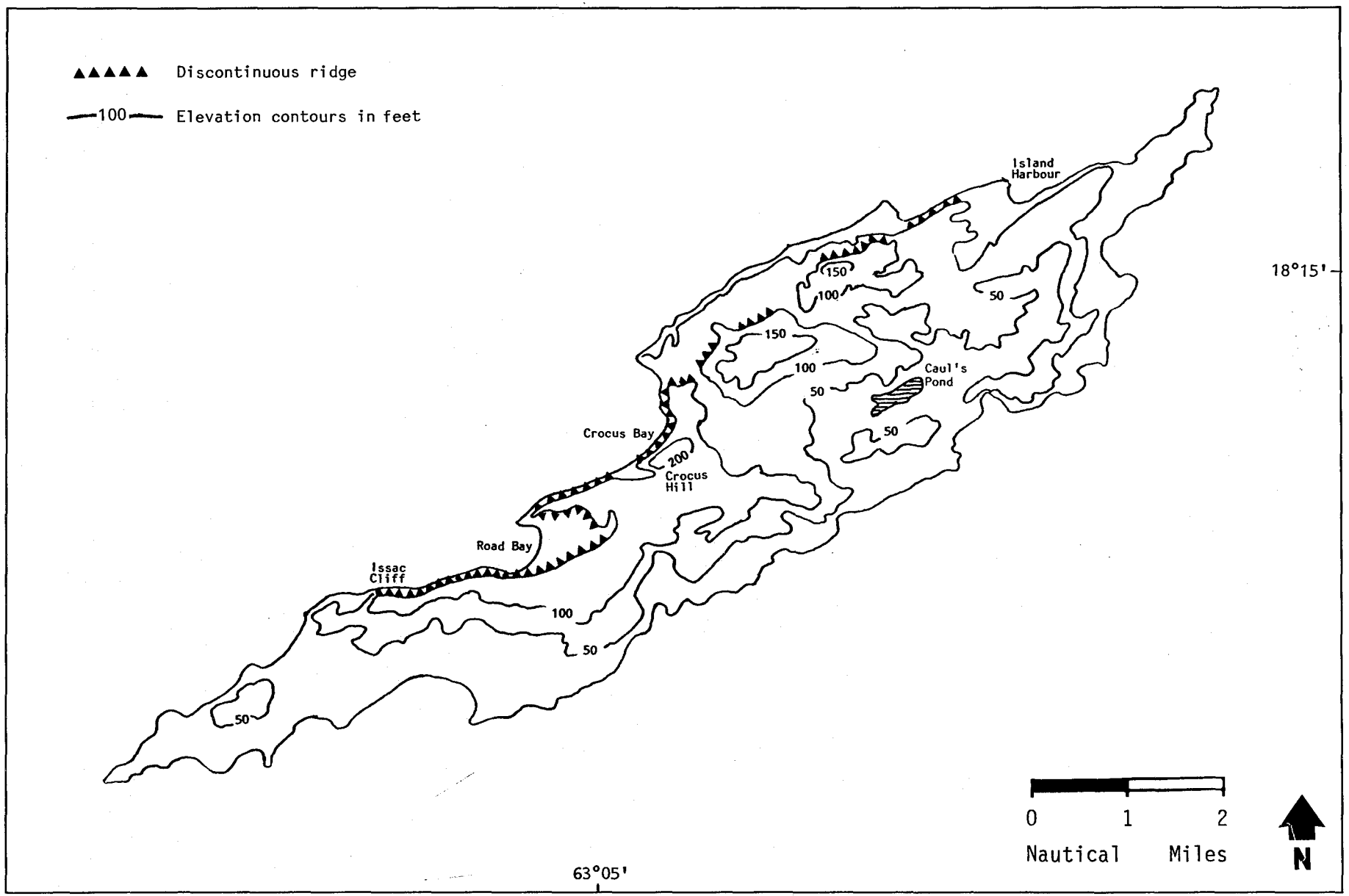


Figure 4.1. Topographic features of Anguilla.

cotton production began to decline, and much land formerly under cultivation reverted to secondary growth of herbaceous and woody weeds.

In classifying vegetation on this uncultivated land, Harris in 1965 described it as degraded evergreen woodland, with species such as White Cedar (*Tabeuia pallida*), Loblolly (*Pisonia fragrans* and *P. subcordata*), and Turpentine (*Bursera simaruba*). (Evergreen woodland, alternatively classified as evergreen bushland, is more popularly known as thorn scrub.[3]) Small areas of grassland are scattered throughout the degraded woodland, while littoral and strand vegetation predominate along coastlines.

For reasons not entirely clear, Anguilla apparently did not experience a large-scale invasion of alien (non-native) plants. The relative ineffectiveness of introduced plant species may be due largely to the absence of large, abandoned plantations on which the aliens might spread, unrestricted by competition with native trees and shrubs, and to the presence of fewer livestock to act as agents of alien dispersal.[4] Even today, the woodland of Anguilla consists primarily of native species. These have been severely degraded by generations of shifting agriculture, the cutting and burning of wood, and the grazing of animals, all of which have prevented or retarded the recovery of more mature woodlands.

Perhaps the most common tree found throughout the island is the loblolly tree, which provides good shade. Also fairly common is the turpentine tree with its reddish bark, thick trunk and bare appearance when its leaves drop. The neem (*Azadirachta indica*), introduced relatively recently, is perhaps the most common shade tree.[5] In the more rocky areas throughout Anguilla, there is an abundance of *Melocactus intortus* (or Pope's Head, as it is known locally), a member of the melon cactus family with a body that is green and round covered by a multitude of spines and capped by a red or brown mass of bristles.

But perhaps no indigenous tree or plant will ever have the symbolic value for Anguillians as does the mahogany tree (*Swietenia mahagoni*); the most famous specimen once stood at the crossroads in The Valley. It survived to a remarkable age before it finally fell in 1971, a passing that was commemorated as follows[6]:

> *She was a beautiful tree -- so tall, so stately, so revered by all. She stood on this corner for over 300 years -- as a landmark and meeting place. It was a sad day when, in the early hours of November 12th, 1971, her aged roots could no longer withstand the rigors of nature's elements. She collapsed across the corner. Goodbye to the Mahogany Tree. Anguillians will always remember her.*

Today, most of Anguilla's surface can be described as limestone rock or thorn-scrub vegetation. About 17 percent of the land is considered cultivable, although much of this area is covered by buildings and roads. Yet, Anguilla is an island where the overall effect of generations of change on the landscape has not been as dramatic as it was on neighboring Caribbean islands. The rocky, bush-covered countryside remains much as it was in the early nineteenth century,

> *... thickly covered with maiden berry, myrtle, balsam and sage undergrowth, interspersed with white cedar, frangipani, acacia and boxwood, and occasionally the wild cherry bush. Here and there amongst this vegetation can be seen the tall, impressive Spanish bayonet with its clusters of white flowers, the yellow flowering aloe, the sisal plant with its long tall flowering pole ..., the prickly pear and the tall candelabra and organ pipe cactuses. And all around Anguilla's coastline can be found the sea grape tree, which is more a bush than a tree but which, with its large heavy green leaves, can provide welcome shade and also refreshment ....*[7]

ISSUE ONE:
Strengthening the information base about Anguilla's biodiversity will enhance Anguilla's capacity to develop more systematic biodiversity conservation programs.

According to island theorists, the larger an island, the more diverse its natural habitats and the greater the number of plant and animal species that occupy those habitats (a "habitat" being the environment in which a plant or animal lives, generally defined in terms of vegetation and physical features). Additionally, it is hypothesized that the closer an island is to a continental land mass, the greater the number of species found on the island.

Anguilla is both small and distant from the South American mainland. Thus, we expect to find a relatively low level of biodiversity -- that is, a relatively low level of variety in Anguilla's plants and animals and the habitats in which they live.

Additional factors affecting Anguilla's biodiversity are the island's low and flat topography and its limited rainfall. Islands with more variation in elevation and greater changes in climate from one part of the island to another will have more diverse habitats which, in turn, support a greater variety of plant and animal species. This is not the case in Anguilla.

Finally, island biogeographers (those who study plant and animal distribution) contend that oceanic islands, isolated as they are from larger land masses, can be expected to have a highly endemic flora and fauna (that is, flora and fauna exclusive or native *only* to the island or bank of islands). Anguilla, as an archipelagic island, exhibits these phenomena but not to a very marked degree.

A closer look at Anguilla's plant and animal life will help explain these theories about island biodiversity and endemism.

Plants. There are approximately 500 species of plants recorded for Anguilla, of which 321 are indigenous and 122 were introduced. As mentioned above, Anguilla's plant life consists mainly of indigenous or native species. There is, however, one species which is endemic to Anguilla, the *Rondeletia anguillensis*, which is in the family of plants that includes the Five-finger Tree, the Mutton Polly, Stinging Whip, and Wild Guava. This Anguillian endemic is found at the east end of the island and in the vicinity of Little Bay, near Flat Cap Point.[8]

Mammals. The only native, or naturally-occurring (i.e., not introduced) mammals in Anguilla today are bats. Five species have been recorded (*Monophyllus plethodon luciae, Artibeus j. jamaicensis, Brachyphylla c. cavernarum, Natalus stramineus, and Molossus molossus*),[9] all of which reside in the many caves and sinkholes that abound on the island.

Birds. This is the most diverse group of animals in Anguilla. Seabirds, shorebirds, wading birds, waterfowl and song birds are abundant on the main island and surrounding cays, primarily because birds are easy dispersers, flying readily from one Caribbean island to another or from points more distant. There are no endemic species of birds in Anguilla, probably because they disperse so easily and because of the proximity of adjacent land areas within the archipelago. Most birds that occur on Anguilla are common species found throughout the Caribbean.

Standard West Indian bird references do not provide specific listings of Anguilla's bird population. Furthermore, a definitive Caribbean seabird reference[10] lists Anguilla as one of the few islands for which "knowledge of the present seabird situation is particularly sparse or even lacking". There is a list of bird species identified in Anguilla during a one month period in 1990 in Pritchard's report on the Ramsar Convention in the Caribbean.[11] Pritchard also points out that because most of the existing knowledge

BIODIVERSITY IS IMPORTANT -- BUT WHAT DOES IT MEAN ? [12]

Biodiversity, short for biological diversity, refers to the variety and variability among living organisms and the communities in which they live. The most frequent measure of diversity is a list of the species occurring within an area, but the concept of diversity can also refer to the gene pool of a given species or to the habitats where that species occurs. Thus, biodiversity can be applied to three levels of organization:

Species diversity: A *species* consisting of all individuals that are similar enough to be able to breed with one another and too different from other individuals (i.e., members of a different species) to be able to reproduce offspring together.

Genetic diversity: Even though individuals of the same species are similar enough to be able to interbreed, they can differ significantly from one another in terms of their genes. Consider, for example, the *genetic diversity* that exists in the common mouse species (*Mus musculus*) where two individuals may differ in hundreds or thousands of the estimated 100,000 genes each contains. Without genetic variability, life loses its ability to survive change -- a quality known as adaptation.

Ecosystem diversity: Biodiversity also refers to variations in the ways species associate with one another and their environment to form different *ecosystems*. The Caribbean landscape of 500 years ago, with its forests, savannahs and wetlands, was more diverse than it is today as many natural systems have been physically altered, diminished, or destroyed.

But why is the conservation of biodiversity so important? Biodiversity can be viewed as the key to the maintenance of the natural world as we know it. Every habitat harbors a unique combination of living organisms -- from the soil bacteria that allow a particular plant species to thrive to the birds that pollinate that plant's flowers. Eliminate one species and we may not notice the change, in the same way that a car may still drive with one screw missing. But eliminate too many -- or the wrong one -- and that system falls apart just as surely as that car would.

Within our lifetime, at least a fifth of all plants and animals on earth are likely to become extinct (extinct species are those where no members are living at the present time). Experts agree that if worldwide destruction of ecosystems and natural areas continues at its present rate, at least 20 percent of all of today's species could be gone by the turn of the century. Most of these losses will occur in the tropics, home to more than half the species on earth. Biodiversity loss is occurring today at rates unmatched in the last 65 million years, and we all share some mutual responsibility for this loss.

The term biodiversity is less than a decade old, but efforts to conserve biodiversity date back to the earliest attempts to establish nature parks and to protect selected species. Contrary to the criticism that it just represents the latest in a long line of short-lived fads, *biodiversity conservation* has evolved as a rationale and needed focus for efforts aimed at "saving the environment". We should expect its conceptual basis -- if not its label -- to be with us for some time, guiding our development practices for the foreseeable future.

about Anguilla's bird life has not been recorded in written form, the best source of information is one individual, the island's present Chief Minister, whose personal interest and enthusiasm provide a focus for current knowledge on the subject.

A special interest in Anguilla's seabirds has been expressed by at least two international organizations (ICBP and the British Association of Nature Conservationists).[13] Chapter 5 (Issue Five) discusses this aspect of Anguilla's biodiversity, noting that salt ponds are especially critical habitat for aquatic birds. The most recent assessment of Anguillian wetlands and their associated bird populations by Pritchard provides some information regarding residence and nesting activity for several species of seabirds on Anguilla and its offshore cays (see especially Section 19 of Pritchard).[14]

Reptiles and Amphibians. There are ten species of lizards and one species of snake, land turtle and frog on Anguilla and its cays. Some of these also occur on the offshore cays. In addition, there are two species of black ground lizards which occur only on Sombrero and Little Scrub Island. Several reptile species are endemic[15]; these are:

(1) The black ground lizard on Little Scrub Island (*Ameiva corax*) which occurs only on Little Scrub;
(2) the black ground lizard on Sombrero (*Ameiva corvina*) which occurs only on Sombrero;
(3) the snake (*Alsophis rijersmai*);
(4) the ground lizard (*Ameiva plei*),
(5) the tree lizard (*Anolis gingivinus*) and
(6) one of the very small geckos (*Sphaerodactylus macrolepis parvus*).

The last four species occur only on the Anguilla Bank.

The Iguana (*Iguana delicatissima*) is endemic to the northern Lesser Antilles, as is a second small species of gecko (*Sphaerodactylus sputator*). The other three species of lizards (two woodslaves, *Hemidactylus mabouia* and *Thecadactylus rapicauda*, and the slipperyback, *Mabuya mabouia*) are found throughout the Caribbean, although one of the geckos (*H. mabouia*) has its roots in Africa.

The snake, ground lizard, tree lizard and both woodslaves are common throughout the island of Anguilla, although the snake is very secretive. The smallest gecko (*S.m. parvus*) is found only in moist areas, such as caves and canyons. It is most abundant in Katouche Canyon and Cavannagh Cave. The slipperyback is locally abundant in areas of limestone outcrops. A land tortoise (*Geochelone carbonaria*) is found sporadically in areas like Locrum Bay and Rendezvous Bay.[16]

All reptiles in Anguilla, except the iguana (and possibly the tortoise), are relatively abundant. They have either adapted to human modified habits, or they occur in areas which have not been disturbed or altered. Only the iguana is threatened with extirpation on Anguilla. They are shy and have not done well in areas of habitat alteration. Most that have been seen are old animals, although in recent years a few young, green individuals have been encountered.

There are probably two primary reasons for the decline in the population size of iguanas. One is loss of habitat, due to cutting of trees. This reduces not only food resources but also basking sites. In the past few years, prime iguana habitat near the Fountain has succumbed to the rock crusher.[17] Additionally, wild goats compete for food with the iguana which feeds mainly on vegetation. This becomes particularly critical in years of drought when vegetation is scarce. Iguanas captured in 1992, an unusually dry year, were extremely thin.

The only amphibian recorded on the island is a species of frog (*Eleutherodactylus johnstonei*). A chorus was discovered in 1987 at the Agricultural Station in The Valley, and heard again in 1989 and 1993. The species was undoubtedly introduced to the island on plants brought to the Station.[18]

IT MAKES A DIFFERENCE . . . The Starfish Parable[19]

A woman was walking the beach one morning and came upon the lone figure of a young man silhouetted against the sea. He skipped and frolicked as if performing a ritual dance to celebrate the dawn. Fascinated, she moved closer. As she approached, she realized the young man was not dancing -- he was, with graceful and joyous movements, picking up objects and tossing them into the sea. Soon she realized the objects were starfish.

"Why are you throwing starfish into the sea?" the woman asked.

"The tide is going out and if they are still here when the sun rises, they will die," he responded. And, without breaking his rhythm, he continued tossing them out to sea.

"That's ridiculous! There are miles of beach and countless starfish. You can't really believe that what you are doing could possibly make a difference!"

He smiled, bent over and picked up another starfish, paused thoughtfully, and remarked as he tossed it into the waves, *"It makes a difference to this one."*

Natural Areas. While one is always within walking distance of uninhabited places in Anguilla, there are only a few areas which can be considered expansive "natural areas" by virtue of the fact that they have not been significantly altered through cultivation or human habitation (see also Chapter 3, Issue Five). Such areas are generally of two types: (i) thorn-scrub or drought-deciduous forests and (ii) wind-blown open areas with salt-tolerant vegetation. Three of the most important are described as follows.

(1) Most remaining natural areas in Anguilla are on the north coast, from Little Bay northeastward to Windward Point. While some of this area is settled (e.g., Shoal Bay Village and Island Harbour), the vast amount of land -- at the present time -- is still in a natural state. The most extensive tract of thorn-scrub forest is an area lying between Little Bay and the west end of Shoal Bay (near The Fountain), and extending about one-half mile inland. Along this coast, there are many vertical cliffs which are over 100 feet high, studded with sea caves and sink holes. Just inland from the cliffs are areas of dense vegetation. In most places, the only access is along survey cuts. Most trees grow in a thin layer of soil found primarily in depressions in the exposed limestone and are, as a result, stunted in height. However, along the coastline, there are trees that attain heights of over 30 feet. The dominant vegetation is White Cedar (*Tabebuia pallida*), Pigeonwood (*Plumeria alba*) and Manchineel (*Hippomane mancinella*), along with Frangipani (*Plumeria rubra*), Five-Finger Trees (*Randia aculeata*), and Bromiliads (*Tillandsia ssp.*), plus a variety of cacti (*Opuntia, Melocactus*). Pitch apple (*Clusia rosea*) trees dot the landscape.

This area is relatively rich in wildlife. It is home to snakes, slipperybacks, ground lizards, tree lizards, woodslaves, bats and a variety of birds. Its most impressive and elusive resident is the iguana, an animal which once occurred over most of the northern half of the island but is now almost entirely restricted to this area (there have been a few sightings at Limestone Bay and Road Bay in recent years).

(2) The windward point of the island, from Savannah Bay on the south coast and Island

Harbour on the north coast heading northwestward, is another extensive tract of natural area. There is relatively little vegetation, and what does occur is salt-spray tolerant. It is also stunted and sculpted as a result of the almost constant battering of the wind. Most of this area is characterized by very sandy soil, with the dominant vegetation being Cockspur (*Castela erecta*). Nearer to the point, the sandy soil gives way to limestone fissures and ridges, with Pope's Head Cactus and Sea Purslane (*Portulaca oleracea*) as the dominant plants. Relatively few animals occur here as most cannot tolerate the constant wind and salt spray.

(3) A natural area not as expansive as the previous two is the valley above Katouche Bay. This area extends from the bay eastwards up the canyon to Cavannagh Cave. At the mouth of the canyon, just behind the beach, is a small pond surrounded by Button Wood (*Conocarpus erectus*) and the tallest Manchineel and Loblolly Trees on the island, some reaching heights of 60 feet and more. Other types of vegetation are Pepper Cinnamon Trees (*Canella winterana*), Tamarind (*Tamarindus indica*), Mawby (*Colubrina arborescens*), and Sherry Trees (*Malpighia emarginata*). Bromiliads are very abundant. Turpentine Trees and orchids appear further up the canyon; there are even small patches of bamboo.

Of the number of caves in the canyon walls, two are well-known: Cavannagh Cave, located near the top of the canyon's south wall, approximately 350 m (1,150 ft) northwest of the Governor's Residence, and Katouche Cave, an abandoned stream cave located up-valley[20]. Katouche Canyon is probably one of the least disturbed areas in Anguilla, as can be confirmed by the height of the Manchineel Trees at the canyon mouth. There are no goats roaming the area, nor are there cats and dogs.

The canyon is host to a variety of wildlife, including Land Crabs, Fiddler Crabs, Ground Lizards and Tree Lizards. Iguanas lived here until recently when the last were hunted and captured for food. While the pond does not shelter a great number of birds, there are occasional White-cheeked Pintails (*Anas bahamensis*) and breeding pairs of Yellow-crowned Night Herons (*Nyctanassa violacea*). More abundant are song birds such as Bananaquits (*Coereba flaveola*), Yellow Warblers (*Dendroica petechia*), and Mangrove Cuckoos (*Coccyzus minor*). About half way up the canyon is an area that is relatively moist with the most dense population of the smallest gecko on the island.

Critical Habitats. Habitats are the environments in which animals and plants live. They are considered critical if they are both unique or valuable and also under threat or at some risk. Three such areas stand out in Anguilla.

(1) The specific area (Brimegin) on the north coast between Limestone Bay and The Fountain at Shoal Bay should be considered critical habitat because this is the prime area where iguanas occur. In addition, there are many unique pockets of habitat with tall trees, Bromiliads and orchids. At the present time, it is the largest track of relatively undisturbed land in Anguilla, but because it is in multiple ownership, development as a park or protected area will be difficult to implement.

(2) Another critical habitat area is that from Katouche Bay up the valley to Cavannagh Cave. It is one of the last tracts (if not the last) of tall forest in Anguilla, with a great diversity of vegetation and animal life within a relatively small area that has been relatively undisturbed since early colonial times. The Katouche Valley could be considered as an alternative habitat for the threatened iguana which did occur at one time in the Valley before hunting destroyed the population at this site. Iguanas could, in theory, be reintroduced into Katouche.

(3) Anguilla's offshore cays -- particularly Dog Island and Middle Cay -- are critical habitat because they have large rookeries of several bird species, such as the Sooty Tern (*Sterna fuscata*), Brown Booby (*Sula leucogaster*), Blue-faced/Masked Booby (*Sula dactylatra*), and Noddy Tern (*Anous stolidus*).

RECOMMENDATIONS:

4.1 To conserve biodiversity requires at least a semi-quantitative knowledge about what already exists, what is at risk, and what is needed to maintain species or habitat. Anguilla should expand its information base about the natural environment in order to be in a better position to establish priorities and examine options for natural area protection and conservation (this subject is also discussed in Chapter 5 relative to the marine environment). Some steps have already been suggested:

- implementation of professional surveys, specifically:
  - (i) breeding bird census of the main island and offshore cays;
  - (ii) systematic inventory of Anguilla's cave fauna -- perhaps the most unique aspect of the island's fauna;
  - (iii) update and expansion of Pritchard's 1990 inventory of Anguilla's wetlands;
  - (iv) entomological survey as there is a paucity of data on insects;
  - (v) survey of the iguana population and the tortoise population;
- dissemination of such information as part of the environmental education curriculum now being developed (see Chapter 2, Issue 2);
- publication of guides to Anguilla's birds and other local wildlife which could be "packaged" and marketed for local distribution and also for visitors;
- establishing (probably under the auspices of the National Trust) a "conservation data center" and then working with visiting and resident scientists and natural historians to encourage deposit of all research data, field work records, reports and species lists, including photographic records where possible, with the center.

Some research, data collection and population monitoring of selected species can be carried out by local NGOs, older school children, and other community organizations under the direction of professional personnel, such as a GOA conservation officer, a post that has not yet been established by Government (see also Recommendation 5.21 in Chapter 5). NGO-initiated and implemented biodiversity research programs are now in place in several Eastern Caribbean islands, funded by European and North American organizations concerned about international biodiversity protection.

4.2 Over time, other elements of an incrementally-developed plan for protecting natural areas can be put in place.

One high priority area already identified is the Katouche Valley which has been suggested for an iguana reintroduction/relocation program, i.e., moving this threatened species from its current primary habitat on the north coast, where it is increasingly at risk, to the relatively undisturbed Katouche Valley where it once lived. Iguanas may be very site-specific and do not move great distances, thus making the job of monitoring the re-established population somewhat easier. The author of this recommendation[21] also suggests that additional ecological studies are required prior to implementing the program. Certainly, consideration needs to be given to what steps are needed to protect the animals once they are relocated.

With the estimated number of surviving animals unknown, the survival of Anguilla's iguana could also be targeted as the centerpiece of wildlife education and ecotourism programs, an approach that has already been used successfully in St. Lucia, St. Vincent, Dominica, Nevis, and Montserrat.

The point is that gradually and incrementally Anguilla should begin to focus some attention on biodiversity protection and develop an Anguilla-specific plan and

program which emphasizes Anguilla's needs and Anguilla's priorities within the context of an important conservation issue that is now receiving regional and global attention.

4.3 Some natural areas have potential for development as environmental education and ecotourism sites, for example, the creation of an interpretive trail from the beach to Cavannagh Cave in Katouche Bay, with a small information center near the beach. Providing experiential opportunities for hikers, naturalists, school children, and the just plain curious to view firsthand some of Anguilla's unique natural features is one important way of enhancing the environmental awareness and understanding of residents and visitors alike.

4.4 Although the Anguilla National Trust is still in a formative stage (see Chapter 8), it should eventually consider establishment of a lands conservation program for natural heritage sites, for example, the offshore cays, some number of which (or all of which) could be vested in the Trust for preservation as nature reserves or bird sanctuaries. The Trust, in coordination with Government, might also establish a protected species program for all sea turtles, the iguana, the tortoise, and marine mammals.

ISSUE TWO:
Anguilla has inherited some land use and environmental problems from its agricultural past. As a sector, however, agriculture is on a decline, and more needs to be done to provide stronger linkages between agricultural production and Anguilla's leading economic sector, tourism.

Throughout Anguilla's history, subsistence farming has provided a needed source of food for its households. Until the late 1950's, most households depended on home-grown produce, in addition to catches from the sea, for survival. Fresh milk was supplied by local livestock, while yard fowl, guinea birds and turkeys were important sources of protein. The traditional method of cultivation was through "jollifications," a local form of communal or shared labor for farming tasks. A decline in food self-sufficiency dates to Hurricane Donna in 1960, marking the period when Anguillians began to import boxed and canned foods.

With the rise of employment opportunities in tourism in more recent years, along with the enticement of often substantially higher wages in that sector, the role of agriculture has declined. Nevertheless, backyard or kitchen gardening is carried on today in many Anguillian households. Crops that are grown for subsistence are mostly vegetables, including corn, peas, carrots, sweet potatoes, tomatoes, sweet peppers, lettuce, herbs, eggplants, okra, yams, pumpkins, paw-paw, cabbages, cucumbers, and celery. Most are grown during the wetter months from September to March. Some crops are sold locally, e.g., peas, tomatoes, sweet peppers, sweet potatoes, corn, eggplants, cabbage, pumpkins (see Table 4.1); additionally, pigs are raised locally and sold to the public and hotels, as are eggs[22]. There is some export of crops (to nearby St. Martin, for example), but export figures are not available.

It has been estimated that about 243 ha (600 ac) of vegetables and root crops are cultivated annually out of a total of some 1,200 ha (3,000 ac) considered cultivable[23] (see Figure 4.2). There is also a hydroponic farm on the island that produces mostly lettuce, but also some herbs, primarily as export crops. The use of drip irrigation is on the increase, with about 30,000 feet of irrigation tubing currently on the island, approximately half of which is operational.[24] However, no systematic irrigation is employed on an island-wide basis. (Chapter 6 discusses the issue of water and expanded use of the resource for activities such as irrigation.)

There is also some livestock production, although it is not well-integrated into the agricultural system.[25] For example, few farmers practice "cut and carry' to help their livestock through prolonged periods of drought. Animal manure is wasted as it is not properly cured and incorporated into soils for crop production. Livestock pens are few and those that exist are inadequate; free-grazing is the common practice. Department of Agriculture officials estimate that there are approximately 250 head of cattle, 4,500 sheep and goats, 800 pigs, and 8,000 poultry layers at the present time.

Four major soil types have been identified for Anguilla.[26]

(1) **Brown Sandy Loam.** These soils are found on higher hill slopes, where they have been severely eroded, to the extent that gravel appears on the surface. The soil type occupies an area of about 2,000 acres, predominantly on the western and eastern ends of Anguilla. Water retention capacity is poor, and fertility is fair to poor. Such soils vary in depth from 8 inches to 2 feet and overlay very porous limestone formations. Its water retention capacity can be improved by the addition of humus and other compost material, and with good management practices can support the cultivation of a variety of vegetable crops.

(2) **Grey Silty Clay Loam.** Identified at only one location (Sandy Hill, about 100 acres), the soil's water retention capacity is good, but

Table 4.1. Production of field crops in Anguilla, by quantity and value, 1989 - 1991.

CROPS	1989 QUANTITY (Tons)	1989 VALUE (EC$)	1990 QUANTITY (Tons)	1990 VALUE (EC$)	1991 QUANTITY (Tons)	1991 VALUE (EC$)
CORN (MAIZE)	7.30	14,500	16.20	48,480	1.50	4,500
SORGHUM	0.80	2,250	4.80	19,120	0.75	3,000
PIGEON PEAS	33.00	132,000	41.80	208,900	8.50	59,500
SWEET POTATOES	26.0	104,000	59.50	238,000	12.00	60,000
SWEET PEPPERS	5.90	40,950	17.30	120,890	6.00	42,000
CABBAGES	2.00	14,000	8.30	57,750	2.25	15,750
PUMPKINS	0.80	2,250	9.20	27,450	2.50	7,500
CARROTS	0.50	2,000	1.40	6,900	0.25	1,000
TOMATOES	4.80	33,250	17.8	124,740	1.50	12,750
YAMS	8.00	32,000	13.4	53,520	9.65	38,600
EGGPLANTS	--	--	3.50	14,000	1.50	7,500
ONIONS	--	--	4.00	16,000	1.25	6,250
BROAD BEANS	--	--	4.25	17,000	0.75	3,000

Source: Department of Agriculture, as reprinted in Hodge (1992).

this feature is offset by its shallowness (about 12 inches deep overlaying weathered, extremely porous limestone, not less than ten feet deep). It can support vegetable farming with proper soil management practices.

(3) Saline Silty Clay Loam. Found in low-lying areas (near to ponds and beaches), usually covered with mangrove trees, this soil is not suitable for agriculture because of its high salt content.

(4) Red Silty Loam. This soil type, comprising about 600 acres, is concentrated in The Valley and in small pockets in relatively flat, low-lying areas. The soil is deep, fertile and has good water retention capacity. It is by far the most important soil type in Anguilla.

Environmentally-sound soil and water conservation practices are generally not used in Anguilla, according to agricultural officials. Concepts of crop rotation or fallow land are not well-understood. For example, the same plot of land is cultivated again and again with a single crop, often acquiring a designation such as "corn land". Uncultivated fields of grass are considered wasteful. The removal of fruit trees is regulated by legislation and can only be done with permission of the Department of Agriculture. In practice, this does not occur and fruit trees, with their deeper root systems to help prevent soil erosion, are removed without official approval. As with all privately-held land in Anguilla, the exercise of sovereignty on privately-owned land is a deeply felt right (see also Chapter 3).

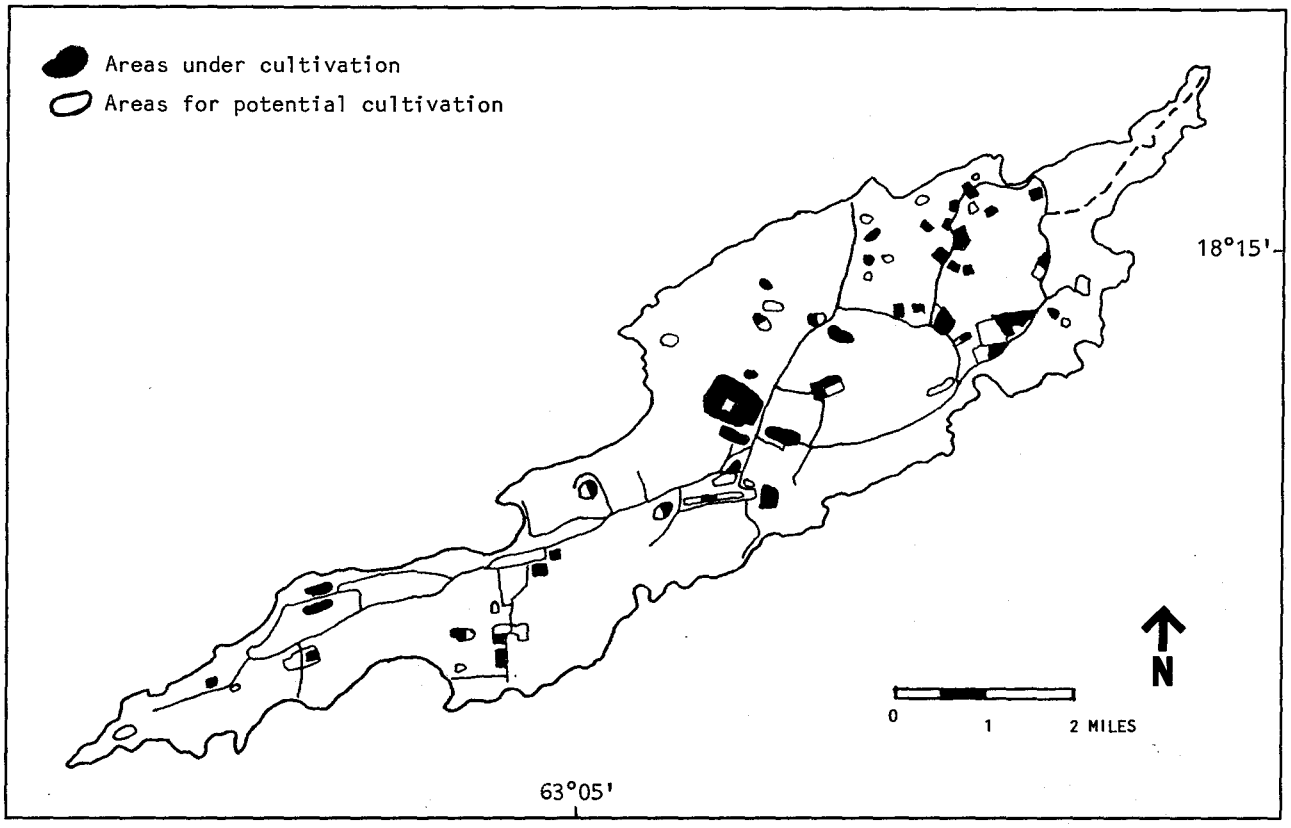


Figure 4.2. Areas under cultivation in Anguilla (source: Department of Agriculture).

Although many emerging environmental problems in Anguilla have been attributed to the surge in tourism development in the 1980's, Anguilla has also inherited environmental problems from its agricultural past;[27] many of these issues continue to be relevant today, for example:

- The indiscriminate clearing of tree and vegetative cover for agricultural production, combined with inadequate land management practices (e.g., not enough crop rotation) have contributed to soil destabilization and its exposure to the erosive forces of nature.
- Uncontrolled livestock grazing particularly during the dry season -- with untethered, unfenced animals permitted to roam and browse without restriction -- has, over time, accelerated vegetation loss and land deterioration.
- *Ad hoc* residential development of the little land in Anguilla suitable for agriculture has occurred in the relative absence of controls over where buildings and other facilities are to be sited (see also Chapter 3).

Thus far, the tourism industry has developed with relatively few linkages to Anguilla's agriculture sector. Stronger linkages between the two economic activities -- one in decline and the other expanding -- could, by providing farmers with a reliable and established local market for their products, help to strengthen food crop productivity and thereby increase local self-sufficiency in the long run. It would also help to reduce the current drain of foreign exchange dollars (most earned by the tourism industry) to pay for the import of food stuffs to stock the hotels and restaurants that cater to that same industry.

To do this, however, Anguilla must confront three problems:

(1) the need for expanded, more efficient irrigation systems to encourage production, especially outside of the wetter months;

(2) the need to eliminate a continuing contemporary bias, particularly among the young, against agriculture which is still associated by many with the days of slavery and is often looked upon as an older person's job -- younger Anguillians tend to look to tourism for future economic livelihoods; and

(3) the need for a clearly-articulated policy on agricultural development that defines its relationship to the growing tourism industry and Anguilla's overall economy.

Department of Agriulture staff numbered only 7 established posts in 1993, and there is no formal Extension Service. Advice to farmers on cultivation practices is done more or less on an *ad hoc* basis rather than through a more formal extension program. Some regional organizations like CARDATS and CARDI are providing assistance with training and materials, but more training opportunities are needed in areas such as soil and water conservation and the proper handling, use, and storage of agrochemicals.

RECOMMENDATIONS:

4.5 Agriculture is the stepchild of the Anguillian economy in the 1990's. There is no clearly-articulated, island-wide policy regarding this sector from outside of the Department of Agriculture, which would like to see GOA lend more support and encouragement to backyard gardening efforts and to promoting agriculture generally as something positive in the life of Anguillians. There are many problems associated with an expansion of agriculture in Anguilla, and a prevailing conclusion[28] seems to be that while there are significant gains to be made from further investment in household agricultural production, there is limited potential for the development of commercial agriculture, in part because of the high costs associated with such development. However, it is also true that a significant portion of the foreign exchange dollars brought into Anguilla via the tourism industry is lost because of high import costs for the food products that both residents and tourists now require from off-island sources.

It is appropriate for Government to review, at a policy-making level, its overall agricultural policy, goals, and directions, keeping in mind known limits on available supplies of groundwater (see Chapter 6).

4.6 The land tenure situation in Anguilla is unique in the Eastern Caribbean. In other OECS countries, environmentally-damaging cultivation practices are largely the result of insecure land tenure. Small farmers and livestock producers see little personal gain in investing in planting methods or soil erosion control devices when they do not own the land they cultivate, do not have clear title to it, or hold only short-term rental leases. Conversely, in Anguilla, there is a high percentage of individual landownership but this has, in turn, created a different kind of conservation problem -- the independent landowner does not want Government to dictate how private land holdings are to be cultivated. The outcome is the same, however, for the methods and practices used for crop production and livestock raising have been responsible for widespread ecological destruction to the land throughout the Caribbean.

Anguilla needs to encourage more careful husbandry of the land, through

- training workshops for farmers, part-time backyard gardeners, and those who use pesticides and fertilizers;
- integration in the school curriculum of materials that teach respect for the land and for those who make their livelihood from the land;
- programs that encourage tree planting and other agroforestry efforts which have elsewhere demonstrated their effectiveness in reducing evaporation from the soil and controlling erosion.

KEY THEMES OF CHAPTER 4

- Anguilla's original forest has been devastated through a combination of felling for timber, cutting for firewood and charcoal, clearing for cultivation and grazing for livestock. The surviving woodlands are described as "degraded evergreen" (popularly called thorn scrub), with a high percentage of "native" species.

- Anguilla's small size, lack of diverse topography, and distance from larger land masses have produced a relatively low level of biodiversity (the variety and variability in plants and animals and the habitats in which they live). Anguilla exhibits some endemism, but not to a very marked degree, meaning that it has very few animal and plant species which are exclusive or native *only* to Anguilla.

- The most diverse faunal species on the island are its birds, which are abundant on the main island and surrounding cays. No field guide or similar natural history publication exists for the birds of Anguilla.

- All of Anguilla's reptiles except one are relatively abundant. Only the Iguana is threatened with extinction. Its decline has been attributed to habitat loss and competition for food.

- Anguilla has few expansive "natural areas" that have not been significantly altered through cultivation or human habitation. Three areas stand out: the island's north coast from Little Bay northeastward to Windward Point; the windward point of the island from Savannah Bay on the southern coast and Island Harbour on the northern coast; and the valley above Katouche Bay.

- Three areas are considered critical habitat in that they are both unique or valuable and also are under threat or at some risk. They are (1) the specific area (Brimegin) on the north coast between Limestone Bay and The Fountain at Shoal Bay (the prime area where iguanas occur); (2) Katouche Bay up the valley to Cavannagh Cave, one of the last tracts of tall canopied trees in Anguilla, with a great diversity of flora and fauna; and (3) the offshore cays (especially Dog Island and Middle Cay) because of bird rookeries.

- Anguilla needs to take the first steps toward developing a plan for protecting natural areas and critical habitat. Key to this effort will be the establishment of a "conservation data center" under the auspices of the National Trust so that quantitative information about what already exists, what is at risk and what is needed to maintain species or habitat can be centralized and made accessible to planners, naturalists, researchers, and students. An Anguillian biodiversity program must involve both NGOs and the educational system.

- The agriculture sector in Anguilla is on the decline, primarily because of the employment opportunities now available in tourism. Other contributing factors include the need for a low-cost, reliable water source to increase agricultural productivity; a prevalent bias against agriculture as an occupation (particularly among the young); and the lack of clear policy linkages between agriculture and tourism, the leading economic sector. Only about 3,000 acres of land are considered cultivable, of which approximately 600 are now cultivated annually with vegetables and root crops.

- Anguillians enjoy a high percentage of landownership. As with all privately-held land in Anguilla, the exercise of sovereignty is a deeply felt right, and it is therefore difficult to regulate environmentally-harmful practices such as tree cutting or, conversely, to successfully encourage environmentally-sound practices such as agroforestry.

- The prevailing conclusion about agriculture in Anguilla seems to be that while there are significant gains to be made from further investment in household agricultural production, there is limited potential for the development of commercial enterprises.

REFERENCE NOTES - CHAPTER 4
PLANTS, ANIMALS and THE LAND: AN ISLAND HABITAT

1 The information in this introductory section (prior to Issue One) is taken largely from:

(a) Harris, D., 1965. Plants, animals, and man in the outer Leeward Islands, West Indies. Publications in geography, vol. 18. University of California Press. Berkeley, CA.

(b) Government Information Service, 1979 (October). Anguilla: The land, climate and flora. The Valley, Anguilla.

(c) Oldfield, S., 1987. Fragments of paradise. A guide for conservation action in the U.K. dependent territories. Prepared for British Association of Nature Conservationists. Pisces Publications. Oxford, UK.

(d) Howard, R. and E. Kellogg, 1987. Contributions to a flora of Anguilla and adjacent islets. *Jour. Arnold Arboretum*, 68:105-131.

2 See note 1(a) above.

3 See note 1(d) above.

4 See note 1(a) above.

5 See note 1(d) above.

6 See note 1(b) above.

7 See note 1(b) above.

8 See note 1(d) above.

9 Jones, L.K., 1989. Distribution and systematics of bats in the Lesser Antilles, pp. 645-660. In: C.A. Woods (ed.), Biogeography of the West Indies, past, present, and future. Sandhill Crane Press. Gainesville, Florida.

10 Halewyn R. van and Norton, R., 1984. The status and conservation of seabirds in the Caribbean. In: J. Croxall, P. Evans, and R. Schreiber (eds.), Status and conservation of the world's seabirds. ICBP tech. pub. no. 2. Cambridge, UK.

11 Pritchard, D., 1990. The Ramsar Convention in the Caribbean (with special emphasis on Anguilla). Published by the Royal Society for the Protection of Birds. Bedfordshire, UK.

12 (a) Wilson, E. (ed.), 1988. Biodiversity. National Academy Press. Washington, DC.

(b) U.S. Office of Technology Assessment, 1987. Technologies to maintain biological diversity. Washington, DC.

13 See note 11 and note 1(c) above.

14 See note 11 above.

15 For more information on the *Ameiva* of Anguilla, see: Censky, E. and D.R. Paulson, 1992. Revision of the *Ameiva* (Reptilia: Teiidae) of the Anguilla Bank, West Indies. *Ann. Carnegie Mus.*, 61(3):177-195.

16 Censky, E., 1988. *Geochelone carbonaria* (Reptilia: Testudines) in the West Indies. *Forida Sci.*, 51(2):108-114.

17 Personal communication, Cleophus Gumbs, landowner in the Brimigen-Shoal Bay area of Anguilla.

18 Censky, E., 1989. *Eleutherodactylus johnstonei* (Salientia: Leptodactylidae) from Anguilla, West Indies. *Carib. Jour. Sci.*, 25:229-230.

19 Adapted from: "News-Notes" (#19, March 1992), published by the U.S. Environmental Protection Agency.

20 McFarlane, D. and R. MacPhee, 1989. Amblyrhiza and the quaternary bone caves of Anguilla, British West Indies. *Cave Science*, 16(1):31-34.

21 Censky, E., 1993. Draft report on biodiversity prepared for the Anguilla Environmental Profile Project.

22 Hodge, M., 1992. Agriculture in Anguilla. St. Kitts and Nevis Teacher's College of Further Education, Division of Teacher Education.

23 Matadial, W., 1986. Soils and agricultural potential of Anguilla. CARDATS, St. Vincent.

See also note 22.

24 Personal communication, Leslie Richardson and Willie Vanterpool, Department of Agriculture.

25 See note 23.

26 See notes 22 and 23.

27 Mokoro Limited, 1993. Anguilla strategic review. Interim report (February). Prepared for the Government of Anguilla.

28 See note 27.

5. ANGUILLA AND THE SEA

HYMN TO THE SEA

Like all who live on small islands
I must always be remembering the sea,
Being always cognizant of her presence; viewing
Her through apertures in the foliage; hearing,
When the wind is from the south, her music, and smelling
The warm rankness of her; tasting
And feeling her kisses on bright sunbathed days;
I must always be remembering the sea.

Symbol of fruitfulness, symbol of barrenness,
Mother and destroyer, the calm and the storm!
Life and desire and dreams and death
Are born of the sea; this swarming land
Her creation, her signature set upon the salt ooze
To blossom into life; and the red hibiscus
And the red roofs burn more brightly against her blue.
I must always be remembering the sea.

Frank Collymore

[The first and last verses of a poem printed in CARIBBEAN VERSE, an anthology edited and introduced by O.R. Dathorne. It was published by Heinemann Educational Books Ltd., London, 1967.]

Throughout time, Anguillians have sustained a vital, almost spiritual, connection with the sea surrounding their island home. Fishing, boat building, and boat racing have all contributed to a proud maritime heritage that is linked in many ways to the heart and soul of Anguillian culture.

Marine-based industries have played an important role in the development of the island. Many villages are located in coastal areas. Mangroves (including those associated with ponds) and coralline structures contribute to the protection of the shoreline and adjacent natural and manmade features. Fisheries provide the major source of animal protein for Anguillians.

These traditions, development patterns, and economic contributions -- all derived from Anguilla's relationship with the sea -- have stimulated a national commitment for improved understanding and management of coastal resources. Historically, in Anguilla, the importance of marine and coastal resources has been widely appreciated.

More recently, with the emergence of tourism as a key economic factor in Anguilla, and with the industry's heavy reliance on the coastal environment (especially beaches), conflicts and competition among resource user groups have emerged. The tourism sector is dependent upon the natural features and built infrastructure located within the coastal zone, but its priorities and concerns are not necessarily those of more traditional resource users. (Figure 5.1 displays many of the ways in which Anguilla uses its marine environment.)

Thus, there is a new incentive for developing a broader, more holistic management approach for this critical resource sector. Several issues stand out as both constraints and opportunities for the future utilization and management of coastal and marine resources.

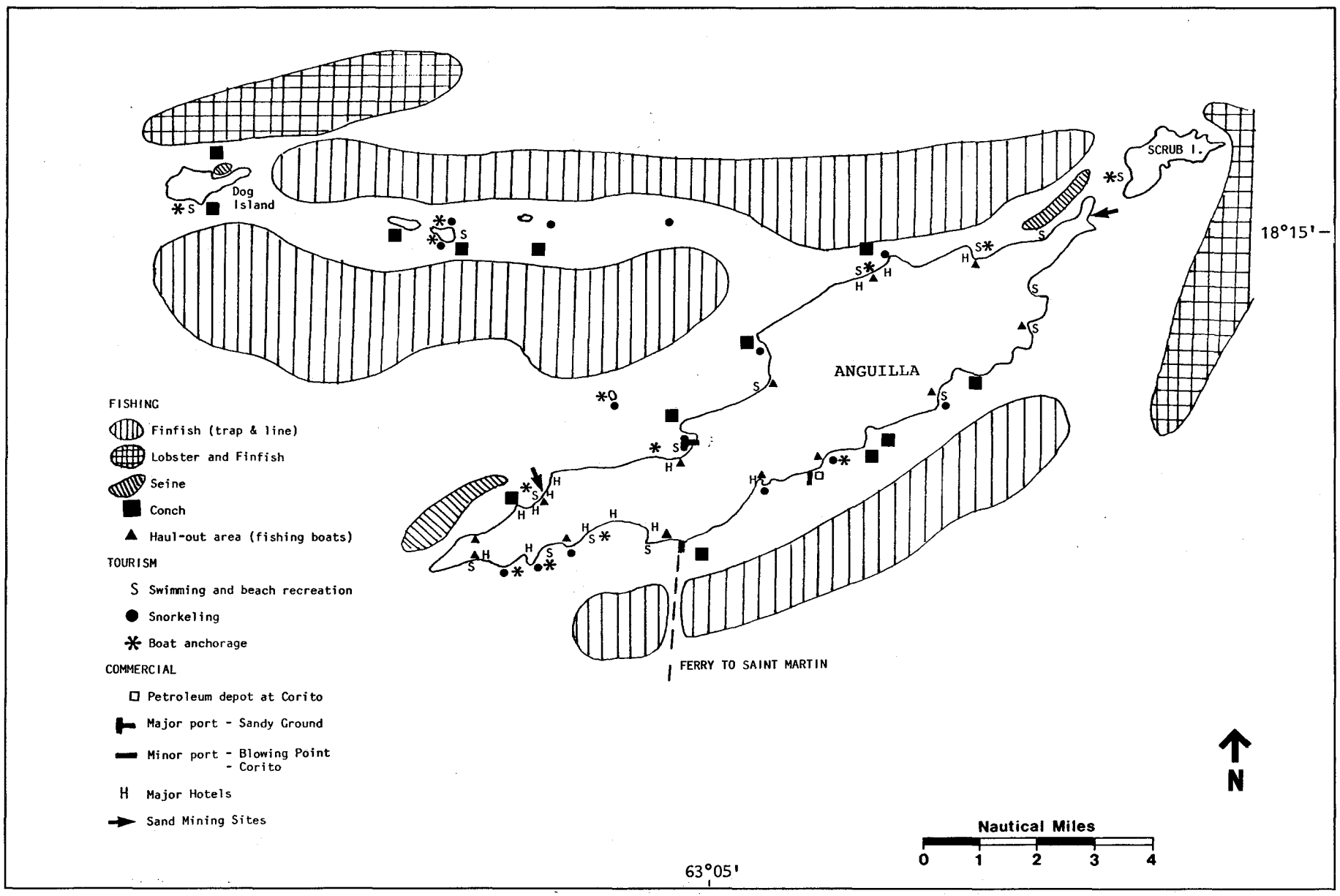


Figure 5.1. Distribution of coastal and marine resources, uses and facilities in Anguilla (adapted from Jackson, 1981).

ISSUE ONE:
Selected fishery resources are being depleted in Anguilla, and a targeted fisheries data collection program is needed to help reverse this trend. The long-term goal is to develop fisheries management programs that provide for sustainable development and ensure the availability of fishery resources for future generations of Anguillians.

Lobster, sea turtle and inshore demersal (bottom dwelling) fin fish, including reef fish, are all reported to be "depleted" to varying degrees in Anguilla. Large adult specimens of many reef fish are increasingly difficult to find whether one's objective is filet or photography. Diminished populations of algae-eating reef fish is especially noticeable when algal growth on reef surfaces increases in the absence of "consumers" who keep it in check. While this may be true, in Anguilla the algae on coral is also due to a 1982-84 decline of algae-eating sea urchins which are on the increase again.

Why have the fish gone away? Some observers say it's because of overfishing caused by too many fishermen who have gotten too efficient with too many traps, some of which is carried out by foreign fishermen from nearby islands or visiting charter yachts. The solution in this case appears easy -- fish less or stop fishing for a while. But fishermen and others say, it's the pollution -- from too many charter boats, too many divers, too much cruise ship garbage from nearby islands, sewage disposal by hotels, and even too much oily sun tan lotion washed off thousands of ever-present tourists.

Scientific verification of the reported declines in Anguilla's traditionally harvested, edible marine species will be possible once an orderly fisheries data collection system is put in place to retrieve and analyze catch and effort levels so "catch per unit of effort" calculations can be attained. Such data will be most useful if supplemented with biological data on target fish species, e.g., overall length, weight, sex, and presence/absence of eggs. Of critical importance, however, is the need for baseline data against which future trends can be adequately assessed.

The only assessment completed of Anguilla's fishery resources was derived from estimates in the early 1980's of available fish stock in given habitat types, based on (at that time) a poor understanding of the extent of various marine seabed communities. Although the authors of this assessment urged caution in the use of their "tentative" estimates, they argued that a significant increase in catch effort for fin fish was warranted at that time[1]. It appears now that this estimate may have been overly optimistic.

Regrettably, the most appropriate types of gear technology that affect catch levels were not specified in this decade-old assessment. As a result, fin fish traps of only 1.5 inch mesh size have proliferated in use over the years, and an important resource management objective -- i.e., that juvenile fish should not be harvested -- has not been achieved.

Other factors have combined to place the Anguillian fishery resource base in jeopardy.

- The use of pots, lines, and gill nets -- and, to a degree, spear fishing -- further depletes stocks through the taking of juveniles before they have reached the age for reproduction.

- Existing technology renders some species more vulnerable. Moreover, the overall level of fishing effort is poorly known, particularly since fishermen from nearby countries are observed to fish regularly in Anguilla's waters, entering but leaving without providing a written record for local officials.

- Although a recent study[2] suggests that seabed communities have remained relatively healthy, anecdotal reports from longtime fishermen about the physical de-

struction of critical habitat (especially seagrass beds and corals) suggest that such degradation may further limit stock recruitment rates and overall sustainable yields. The latter effects appear to result primarily from anchor and trap damage, and possibly from a growing number of coral specimen collectors arriving by yacht.

Whether or not these impacts are as yet severe, they will in all likelihood become more significant over time.

In addition, the naturally limited biological productivity of Anguilla's isolated, essentially open-ocean marine shelf system (Figure 5.2) can be viewed as a constraining factor. Its portion of the commonly shared (with St. Barthelemy and St. Martin/St. Maarten) submarine shelf covers approximately 199,700 ha[3].

Although this may seem like an adequately large area to support an expanded commercial fishery, coral reef areas on Anguilla's shelf are limited. For example, it is estimated that coral covered outcrops and scattered reefs comprise only 22 percent of total shelf area but account for 80 percent of productivity potential.[4] (See Figure 5.3 for a display of important marine habitats in Anguilla, including coral reefs.)

It would be a mistake to underestimate the importance of this singular one-fifth of the inshore shelf area of Anguilla. These and other special habitats for fin fish and shell fish are critical for several commercially-important species. During their juvenile development stages, when they are most vulnerable, these species sometimes migrate among coral colonies, seagrass pastures and other more sheltered coastal bays and inlets, such as Forest Bay and Little Harbour with their associated seagrass beds and mangroves.

It is these highly productive zones on Anguilla's inshore shelf that constitute the biggest management challenge, for these areas are accessible and attractive and will be heavily impacted by rising levels of land-based sources of marine pollution.

Compounding the task of marine resource managers has been the recent growth (and projected growth potential) of Anguilla's tourism industry, with its own expanding demands on coastal and marine resources. A significant number of tourists visiting Anguilla derive their fascination and pleasure from the island's coastal/marine features and abundant marine life -- in the form of diving, snorkeling, yachting, and beach-related recreational uses.

For example, one source of increased pressure on the marine environment has been the emergence of a day-charter yachting component to Anguilla's tourism market. Visiting yachtsmen, especially day cruisers from St. Martin/St. Maarten, enter the Territory's waters daily to utilize several offshore cays. Although foreign yachts are required to clear customs at Road Bay before proceeding to the cays, in practice the requirement is not enforced. Some of them may purchase long-term permits, but a majority of yachts only clear customs (and pay the nominal cruise permit fee) upon leaving the Territory. Under these circumstances, it is difficult to inform visitors about Anguilla's marine regulations and anchorage zones which they are expected to use.

Nevertheless, in contrast to the more widespread impacts customarily associated with overfishing an entire submerged shelf like the Anguilla Bank, marine resource use over the same area but for recreational purposes -- snorkeling, surfing, boating, swimming, diving, sailing, sports fishing -- carries less risk of major environmental damage. This is principally because the user tends to focus on mostly passive, non-extractive uses (and user experiences). In doing so, the user tends to develop a perceived interest in the quality and resilience of the resource and its environment. (There are, of course, noteworthy exceptions to this more general rule, and cumulative impacts to corals can be significant without proper education and management of the recreational user group.)

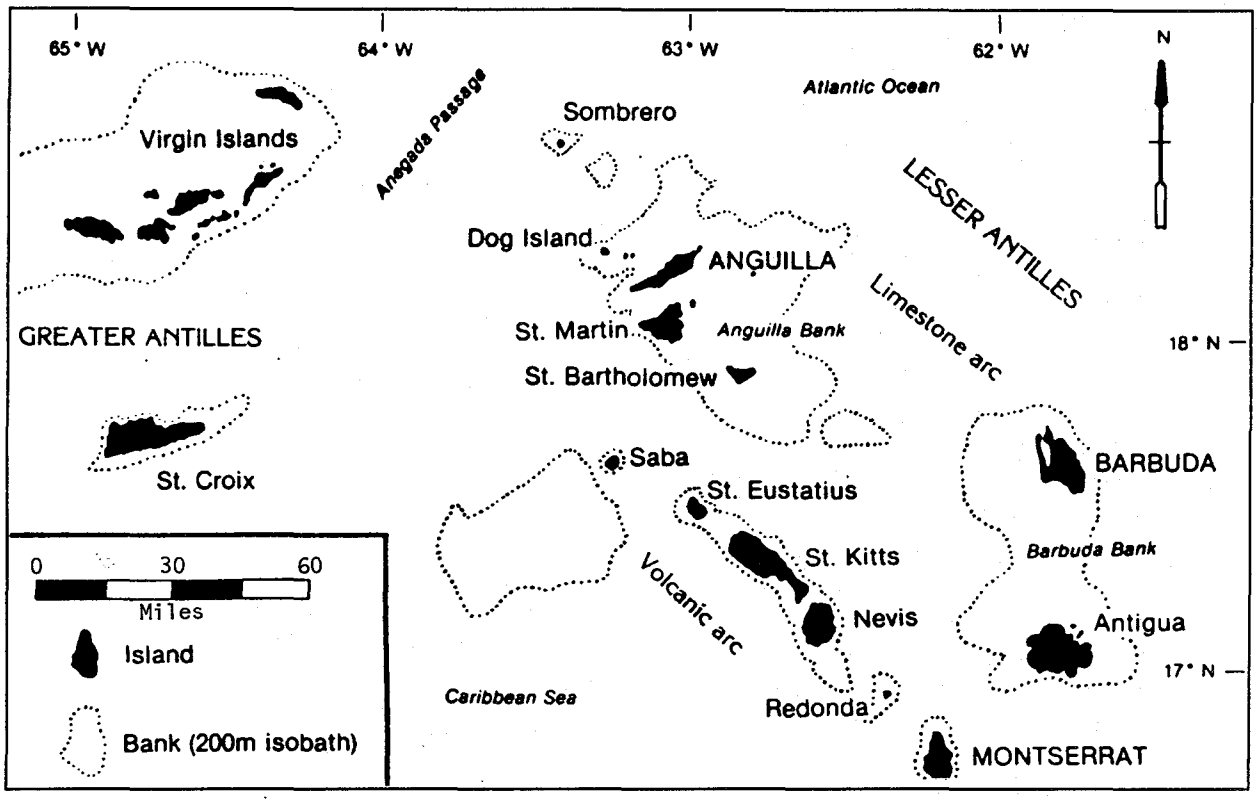


Figure 5.2 Islands and banks of the northern Lesser Antilles, including the Anguilla Bank (source: Watters, 1991).

Secondly, the user, in contrast to the fisherman, is quite prepared to pay a fee for the use privilege, a fee which the government, as manager of the resource, can elect to collect, tax, share, or exchange for services with a private sector "partner" or "agent" who may also be required to obtain licenses that produce additional income linked to the resource.

Therefore, revenue generation by a resource *normally* guarantees its survival if such funds are then made available for appropriate short and longer term monitoring and management. The funds rise in proportion to use levels which is of course convenient. Secondly, they can be apportioned by policy between public and private costs appropriate to the sharing of responsibility for management of the resource.

In the case of recreational "exploitation" of a marine resource, the principal risk is from the over-use, very much like overfishing which involves an extractive excess. Popular dive sites, for example, frequently suffer significant resource damage from careless divers and the anchors of visiting boats, legitimately raising the issue of how to deploy a fee and regulation system to encourage visitors, protect the environment and raise revenue -- all at once!

The growth of tourism guarantees that coastal resource development will expand in Anguilla. At the same time, exploitation of the marine environment by indigenous fishermen is seen as something akin to a "birthright" and a part of the island's strong maritime heritage. The importance of these resources, therefore, to economic development and to traditional island lifestyles should -- particularly in light of apparent declines -- stimulate greater concern for their maintenance and a commitment to act on long-term management objectives designed for sustainability.

RECOMMENDATIONS:

5.1 Caution should be exercised in further development of the demersal fin fish fishery, especially the "shallow reef and seagrass" fishery. This is particularly important if the present minimum trap mesh size is not altered to preclude capture of juvenile fish (see Recommendation 5.5). The following factors should be included in the decision-making process used by GOA resource managers:

(i) Past estimates of sustainable yield are tentative at best, and updated estimates would need to be made with great care.

(ii) The management of a tropical submerged shelf fishery like Anguilla's -- with its associated coral reef systems, seagrass "pastures" and other coastal habitats -- is a complex task and certainly not an exact science. Nevertheless, the importance of (1) reducing pollution, (2) controlling excessive harvesting, and (3) protecting those nursery areas fundamental to the survival of marine resources is apparent.

Because of this, there is a broad consensus among fisheries managers that it is always better to err on the conservative side when estimating population stocks and sustainable yields or projecting harvests, *especially* when targeting new species with new technologies. This practice reduces the more subtle but costly risk of overly optimistic investments by the public and private sectors in new gear and equipment and even training (i.e., over-capitalization) only to find that serious overfishing can induce a complete collapse of the fishery, one that can take decades for recovery.

5.2 Additional fisheries personnel are needed in order to fully implement many of the recommendations contained in this chapter of the *Profile*.

5.3 It is time to establish a *targeted* fisheries data collection system. It is recognized that a data collection program must attempt to answer key questions about the fishery but must do so within an institutional framework of finite personnel and dollar resources. Ideally, more quantitative data on fishing (by fishery zone) should be supplemented with basic data on fish length, weight, and sex as a baseline for assessing the sustainability of the fishery.

5.4 Improving management control of the fishery will ultimately depend on a system that gives local officials timely access to catch records and/or reliable estimates of total fishing effort. A more effective licensing system could assist in this regard, and could provide an avenue for more routine dialogue between GOA officials and members of the commercial fishing community.

To make a licensing and fee system more acceptable to local fishermen, a portion of the fees collected (if not all) could be earmarked for construction, deployment, and maintenance of Fish Aggregation Devices (FADs). FADs would benefit all fishermen and are one way to encourage alternative fishing technologies and thus relieve pressure on inshore demersal stocks.

5.5 Fisheries officials should reassess the allowable minimum mesh size for finfish traps. Consideration should be given to raising the minimum from 1.5 inches to 2.5 - 3.0 inches.

5.6 Officials should also reassess the allowable minimum carapace (or back shell) length for spiny lobster. Consideration should be given to raising the minimum from 3.5 inches to 4.0 - 4.5 inches, bearing in mind that evidence suggests Anguilla's spiny lobsters reach maturity (i.e., ready to reproduce) after roughly three years when the carapace is an average 3.74 inches long.[5]

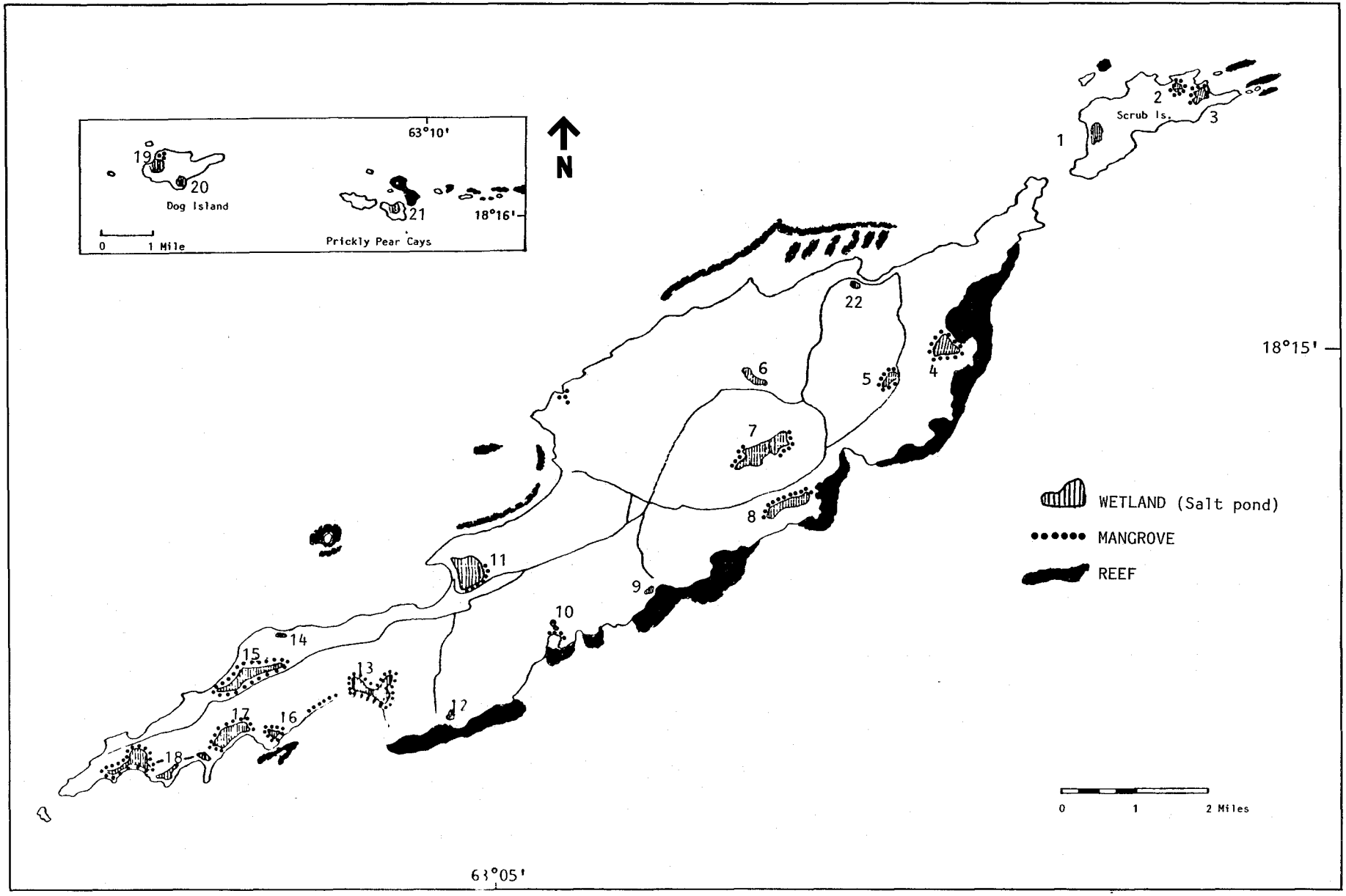


Figure 5.3. Important marine habitats of Anguilla (adapted from ECNAMP, 1980; Wells, 1988; and Pritchard, 1990). The names of salt ponds (shown by numbers above) are identified in Table 5.1.

(A useful description of some of Anguilla's more important marine resources -- conch, lobster, and coral reefs -- can be found in a recent public information booklet prepared for the Government of Anguilla by Sandra and Melvin Goodwin (1992) entitled *Anguilla's Marine Resources: Threatened Treasures*.)

5.7 In Anguilla, marine habitat protection is vital not only to the fishing community but to the tourism industry as well. Both sets of resource users have an interest in achieving successful management of the marine environment, and it is important that national policy reflect a balance of these interests.

At the present time, the Government of Anguilla is in the process of preparing a marine resource assessment and development plan. Primary focus should be on the growth potentials represented by the nation's marine resources, with identification of activities -- including traditional uses -- that will contribute to the sustainable development of these resources.

5.8 All marine turtles are considered endangered by the World Conservation Union (IUCN), and international efforts are underway to protect these species. Therefore, the Government of Anguilla should give consideration to the establishment of a moratorium on all species of sea turtles, for an initial period of perhaps five years or until data on nesting frequency on Anguillian beaches can be collected and a monitoring program put in place. The participation of community volunteers may be an appropriate way to monitor turtle nesting at a low cost to Government. Additionally, education efforts to increase public awareness about wildlife conservation issues is important and should be pursued as funds and resources become available.

MARINE TURTLES OF ANGUILLA [6]

The green turtle and hawksbill turtle are the most common marine turtle species in Anguillian waters. The hawksbill is the principal species *nesting* on Anguilla and its associated cays, with the beaches on Dog Island reportedly the most frequently used nesting sites (some nesting occurs on Prickly Pear Cays and on the main island, as well). Green turtles, particularly juveniles, can be seen feeding on turtle grass in bays around the main island, where Mead's Bay and Little Bay are considered by local divers to be the best places to observe green turtles and hawksbills. There is good foraging habitat for hawksbills on the extensive reef that lies north of the island, and for both hawksbills and green turtles around the offshore cays.

A decade ago, marine turtles were reportedly more abundant around Anguilla than most Leeward Islands. However, populations continue to be depleted and exploitation pressures are rapidly escalating as tourism increases (the meat of green turtles and hawksbills is sold locally to hotels, and fishermen also carry meat to St. Martin where there is a steady demand from restaurants). The relative abundance of marine turtles in Anguilla can partly be attributed to the island's extensive nesting and foraging habitats, many of which are located on and around offshore cays.

The use of artificial lighting (primarily by hotels) in the proximity of known turtle nesting beaches should be "turtle sensitive" (for example, use of low-pressure, long-wavelength, sodium-vapor lamps that are shielded to direct illumination away from turtle nesting areas). Government should work with hoteliers in implementing appropriate guidelines.

ISSUE TWO:
Planning for a marine parks and protected areas program needs to be placed within an orderly and well-balanced resource management framework.

A SYSTEM OF MARINE PARKS FOR ANGUILLA[7]

Anguilla is a 35 square mile island surrounded by 1,800 square miles of coral reefs, seagrass meadows, and related marine habitats. Historically, salt production and fishing have been important sources of income. But early in the 1980's, the Government began an intensive campaign to develop a tourist industry. Since then, the number of visitors to the island has steadily increased, lured to Anguilla by its white sandy beaches, local seafood and underwater scenic appeal -- attractions related to the island's surrounding coral reefs and coastal habitats.

Today, there is growing concern about the impact of accelerated development on marine resources. In response to these concerns, the Government of Anguilla is working on a strategy for long-term development and management of marine and coastal resources. A key element of this strategy is a system of marine parks and protected areas.

The proposed marine parks system will directly benefit individuals whose livelihood depends on the fishing and tourism industries by improving the use and protection of critical marine resources essential to these industries. Equally important, establishment of marine protected areas will benefit present and future generations of Anguillians by protecting a major component of the island's natural heritage.

Selected high value marine resources, such as coral reefs and seagrass beds, are increasingly under pressure. Within Anguilla, as in the region, there is an emerging consensus regarding the adoption of a marine parks and protected areas system to aid in the control and management of the fishery and associated marine habitats[8].

In fact, marine parks legislation was enacted in 1982 but awaits full implementation of regulations that were approved in June 1993. The "marine resource management system" will comprise (see Figure 5.4):

- 5 marine parks/reserve areas (Dog Island, Seal Island, Sandy Island, Shoal Bay, Little Bay);
- 2 tourism management areas (Prickly Pear Cays and Scrub Island) within a 275 km^2 multiple use zone; and
- 2 fish nursery zones (Corito Bay and Little Harbour).

If established, with an appropriate level of administrative and financial support, the marine resource management system will be an important step toward improved management of an increasingly stressed marine resource base. Additionally, the legislation would logically support recently enacted anchorage management regulations to protect sensitive seabed habitats (Cruising Permit Ordinance, amended 1990). The Caribbean Conservation Association, through its CIDA-funded marine parks program, is currently working with GOA in implementing a related training program in species and habitat monitoring and mooring installation.

Care must be taken in managing marine resources so as not to diminish the significance of a marine parks system, while recognizing the potential for user conflicts. In Anguilla, the long-term sustainability of the island's fishery resource base is a national goal equal in importance to the establishment of a marine park system -- and establishment of a marine park system may be the *only* way to have sustainability.

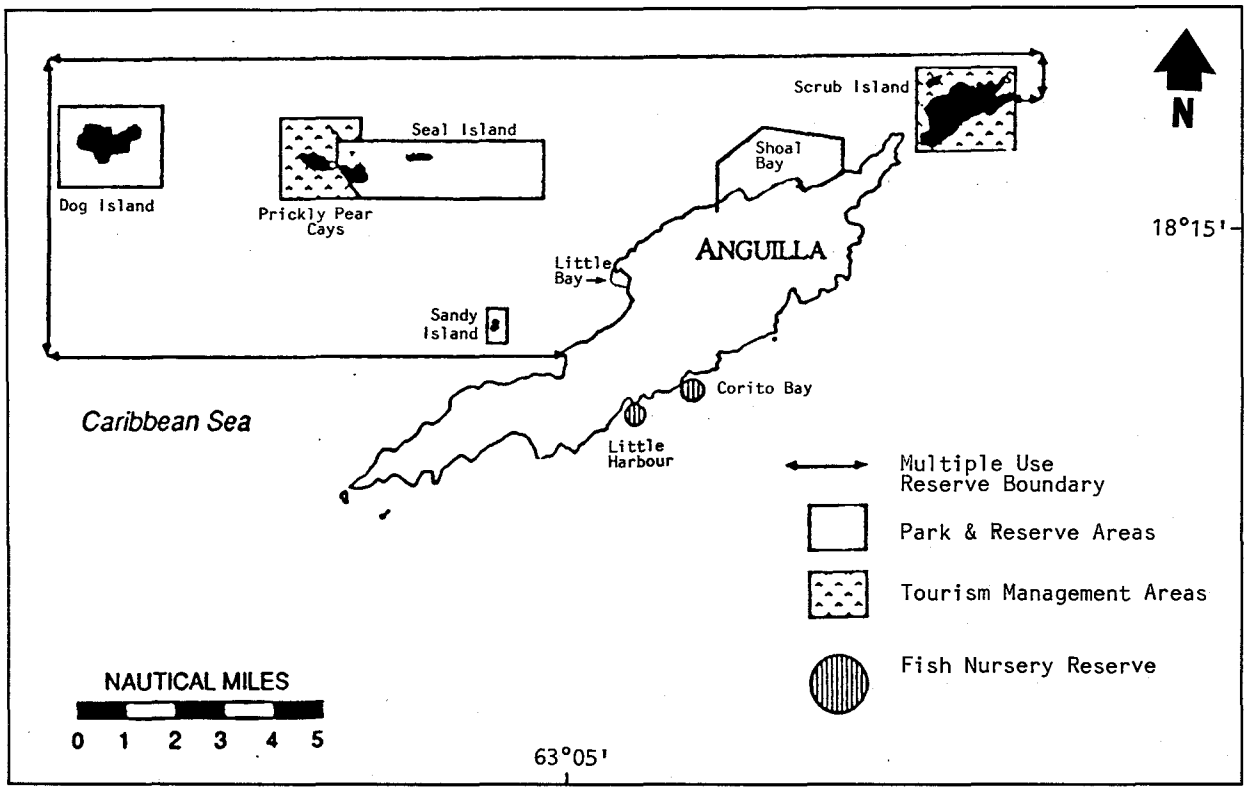


Figure 5.4 Proposed marine resource management system, Anguilla.

An important, recent finding of researchers looking into the dynamics of Anguilla's coastal system[9] is that reef fish stocks and other reef organisms inhabiting the Anguilla shelf area, which is both isolated and exposed to open ocean currents, may well be "island-discrete", meaning that replacement of stocks must rely largely on the success of spawning and recruitment from within the shelf area. A tropical reef and shelf fishery like Anguilla's is very vulnerable and fragile -- and not overly resilient. The fishery depends on an ecosystem that must be conservatively managed and aggressively protected. The emerging marine parks and reserves system can enhance this objective.

For example, special "administrative zones" could be incorporated into the park system. This is a common management tool used to target prohibited and allowable park activities. "Administrative zone" might include:

(1) recreational dive zones, or

(2) restricted fishing gear zones,

both of which offer potential for better management control of multiple resource activities. These designations would be similar to anchorage management zones established in Anguilla to minimize anchor damage.

More importantly, the establishment (within the marine park framework) of a system of carefully selected "no fishing" zones, also known as marine fishery reserves, may in fact represent the best potential for long-term, sustainable management of fishery resources, especially given the limited staff and financial resources available to the GOA's fisheries management agency, the Department of Fisheries and Marine Resources (DFMR).

A system of marine fishery reserves would benefit Anguilla's reef fishery by offering some protection to spawning stocks and the recruitment process, while permiting the reef fishery adjacent to designated zones to continue under traditional management practices. The strategy has the potential for simplifying management control and data collection and reducing at least some of the unknown elements presently inherent in managing a complex tropical marine shelf fishery.

As an example, one group of researchers in the western Caribbean[10] recently recommended a mixed management strategy -- 20 percent of a total habitat set aside as a reserve while the remaining 80 percent to be managed by traditional methods to optimize yields. Given that inshore coastal areas are especially critical for the juvenile development of most marine organisms, it might be prudent for marine park planners in Anguilla to consider ***inclusion of the entire circumference shelf of the main island*** (to a specified radius, e.g., 500 - 1,000 m from land), with restrictions on certain activities to ensure that spawning and rearing habitat for key commercial species is not damaged.

RECOMMENDATIONS:

5.9 The Government of Anguilla should move ahead without further delay in providing the regulations and identifying the administrative and financial resources needed to support the marine parks system. In drafting park regulations, consideration should be given to establishing "administrative zones" (or equivalent management classes), with guidelines for each zone or class and a clarification of non-compatible uses which will not be permitted in designated areas within the system. Regulations need to ensure that increased numbers of visitors, attracted by the presence of the park, will not increase environmental degradation.

Eventually, consideration should also be given to expanding management to include all shelf area within a defined distance from the shoreline, applying the agricultural principle of good husbandry practices to marine resources.

5.10 By consultation, marine resource users -- like fishermen, divers and water sport instructors -- can be brought into the process of mobilizing local support for the marine park system and for the designation of marine fishery reserves. Such efforts (often referred to as "user management") will be most successful when there is a shared consensus or mutual understanding of the limits of resource exploitation and the value of resource conservation. Non-formal approaches should be emphasized, along with early involvement of user groups affected by any proposed changes.

If fishery reserves are not established, an evaluation of the feasibility of a "closed season" for certain species and/or certain areas would be appropriate.

ISSUE THREE:
The establishment of appropriate guidelines for coastal developments -- especially major tourism developments -- will minimize damage to coastal and nearshore environments as a result of storm surges. The regulation and monitoring of sand harvesting also minimize the risk of increased shoreline erosion.

[Note: Chapter 3 describes the Territory's development control process, but a few specific examples concerning coastal development are discussed here as they have the potential to affect the coastal and nearshore marine environment.]

Siting facilities along the coast increases the cumulative impact of coastal storms in three ways: (1) increased risk to public health, safety, and welfare; (2) costs to the public treasury for disaster relief and protection; and (3) losses of irreplaceable natural resources[11]. Compounding the potential for catastrophic losses due to coastal storms is the possibility of significant sea level rise (SLR) in the decades ahead.

While average SLR over the last century has been less than 10-15 cm (4-6 in), an increase in that much or more (10-20 cm) is projected by the year 2025, and of between 50-200 cm (1.5-6.5 ft) by the year 2100. Using an average of 1 m of shoreline erosion per cm of SLR for low-lying areas fronted by beaches, the resulting average by the year 2025 would be a probable loss of 10-20 meters (33-66 ft).[12] This formula does not apply to Anguilla's rocky shorelines.

GLOBAL CLIMATE CHANGE and SEA LEVEL RISE

There is growing international concern that warming of the atmosphere will have consequent climatic changes in temperature and precipitation distribution that could accelerate a worldwide rise in sea level. The environmental, economic, and social disruptions produced by such changes would pose particularly severe challenges for low-lying islands like Anguilla.

Critical ecosystems such as coral reefs could be seriously damaged if the sea level rises so fast that they cannot compensate. Global warming would increase sea-surface water temperatures and may cause changes in the strength, frequency and paths of hurricanes, and/or an extension of the hurricane season. Beaches vital to the tourism industry in Anguilla would also be at risk.

At this time, many if not most experts believe that some global warming will occur, but there is a great deal of uncertainty about the rate and magnitude of warming and its effects on sea level. Timely planning can reduce losses.

There are generally three strategies that may be adopted to mitigate coastal storm hazards and SLR impacts:

(i) the natural coastline can be "hardened" by using protective structures such as bulkheads, revetments, and gabions;

(ii) facilities and structures built in high hazard areas can also be "hardened" through the use of stricter building standards to achieve increased wind and/or flooding resistance; and

(iii) coastal development can be redirected away from high hazard areas through the use of shoreline setback standards and/or re-zoning of high hazard areas to achieve simultaneous risk reduction and other objectives such as open-space preservation or wildlife management.

The last alternative, the so-called "development management" strategy, is generally the most cost-effective option. As with the use of stricter building codes, increased costs associated with the alteration of land use patterns to reduce the exposure of people and

property to storm damage are generally offset by long-term savings from reduced property damage and reduced insurance rates. Failure to take action (e.g., enforcement of coastal setback requirements) will continue to increase the risk of coastal flooding and destruction of structures in the coastal zone during period of high tide and heavy sea swells.

Unregulated removal of sand and vegetation in the coastal zone further increases rates of coastal erosion and elevates risks of storm damage. In Anguilla, the depletion of sand resources, especially along the northwest coast, has marred the natural landscape, subjected certain low-lying areas to increased erosion, and in some cases reduced the natural protective function of coastal dunes.

Sand mining from private property (i.e., above the mean high water line) is legal in Anguilla. Advance approval from the Lands and Survey Department is required, but in practice there appears to be insufficient regulatory control. Although Government prohibits the taking of sand from Crown Lands (i.e., below the mean high water line), this unregulated practice also occurs. As is the case elsewhere in the Caribbean, beach sand in Anguilla has traditionally been used for construction and its exploitation for this purpose is generally unregulated, despite evidence of beach loss as a result of sand mining and wave erosion. Coastal erosion caused by sand removal also increases sedimentation in nearshore environments, where the damaging effects of sediments on coral reef communities and associated organisms have been well-documented elsewhere in the region.[13].

In any discussion of coastal erosion and sand mining, it is helpful to understand that (1) coastal erosion is normal but can be greatly accelerated by human activities and (2) beach sand is both a renewable/non-renewable resource, depending on the beach and its location with reference to nearby reefs where most of the new sand is generated. Theoretically, management practices should be determined at the micro-level, i.e., what is the sand productivity rate and loss rate at *any given location* and what is the sustainable yield, *if any*. Because of rising sea levels and in the absence of convincing evidence of a major surplus at a *given site*, sand generally should be treated as a non-renewable resource, complete with *"severance taxes"* or an extraction fee paid to the State when mining occurs on Crown Lands.

RECOMMENDATIONS:

5.11 The development and application of standards for buildings and infrastructure in the coastal zone will help reduce potentially adverse impacts on coastal and nearshore environments. Especially useful would be standards for:

- on-site wastewater treatment and disposal (see Chapter 6),
- minimum lot size and/or subdivision size,
- desalination plants (see Chapter 6),
- shoreline setback (see Recommendation 5.12), and
- coastal development siting to ensure that critical habitat and/or groundwater resources (see Chapter 6) are not affected.

5.12 A coastal storm hazard-mitigation policy and regulations should be developed and incorporated into the functions of the Planning and Land Development Control Committee. Areas of high risk and low risk need to be identified as this classification may in turn influence setback requirements and building standards. Shoreline setback regulations can be determined by using a simple formula (e.g., erosion rate times the expected life of the structure) or a standard distance (e.g., 200 feet [approximately 60 meters]) as has been previously recommended[14].

The policy might also incorporate redevelopment options for existing coastal development to minimize potential losses, and should establish a recon-

struction plan for implementation immediately following catastrophic storms.

In the interim (and in the absence of a coastal hazard-reduction and mitigation policy), the Planning and Land Development Control Committee should direct new development away from known high-hazard areas.

5.13 Various studies[15] have made the point that there is real risk in the regular harvesting of sand from the coastline where it customarily functions as a storm barrier and dynamic buffer for land areas and infrastructure such as roads and buildings. Generally, it is a preferred strategy to harvest sand by hydraulic marine mining some distance from shore. All sand mining options require a serious evaluation of potentially adverse impacts. The Government of Anguilla should therefore consider a formal sand resource management policy that, among other things, encourages and provides private sector incentives for the importation of sand for domestic use, and assesses the feasibility and environmental impacts of offshore sand dredging.

5.14 In the case of dredging sand from salt ponds, under ***some*** circumstances dredging to increase the depth and volume of water and its circulation in the pond may be sufficient justification for a sand mining effort that has the dual objective of obtaining sand and reducing sediment build-up in the pond (see also Issue Five below).

Where a salt pond is found to be important as a superior feeding area for both resident and migratory aquatic birds, dredging should be carefully controlled to maintain some shallow areas not deeper than 35 cm (14 in), the maximum depth that is useable as feeding habitat by aquatic birds.

Opening a pond up to the sea and dredging the pond, as in the case of a marina, is sufficiently risky to warrant a full-fledged environmental assessment of the consequences of altering the pond's natural regime and its sediment trap functions.

5.15 As part of a long-term policy for managing sand resources, GOA resource managers should make periodic judgments as to where sand removal (from government-owned property *landward of beach systems*) can be carried out at predetermined levels, by license or permit, with the least detrimental impact. Fees for removal of sand from government-owned property need to be set in proportion to actual volumes extracted. With such a policy in place, and in the absence of similar controls over privately-owned sand resources, it could be expected that market pricing mechanisms might eventually serve to reduce or slow the rate at which both private and public sand is brought into production.

As a matter of general practice, sand removal directly from the sloping sand beach area itself should be discouraged or, ideally, prohibited.

5.16 Special consideration needs to be given to harvesting sand from coastal dunes, which provide long-term protection of life and property and, in the case of the dunes at Windward Point, are of special biological interest. Most of the coastal dunes found in Anguilla are comprised of a single dune ridge paralleling the beach, and it is this dune type that is most vulnerable to washover and blowout. In those few cases where there are multiple dunes serving as storm wave barriers protecting shoreline structures, some limited sand harvesting of the inner-most dune sands may be defensible, as part of an overall sand resource management program. Quantitative and spatial limits at any site

should always be established by Government before mining is allowed, as should a plan for restoring landscape contours and sand-stabilizing vegetation at any sand "borrow" area or harvesting site.

5.17 The recent establishment of a formal and long-term beach monitoring program in Anguilla is to be commended, and appropriate resources need to be identified to continue this program. GOA could request continued support through UNESCO's Coastal Monitoring Program for the Lesser Antilles which first provided assistance to the Territory in 1992. At that time, 22 sites were established and five staff members from the Department of Fisheries and Marine Resources and the Lands and Surveys Department were trained in field and data analysis techniques. This effort needs to be formally programmed as an ongoing resource management function of the Anguillian Government.

ISSUE FOUR:
The use of environmental impact assessments for major development projects encourages a more holistic examination of environmental and social issues at an early stage in the planning process.

[Note: Chapter 3, Issue Four also discusses environmental impact assessments as a part of the development control process.]

Like most other Eastern Caribbean countries, Anguilla does not as yet require the formal preparation of environmental impact assessments (EIAs) as part of the development planning or permitting process (see Chapter 3, Issue Four). It is particularly important that approval of major development projects in the coastal zone, whether initiated by public or private sector agencies, should require preparation of EIA reports to supplement the less detailed information presented on the standard development application form.

From an institutional perspective, EIAs are useful because they encourage a more holistic and energetic integration of technical data and environmental expertise across departmental and ministerial lines while, at the same time, guaranteeing more systematic input of environmental and social considerations at an early stage in the site-specific development planning process. This can be particularly important in smaller countries like Anguilla where resource management functions are not yet clearly defined and are spread among several government units, each of which tends to view "the environment" from its own perspective or area of interest.

RECOMMENDATION:

5.18 Procedures (probably leading to legislation) should be discussed within Government to require the formal preparation of environmental impact assessments for all "major" development projects (public or private sector) within the coastal zone. (For further recommendations on EIAs, see Chapter 3, Recommendations 3.7, 3.8, and 3.9.

ISSUE FIVE:
Unregulated development in the coastal environment will, if not addressed, adversely affect wildlife habitats and reduce wildlife resources.

[Note: Chapter 4 deals specifically with the issue of landscape and biodiversity protection, but the same issues as they relate to coastal habitat protection are discussed here.]

More than 100 migratory bird species have been recorded in the Lesser Antilles. A majority of these species undertake semi-annual migrations between North and South America, stopping along the way in the Lesser Antilles to rest and feed. Others, including many seabird species, remain year-round in the Caribbean, relying on the availability of suitable habitat to feed, nest, and raise fledglings.

Published data on seabird nesting sites in Anguilla is limited. Most sites are located on the Territory's offshore cays such as Dog Island, although at least four species are reported to nest on the main island[16].

Salt ponds are especially critical as habitat for several aquatic bird species. Fortunately, most of Anguilla's approximately 20 salt ponds (Figure 5.3 and Table 5.1) are relatively untouched and continue to provide healthy habitat for aquatic birds[17]. However, development pressure on salt ponds is rising and likely to increase.

Salt ponds are sometimes viewed as a nuisance; one consulting group in Anguilla suggested that they were "little more than ... putrid breeding grounds for insects"[18]. Throughout the Caribbean, salt ponds have been used as dump sites for waste (the former pond at Island Harbour in Anguilla is a case in point). Everywhere, they are under-appreciated for the valuable environmental service they perform as natural sediment traps protecting nearshore coral reefs from excessive turbidity.[19]

Table 5.1. Anguilla's wetlands (see Figure 5.3 for pond location corresponding to numbers displayed in this table).

1/2/3	Scrub Island Ponds	13	Rendezvous Salt Pond
4	Grey Pond (Savannah Pond)	14	Long Bay Pond
5	East End Pond (Mount Fortune Pond)	15	Mead's Bay Salt Pond
6	Badcocks Pond	16	Merrywing Pond
7	Caul's Pond	17	Cove Bay Salt Pond
8	Long Salt Pond	18	West End Salt Pond
9	Forest Pond	19	Spring Bay Pond, Dog Island
10	Little Harbour Pond	20	Stoney Bay Pond, Dog Island
11	Road Salt Pond	21	Prickly Pear East Pond
12	Blowing Point Pond	22	Island Harbour Pond (FILLED)

Sources: See Pritchard, 1990 for a descriptive inventory of Anguilla's wetlands; see Goodwin, *et al.*, 1984 for physiographic and physico-chemical data, ownership information and *Artemia* distribution for selected ponds.

Dredging a salt pond, if carefully done, can prolong its useful life as a sediment trap or settling pond, but only if its mangrove margins are kept reasonably healthy and intact as an important wildlife habitat and as a buffer zone stabilizing the pond's edge which interfaces with the adjacent land. Caution is required in deepening any pond near residential areas (Sandy Ground, for example) as noxious odors from the dredge spoil and excessive mud and/or dust can be most unpleasant to neighboring downwind communities.

A pond's essential function as a catchment basin trapping sediments will be completely destroyed if it is filled. Opening a pond to the sea may also significantly alter its ecology and perhaps that of the adjacent bay, primarily through the release of fine-grained sediments and possibly accumulated toxins. Some ponds, however, are irregularly opened to the sea as a natural consequence of flooding following a period of heavy rain.

RECOMMENDATIONS:

5.19 The following general guidelines are applicable in Anguilla[20]:

(1) The filling of ponds should be avoided except in the case of a compelling public interest.

(2) Mangroves bordering ponds should not be removed (except for incidental access points), especially as they serve as valuable avian habitats and provide storm wave buffering protection.

(3) Most salt ponds should not be opened up for development as marinas.

(4) In the event that a closed salt pond is selected as a marina site, and therefore is opened up to the sea, during the next five year period no additional ponds in the immediate area should be opened to the sea to allow time to monitor the effects of any such opening on coastal water quality from increased sediments and turbidity.

(5) Before any normally closed pond is opened, an engineering study and environmental impact assessment should be undertaken regarding (a) siting and design of the entrance from the sea, (b) dredging and disposal techniques including destination of dredge spoil, (c) marina flushing options, and (d) the biological impact of sediment discharge or deposition.

5.20 A systematic review of the Territory's ponds is needed and could logically lead to the development of a national policy for the protection and management of this important resource. A resource management plan focusing on ponds might establish the following:

(1) A legal definition of Anguilla's ponds.

(2) A delineation of existing pond boundaries based on specified criteria (such information should be used to update records in the Land Registry, with the question of public and private ownership, access, and management also being addressed).

(3) Baseline information for each pond, including functions, use, status, flora, and fauna.

(4) Mitigation and restoration targets, including criteria for determining if and under what conditions alteration or even loss of pond habitat will occur.

5.21 Management of Anguilla's wildlife resources, including ponds, should be specifically vested in a conservation officer, probably attached to the Department of Fisheries and Marine Resources. This added responsibility might be reflected in a name change, e.g., the Department of Marine and Wildlife Resources.

5.22 External funding and support should be identified for a survey of Anguilla's seabird populations, including a status report on coastal habitats where seabirds nest (see also Chapter 4, Recommendation 4.1). This information would be useful to the Planning Unit and to resource managers within Government as part of longer-term efforts to protect

remaining wildlife habitat. Anguilla is important regionally for a variety of migratory aquatic bird species and for seabird breeding colonies, of which four and possibly five species are thought to occur on the main island[21]. Other seabird breeding colonies exist in one or more of the offshore islands and cays.

5.23 More recent efforts in Anguilla to focus attention on environmental education are very positive and timely. In such programs elsewhere in the Eastern Caribbean, emphasis on protecting critical wildlife habitat has been used successfully as a focusing device for stimulating more general public interest and concern about broader environmental issues. Anguilla should consider such a program focusing on its ponds as important wildlife habitat.

ISSUE SIX:
Identifying resources to deal with deteriorating coastal water quality is an issue in every Caribbean island. Anguilla is not exempt from the challenge.

Anguilla's high quality coastal zone depends on clean, clear, swimable, fishable, enjoyable inshore water. If there is a risk that this is changing, then the issue of who's looking after this important common resource attribute -- water quality -- becomes important.

But this is not an easy task. There is no single target or solution, no single victim or problem, no single tactic or technology. The real issue is: who will lead in the development of a strategy to sustain high standards for coastal water quality, knowing that the best, least-cost strategy must be anticipatory?

Like coastal systems everywhere, Anguilla's coastal water quality is principally a function of the nature, volume and flow rates of land-based sources of pollution. In turn, the local (insular) dimensions of the marine water quality problem are most often directly proportional to population densities, use levels of agro-chemicals, urbanization, industrialization, steepness of watersheds, and intensity of rainfall. On all counts, Anguilla is a low risk area.

Additionally, by virtue of the island's relatively well-flushed coastline, its numerous ponds which function as sediment traps, and the absence of significant estuaries, coastal wetlands, or other perennial sources of fresh water input, Anguilla has relatively few coastal pollution problems. Its characteristically clear waters indicate modest nutrient levels and provide good conditions of growth for complex communities of corals, seagrasses, and other marine organisms. The neighboring, more mountainous island of St. Kitts, well-known to most Anguillians, stands in distinct contrast -- with its steep watersheds, extended periodic flows of run-off following heavy rains, and a limited inventory of coastal salt ponds. In St. Kitts, these conditions have resulted in reduced stands of corals, seagrass, and mangroves as well as more turbid (murky) inshore water everywhere on the island, except along the shorelines of the lower, drier Southeast Peninsula.

The experience of more developed Caribbean islands should serve as a warning to Anguilla. In many neighboring islands, major concerns related to coastal resources derive primarily from the consequences of tourism development in the absence of effective coastal zone management. The result has too often been an increase in pollutant loading to coastal waters and localized degradation of water quality to the detriment of public health, natural habitat productivity, and tourism.

Expansion of tourism development in Anguilla clearly has implications for the marine and coastal environment, with potential for negative environmental impacts unless adequate controls and standards are carefully developed and fairly implemented. Expanding numbers of yachts will likely increase pollution in harbors and bays from the routine discharge of oil and sewage. Larger concentrations of coastal tourism facilities will increase sewage discharges into nearshore waters which may result in degradation of coral reefs.

RECOMMENDATIONS:

5.24 Establishment of a modest, but carefully targeted, long-term water quality and marine biological monitoring program should be explored by the Government of Anguilla, with the aim of acquiring continuous and reliable information on the coastal and marine environments. Some limited steps at focused, longer-term monitoring are essential to the documentation of trends and the formulation of a rational GOA response to changes in coastal water quality. Laboratory and personnel capabilities will need to be upgraded, probably with donor assistance.

5.25 Over time, a more broadly-based assault on various elements of an incrementally-developed coastal zone management program for Anguilla should be given high priority by the Government. Perhaps the best suitably-scaled implementation model is that offered by the British Virgin Islands. For understanding technical problems and defining best management practices, an instructive procedural model can be found in the U.S. Virgin Islands, with its nearly two decades of adaptive coastal zone management program testing in a tourism-oriented economy.

KEY THEMES OF CHAPTER 5

- Throughout time, Anguillians have sustained a vital, almost spiritual, connection with the sea surrounding their island home. Fishing, boat building and boat racing have all contributed to the island's proud maritime heritage. More recently, the emergence of tourism as a key economic sector has provided a new incentive for developing a broader, more holistic management approach for this critical resource sector.
- Although not yet scientifically verified, lobster, sea turtle and inshore bottom-dwelling fin fish (including reef fish) are all reportedly "depleted" to varying degrees in Anguilla. The implementation of a targeted fisheries data collection system would provide information necessary to make better informed resource management decisions.
- A rather narrow range of critical marine habitats on Anguilla's inshore marine shelf constitutes the biggest challenge for the island's marine resource managers. These special habitats are critical for the development of several commercially important fin and shell fish species. At the same time, this assemblage of coral colonies, seagrass pastures, and other marine habitats is easily accessible to Anguillians and non-Anguillians alike, is attractive to a variety of recreational users, and is potentially subject to rising levels of land-based sources of marine pollution.
- Selected high value marine resources are increasingly under pressure in Anguilla. Fortunately, the Territory is moving toward formal implementation of a Marine Resource Management System which will initially comprise 5 marine parks, 2 tourism management areas, and 2 fish nursery areas. The incorporation of special "management" or "administrative" zones could target the kinds of activities permitted within specific marine park areas. For example, the establishment of recreational dive zones or restricted fishing gear zones would complement the anchorage management zones already created to minimize anchor damage. Marine resource users -- like fishermen and divers -- should be brought into the process of mobilizing local support for the marine park system and the designation of fishery reserves.
- The development and application of standards and guidelines for buildings and infrastructure in the coastal zone can help minimize damage to coastal and nearshore environments as a result of storms. The regulation and monitoring of sand harvesting and vegetation removal in the coastal zone are essential to reducing coastal erosion and the risks of storm-related damage.
- Major development projects, whether initiated by the public or private sector, should require the preparation of environmental impact assessments, especially for those within the coastal zone. The cost of the EIA should be borne by the developer, but defining the scope and content of the EIA as well as reviewing and approving the soundness of the EIA report would be the responsibility of the Government of Anguilla.
- Anguilla's only wetland feature is its approximately 20 ponds scattered throughout the main island and on adjacent cays. Most are relatively untouched, but development pressures are rising and likely to increase. Generally, these ponds are under-appreciated for the valuable environmental service they perform as natural sediment traps protecting nearshore coral reefs from increased sediments and turbidity. Guidelines need to be put in place to provide protection for this important resource, while at the same time not foregoing selected uses.
- Salt ponds are also important as habitat for aquatic birds. Anguilla's recent efforts on behalf of environmental education might borrow from the experience of similar programs in the Eastern Caribbean, namely using the protection of wildlife habitats (for example, the island's numerous salt ponds) as a focusing device for stimulating more general public interest and concern about broader environmental issues.
- By virtue of its relatively well-flushed coastline, its numerous ponds which function as sediment traps, and the absence of perennial sources of fresh water input, Anguilla has relatively few coastal pollution problems. Nevertheless, establishment of a modest, but carefully targeted, long-term water quality and marine biological monitoring program, with the aim of acquiring continuous and reliable information on coastal and marine environments, could decrease the risk of coastal water pollution which has resulted elsewhere as a consequence of tourism development.

REFERENCE NOTES - CHAPTER 5
ANGUILLA AND THE SEA

1 Olsen, D. and J. Ogden, 1981. Management planning for Anguilla's fishing industry. Draft report prepared for Eastern Caribbean Natural Area Management Program. St. Croix, USVI.

2 Bellairs Research Institute, 1990. A survey of marine habitats around Anguilla, with baseline community descriptors for coral reefs and seagrass beds. Prepared for the Government of Anguilla by the Bellairs Research Institute of McGill University. St. James, Barbados.

3 Jackson, I., 1981. A preliminary management strategy for the utilization of the critical marine resources of Anguilla. Prepared for Eastern Caribbean Natural Area Management Program. St. Croix, USVI.

4 See note 1 above.

5 Goodwin, S. and M. Goodwin, 1992. Anguilla's marine resources: Threatened treasures. Prepared for Government of Anguilla by Coastal Images and South Carolina Sea Grant Consortium with support from U.S. Fish and Wildlife Division. Charleston, SC.

6 Meylan, A., 1983. Marine turtles of the Leeward Islands, Lesser Antilles. *Atoll Research Bulletin*, 278:1-23. Smithsonian Institution, Washington, D.C.

7 Goodwin, M., 1988. A project to implement a marine parks programme for improved management of marine resources in Anguilla, West Indies. Prepared for Government of Anguilla, Ministry of Agriculture and Fisheries by Caribbean Conservation Association with South Carolina Sea Grant Consortium. Charleston, SC.

See also note 5 above.

8 Salm, R., 1980. Anguilla: Coral reefs and the marine parks potential. Consultation on the selection and design of marine parks and reserves. Prepared for ECNAMP and Government of Anguilla.

See also note 3 and note 5 above.

9 See note 2 above.

10 U.S. Department of Commerce, 1990. The potential of marine fishery reserves for reef fish management in the Southern Atlantic. NOAA technical memorandum NMFS-SEFC-261. Prepared by the South Atlantic Fishery Management Council. Miami, FL.

11 Godschalk, D., D. Brower, and T. Beatley, 1989. Catastrophic coastal storms: Hazard mitigation and development management. Duke University Press. Durham, NC.

12 See note 11.

13 See for example:

Rogers, C., 1990. Responses of coral reefs and reef organisms to sedimentation. Marine Ecology Progress Series, Vol. 62:185-202. Inter-Research Publications. F.R. Germany.

14 Abernethy, C., 1985. Coastal erosion in Anguilla. Prepared for Government of Anguilla under assignment to the British Overseas Development Administration.

15 For example, see: Halcrow, Sir William and Partners, 1973. Anguilla sand resources. Prepared for British Overseas Development Administration. London, UK.

16 Listings of seabirds for Anguilla can be found in:

(a) Pritchard, D., 1990. The Ramsar Convention in the Caribbean (with special emphasis on Anguilla). Published by the Royal Society for the Protection of Birds. Bedordshire, UK.

(b) Halewyn, R. van and R. Norton, 1984. The status and conservation of seabirds in the Caribbean. In: Croxall, I., *et al.* (eds.), Status and conservation of the world's seabirds. ICBP technical publication no. 2. Cambridge, UK.

17 See note 16(a) above.

18 See note 15 above.

19 A general description of salt pond ecology and physical function can be found in:

Island Resources Foundation, 1977. Marine environments of the Virgin Islands: Technical supplement no. 1. Prepared for the Virgin Islands Planning Office, Coastal Zone Management Program. St. Thomas, USVI.

20 Towle, *et al.*, 1986. Land use management plan for the Southeast Peninsula, St. Kitts, West Indies. Prepared for the Government of St. Kitts and Nevis by Island Resources Foundation. St. Thomas, USVI.

21 See note 16(a) above.

6. WATER SUPPLY, WATER QUALITY, POLLUTION CONTROL and WASTE MANAGEMENT

Clean water reliably delivered at an affordable cost is essential to Anguilla's future. To accomplish this, rising demand, limited supply, pollution effects, distribution problems, and conservation issues all must be dealt with. This critical task of managing Anguilla's water resources to support both the community and the natural ecosystem will test everyone -- government, industry, and citizens alike -- who must all participate and carry some of the burden. How big a task is it? We need to know so we can plan.

For more than three hundred years, Anguillians have met the challenge of the island's dry environment with careful husbandry, water conservation, and the use of cisterns. On a larger scale, and in more recent decades, the expansion of new residential areas, tourism facilities and economic development enterprises, funded principally by overseas assistance agencies and private sector investment, has elevated the demand for water and other public utility services with a concomitant increase both in waste products and pressure on the landscape, coastal systems, and groundwater supplies. In sum, along with the benefits of economic development, there are often unintended disbenefits or environmental costs, and Anguilla has not entirely escaped the adverse aspects of growth.

These often subtle, mostly unanticipated impacts arise largely from the way new technologies, new chemicals, new consumer wastes and other commercial waste inputs to a small island are handled, for, as the environmentalist says, " ... everything is connected to everything else".

One of the principal "connectors" that links people, nature, land, and landscape is water. Although people use it in various life-sustaining, recreational and service modes, it also provides convenient pollution dilution and disposal services, functioning as it does as a solvent and vehicle for moving pollutants from one location to another (including underground). This is especially true for household wastewater and its relationship to groundwater, a subject addressed later in this chapter.

ISSUE ONE:
Clean drinking water, reliably delivered at an affordable cost, is essential to Anguilla's future. But groundwater supply problems loom on the horizon. What needs to be done?

It is a truism that Anguilla's primary water management problems arise out of the fact that there is not very much to manage. With a parsimonious annual average rainfall of about 100 cm (40 in), Anguilla also has a rainfall schedule that is most notable for its erratic, unpredictable nature and is best appreciated by a close examination of the extreme seasonal variability mirrored by the rainfall analog in Figure 6.1. Most rainfall, in the latter half of the year, falls as short pulses in sudden storms. Drought periods may occur for up to three or four months duration, and evaporation rates are high (around 1,800 mm [70 in] per year)[1].

Anguilla is further vexed by being a karstic (weathered) limestone island that is ill-suited to efficient groundwater storage of rainfall that is not intercepted by catchment systems or lost to evaporation. There is, nonetheless, a small, thin underground "lens" or pool of freshwater which "floats" precariously on the underlying layer of heavier seawater and which has been tapped since the 1930's by an expanding series of public wells and bore holes (principally in The Valley area). This aquifer has provided Anguilla's Water Department with 250,000 to 300,000 gallons of water per day for distribution.

The fundamental problem is that pumping rates at the ten wells now in use are more or less at their maximum. To extract more is to risk seawater intrusion which could effectively destroy the aquifer. This would be catastrophic.

Anticipating this pumping rate ceiling and other related problems, the Government joined forces with the Canadian International Development Agency (CIDA) in 1983 and began a serious long-term program of water resource planning, system design, and groundwater research, including a 1986-1987 test drilling schedule for 27 sites (see Figure 6.2). The final comprehensive report (in two volumes) was completed in 1989.[2] Major recommendations, which await implementation, include:

- activate the Water Board (including expanded consumer representation) to manage water affairs in Anguilla;
- transfer operation of the waterworks from Public Works to an independent Water Department with its own account, clerical, and bookkeeping services;
- require full cost recovery of all water operations;
- implement a staff training plan;
- expand water production using reverse osmosis technology;
- upgrade the water distribution system;
- relocate the Public Works Yard in the Valley to Corito;
- upgrade the Anguilla Building Code to reduce pollution risk and enhance water catchment;
- reduce point-source pollution risk in the Valley (from septic and fuel tanks).

This impressive, detailed water planning initiative reflected a larger Government concern dating back to the late 1970's and early 1980's when a number of new hotels were slated to came on line as part of Anguilla's move into upscale tourism. Realizing the precarious nature of Anguilla's groundwater supply, Government policy favored encouraging the various hotel enterprises to be self-sufficient in water by installing reverse osmosis desalination plants which use seawater from shoreline boreholes as feed water. By agreeing to this decentralized, private-sector strategy, the hotels placed no additional demand on the public water distribution system and, of course, are not dependent upon it. GOA requires hotels to obtain permits for both saltwater supply boreholes and plant

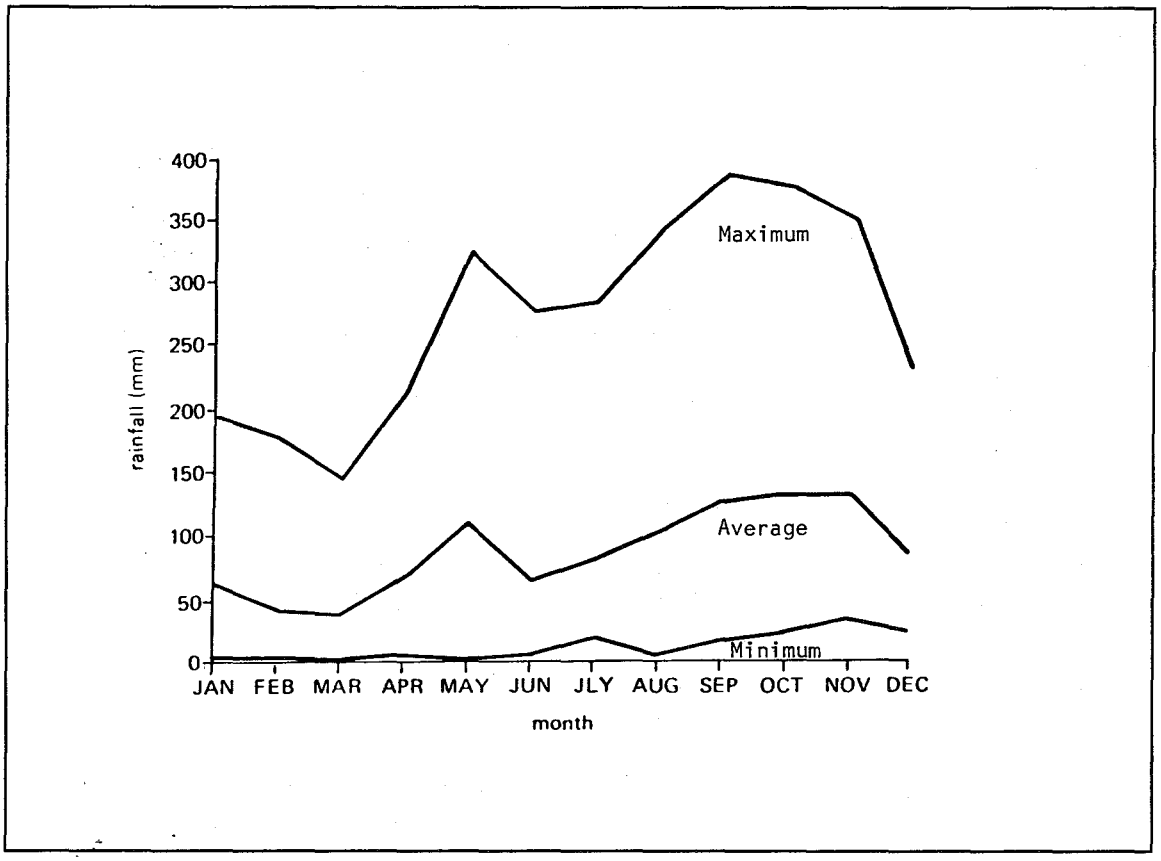


Figure 6.1. Seasonal distribution of rainfall in Anguilla (source: Howarth and Robins, 1988).

operations. Production is limited to a maximum of 25,000 gallons/day.

(1) Water Conservation Compliance.

Rainwater roof catchments are used in about three-quarters of the buildings and provide less than 30 percent of the island's needs.[3] This traditional "conservation-begins-at-home" approach, which requires some individual investment in gutters, downspouts, a cistern and a pump, offers the long-term potential for relieving some of the demand pressure on groundwater. Furthermore, as more and more roads and parking lots are graded and paved, greywater cisterns for irrigation purposes are increasingly warranted.

RECOMMENDATION:

6.1 Government policy should encourage or require roof catchment and cistern use (i.e., water conservation compliance) for various classes of residences, public buildings, hotels, and other commercial facilities. Standards for cisterns and for cistern water quality are needed, and building code requirements need modifications to promote rainfall catchment and cistern use as a supplement to the public water supply system.

Fill and overflow pipes and other openings need to be covered by screening to eliminate potential for mosquito breeding. This should be a legislated requirement, subject to inspection.

"Water, water everywhere, not any drop to drink."
S.T. Coleridge (RHYME OF THE ANCIENT MARINER)

It is not fair to say that Anguillians take water for granted. On the contrary, most Anguillians have traditionally been conservative in their use -- and in avoiding misuse -- of water. They know water is a scarce resource. One generation after another has struggled periodically through rainless periods of drought with one eye on the parched provision ground garden (kept alive with hand-carried kitchen wastewater), and the other on the diminishing volume of dark, cool water in the cistern. These dry season experiences served as a regular reminder of nature's unpredictable stinginess with soft rainwater and of the need to use it sparingly. Fortunately there also was a second best alternative.

Anguillians knew by experience they could almost always find water beneath their feet. But it was hard water, sometimes tasting a bit salty and often better suited for cattle and crops. And it was difficult digging in the tough limestone rock down to the water table just a few feet above sea level where a layer of freshwater (on top of the salt-water) could be had for the pumping.

No one really knows how many wells were dug over the years or more lately drilled through Anguilla's hard scrabble karstic rock to that lens of freshwater at the bottom. But we know it's enough to worry professional hydrologists and water engineers about the prospect of over-pumping in the near future. But they are starting to worry more about something else -- the quality of the groundwater itself. Nitrate levels are rising. What does this mean?

We all know that for convenience sake in the 1930's the Government launched a "works" program, beginning first with The Valley, to introduce Anguillians to plumbed, pressurized freshwater via standpipes and direct household hookups, a generous blessing for those served and a source of complaint for those distant few beyond the end of the pipe. Over time, the supply wells and distribution system have gradually been expanded to serve over 85 percent of the population. But even with this new easy access to free "government" water, which is pumped from the same underground lens or aquifer as before (although in greater quantities), Anguillians traditionally have not been wasteful of water, by comparison to other islanders in the region. But there still is a problem. Demand is rising, and the aquifer has its limits -- perhaps 300,000 gallons per day.

Furthermore, now that there are many more water users and more flush toilets, garden hoses, and washing machines, the community has to deal both with an incipient water supply shortfall and an emerging wastewater disposal problem (see Issue Two below) to reduce the risk of groundwater pollution. Increased volumes of insufficiently treated wastewater discharged or leaching from inadequate septic tanks, tile fields, pit privies and other sources appear to be reaching the underground aquifer, with early indications of bacterial contamination and elevated nitrate levels. Young Anguillians deserve better than this. Clean water should be a part of their future. An island-wide program of aggressive septic tank upgrading, compliance monitoring, and the introduction of other wastewater treatment systems should be high on the Territory's agenda. It may take five or six years, but it must be done.

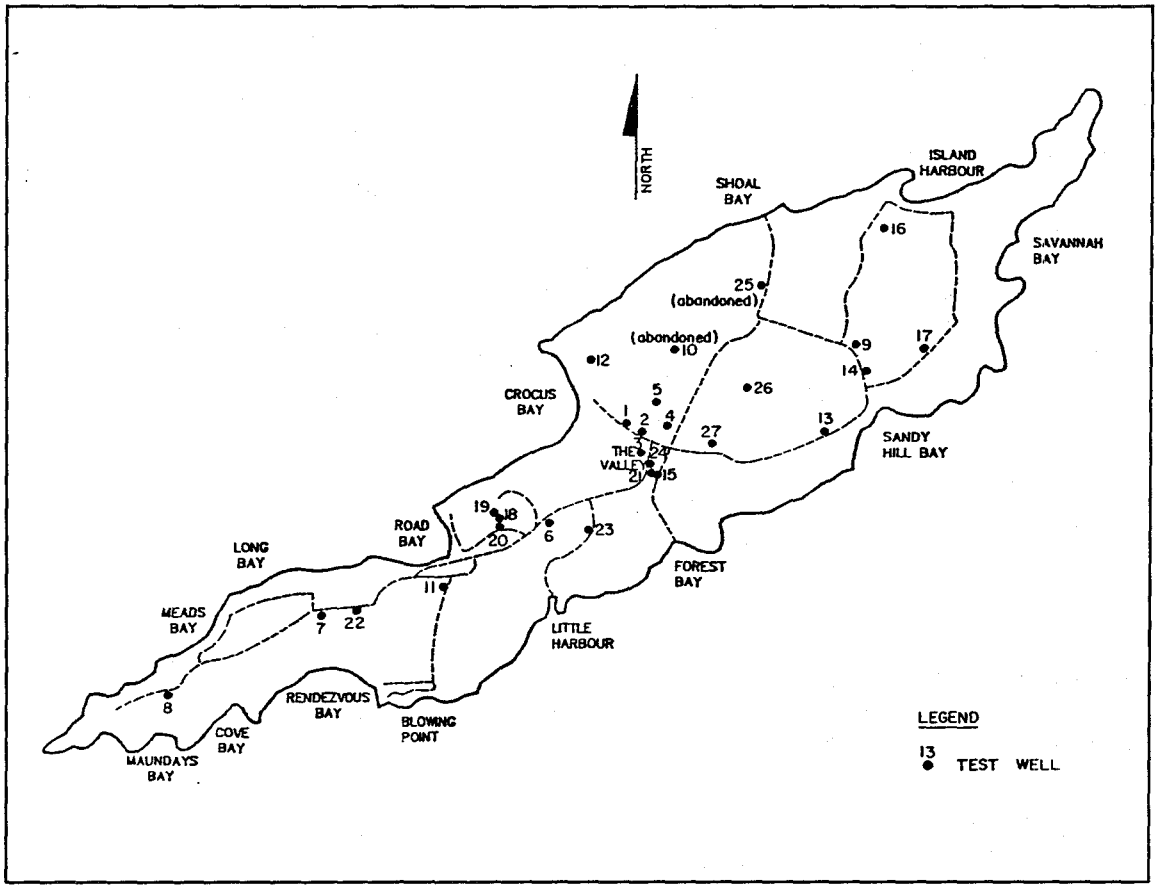


Figure 6.2. Location of test wells, Anguilla (source: CBCL Limited, 1989b).

(2) Water Demand.

With groundwater at near optimum production levels and a limited potential for expanded catchment and cistern production, Anguilla's water supply is not likely to keep up with residential needs. Commercial, industrial and institutional needs face a shortfall in the near- to mid-term (especially if hotel-based reverse osmosis plants are phased out as has been suggested). And this does not include increased water demands for drip irrigation agriculture; for improved horticultural, hydroponic and landscape beautification practices; and for potential higher-volume (lower-cost) water supply services to private sector establishments (like hotels). To do all this may require Government to move toward some type of supplemental water source -- such as an appropriately-scaled desalination plant, probably a multiple-flash distillation system utilizing waste heat from the diesel units at the power plant at Corito.

RECOMMENDATION:

6.2 Even though such a plant would not be built for several years, a Government decision on the efficacy, type, technology, sizing, siting, and funding for a desalination unit should ideally be taken in the very near future. Planning now will allow time for necessary environmental impact and mitigation planning and will permit proper sizing and configuration adjustments to the water supply distribution system, which should be in place before any desalination system comes on line.

Caution is recommended as desalination by reverse osmosis presents a brine con-

centrate discharge problem, and flash distillation systems have both a brine discharge and thermal pollution problem due to elevated temperatures of cooling water discharged to the marine environment. These are manageable problems for which there are technical solutions.

(3) Outmoded Water Distribution System.

The piping network for Anguilla's present water production and distribution system is a classic mixture of old and new, good and bad plumbing, with an alleged 40 percent line loss, inadvertently-installed thin wall pvc piping, limited capacity, small mains, small pumps, small reservoirs and low water pressure at most extremities. The Anguilla Water Development Plan (see Reference Note No. 2 to this Chapter) outlines a multi-step program for overhauling this outmoded water distribution system to obtain increased flow capacities at higher pressures, reaching new areas and new consumers.

RECOMMENDATION:

6.3 Gaining consensus and preparing an accelerated implementation schedule for the first phase of Anguilla's Water Development Plan -- namely, upgrading the existing groundwater production and distribution network -- appear to be of the highest priority to reduce line losses. Once there is a consensus on strategy and plans are complete, the distribution system upgrade needs to be implemented as rapidly as possible so that expansion needs can largely be serviced through desalination rather than through additional high-risk withdrawals from The Valley well field which is close to overload.

(4) Water Planning.

Although the existing Water Development Plan by CBCL Limited is quite adequate, it was begun in 1983, finished in early 1989, and is nearly five years old. An update would be prudent on some regular schedule.

RECOMMENDATION:

6.4 GOA should establish a five-year, ten-year, 20-year plan for producing an adequate water supply to meet the island's demands.

GROUNDWATER QUALITY and THE NITRATE ISSUE

Over the years, Anguilla's groundwater has been subjected to periodic laboratory analysis by those concerned with public health and environmental quality. There exists, therefore, a modest historical profile of the composition and degree of purity for water drawn from deep in Anguilla's primary aquifer (water-bearing rock strata), as well as useful baseline information from the Halcrow, Archer, and CBCL studies[4].

The latter study, funded by CIDA and done in cooperation with Anguilla's Water Department, looked specifically at groundwater quality at eight sites (five water system production wells and three boreholes) and nine (out of 27) test wells drilled in 1986 and 1987 (see table below).

The chemistry of Anguillian groundwater is dominated by two factors: first, its proximity to the sea which influences sodium and chloride content in the water (indicative of salt and freshwater mixing at some interface underground) and, second, the presence of the limestone aquifer through which the water flows and from which the water derives its calcium and bicarbonate components.

But there is another factor, a new one. There are indications that nitrate concentrations are increasing in most of the production and test wells in excess of the maximum acceptable drinking water limit of 10 milligrams/liter (mg/l) -- not much in excess, but sufficient to be a warning signal. The reason for concern is that changes such as these may signal a problem that could take decades to reverse!

What is being observed here is an early stage chemical pollution problem arising from some combination of agricultural fertilizer and/or animal wastes, plus wastewater effluent run-off from domestic and commercial septic tanks, seeping untreated into groundwater. Unfortunately, few septic tank systems in Anguilla have proper tile drain fields. The standard (and convenient) local practice, not normally allowed elsewhere, is direct discharge of the septic tank effluent to the small rock and sand backfill around the buried tank itself. Too many homes have only pit privies and no septic system at all. Commercial and public septic tanks often are too small, and they frequently overload, with short wastewater residency time and discharges of essentially raw sewage.

We do know the problem is <u>not</u> naturally-occurring nitrate, which runs generally less than 0.4 mg/l. We also know that rising nitrate levels in any groundwater which seeps into coastal ponds and embayments, along with phosphates from detergents in domestic wastewater, provides exactly the right chemical nutrients to accelerate the growth and proliferation of unpleasant marine algae, which makes coastal waters murky, inhibits coral growth and annoys swimmers, eventually driving them elsewhere.

ANGUILLA GROUNDWATER NITRATE CONCENTRATIONS (1986)

	LOW	HIGH	MEAN	AVERAGE
9 test wells	5.7 mg/l	30.8 mg/l	17.5 mg/l	18.2 mg/l
8 production wells	2.6 mg/l	17.5 mg/l	8.5 mg/l	10.0 mg/l

NB. 10 mg/l is considered the maximum acceptable nitrate level for drinking water.

ISSUE TWO:
Anguilla's groundwater, upon which the entire public water system depends, needs expanded protection from polluting land-use practices. The task of developing a co-ordinated approach is a challenge. What needs to be done?

Potable water production and distribution and their opposites, wastewater treatment and recycling -- in an island like Anguilla -- are not separate and unrelated, even though they are very different kinds of activities. This is best symbolized by the frequency with which one can find, almost anywhere in Anguilla, a potable water well in proximity to a septic tank or soak-away.

The point is equally well-illustrated by the long-standing but unfortunate proximity of the DPW Yard to the island's primary aquifer, immediately below ground in The Valley. An identical dilemma confronts the Department of Environmental Health in its storage arrangements for hazardous insecticides in The Valley, only a few meters above the aquifer. In the latter case, even a minor fire could result in a flooding, from fire hoses, of the concentrated toxic chemicals that would be catastrophic for Anguilla's groundwater supply. There is some concern that these two examples of inappropriate land use need to be removed from The Valley. The proposed alternative site is within the Corito "industrial" area. Yet, the decision to move appears elusive.

Part of the problem arises from the absence of a development framework for Corito as an industrial park complex. But the future layout of Corito is likely to remain unclear for some time because of unresolved aspects of various proposed facilities and activities at the site, including a bulk shipping terminal, a power plant/waste heat recycling desalination unit, a water softening plant, and the upgrade of the solid waste disposal site into a sanitary landfill. However, the immediate solution of a small, high-risk community health problem should not be held up indefinitely awaiting a final solution of a large, low-risk facilities development problem.

Interim groundwater pollution control measures (such as those reviewed in the boxes on pages 90 and 91, and especially those aimed at community health risk reduction) may be necessary while larger problem-solving initiatives, like land use planning, the new building code and the legal framework of an island-wide pollution control strategy, proceed at a more leisurely pace.

Another pollution control issue in Anguilla is that institutional arrangements for delineating responsibilities between Public Works (for water) and Medical and Health (for environmental health) are not entirely functional. Since remedies for this concern (along with draft regulations) are outlined in the Water Development Plan slated for Phase One implementation this year (with BDD support), alternatives are not presented here.[5]

While point-source pollution risks in The Valley are high, they are not as intractable as the decentralized and ubiquitous issue of domestic and small-scale commercial septic wastes. The CBCL consulting report summarizes this problem as follows:

> *On Anguilla, as on most oceanic [sic] islands, the disposal of domestic septic wastes is usually accomplished through the use of septic tanks, pit privies, tile fields or some type of homemade flow diffuser. Given the absence of appreciable soil cover overlying the fractured limestone bedrock, there is limited opportunity for the natural filtration of pathogens, bacteria and viruses as the septage recharges into the underlying aquifer. ... elevated nitrate concentrations* [discussed in the box on page 87 of this *Profile*] *suggest ... some septic contamination [of groundwater] is occurring on Anguilla. The current sewage disposal*

practices in Anguilla, and especially in the Valley, need to be upgraded.

Groundwater pollution risks and events related to public and private septic systems are made worse by poorly-maintained tile fields and by indiscriminate rock blasting which may create new fissures in the limestone. Unfortunately, Anguilla's land use planning and development controls have not been effective in reducing these and other waste disposal practices that place groundwater at risk. The absence of required environmental impact assessment procedures increases the risk (see Chapter 3, Issue Four).

RECOMMENDATIONS:

6.5 The areas most prone to severe seawater intrusion need to be identified on publicly available maps; and groundwater development proposals, as an element of any domestic, commercial or government project, should be subject to the development control process. The public needs to be made more aware of the consequences of abusing the system.

6.6 An adequate monitoring regime is needed to prevent over-pumping, with consequent incursion of saltwater to the aquifer. All withdrawals of water via public wells as well as from private wells should be metered and recorded.

6.7 Future monitoring and water resource management strategies must address the issue of bacterial contamination of the aquifer. Therefore, design standards for septic tanks and other sewage treatment facilities in the new Building Code need prompt implementation. A phase-in strategy for retrofitting and upgrading previously existing systems will be required, along with a complementary public education program of long duration.

6.8 Septic effluent should be discharged to a septic tile field or an evapotranspiration bed, not into a seepage pit or pit privy as is now the practice. One option for improved treatment was suggested in the CBCL consulting report, namely, that advantage should be taken of the island's natural conditions to use evapotranspiration beds for disposal of septic tank effluent, by which the effluent is distributed in shallow pipes into a small field with a sealed bottom. Growth (plants, grass, etc.) on the bed then takes up the moisture, which passes through the plant to atmosphere. Effluent is thus prevented from flowing down to the groundwater regardless of the nature of the intervening soil or rock column.

6.9 All septic systems and waste treatment facilities, whether for new buildings or as replacement systems for existing buildings, must go through a process of approval for design and be inspected during construction by the Departments of Environmental Health and Public Works.

For larger establishments, public or private, with waste treatment facilities, the treatment process permitted should be one that allows the recovery of sludge to be used as fertilizer on designated agricultural land.

6.10 Blasting of rock should be tightly controlled as it presents a risk of developing new rock fissures which offer pathways to pollutants from the surface to the underground water aquifer.

6.11 The DPW Yard should be moved to Corito. The soil separator pit in the Yard must be closed, and an alternate disposal site located away from water supply areas. Contaminated sand from the disposal pit must be removed and taken to the dump.

6.12 Should there be delays in the relocation of the Public Works Yard out of The Valley, storage of oils and gasoline in the DPW Yard should be stopped immediately and the tanks moved elsewhere (e.g., the power station). Following excavation of the tanks, contaminated soil should also be excavated and taken to the dump.

REDUCING THE RISK OF POLLUTION: A SERIES OF MANAGEMENT ISSUES

ISSUE: Groundwater supplies are threatened by nitrate pollution arising from insufficiently-treated septic tank effluents.

RECOMMENDATION: Investigate the scope of the problem (i.e., of untreated or improperly treated discharges) by a household inventory; undertake a similar review of the septic tanks used by commercial establishments; assess this information by correlating with high nitrate groundwater test wells; map and monitor.

ISSUE: Groundwater (aquifer) pollution risk also arises from carelessly-used chemicals (including agricultural fertilizers and pesticides), leaking underground fuel tanks and piping, informal waste oil disposal, quarrying, and sand extraction.

RECOMMENDATION: Investigate the scope and impact of these and other activities with similar effluent risk; establish standards and compliance procedures (e.g., notification procedures, stop-work orders and, if serious, penalties and damage recovery steps).

ISSUE: Toxic chemicals and pesticides are ill-stored and badly accounted for. Contamination of the aquifer by these products may be irreversible.

RECOMMENDATION: A review of storage conditions, inventory controls and disposal procedures is needed. This, and a reporting system, might best be accomplished through a licensing process. Legislation would be required.

ISSUE: The areas most prone to severe seawater intrusion have not been identified, and private sector drilling and groundwater development are not properly regulated.

RECOMMENDATION: Proper management of the water resources in the aquifer will require a more rigorous control and audit program for private sector withdrawal of groundwater.

ISSUE: Exposure of the water table through excavation and blasting creates pathways to bedrock and the aquifer. Such pathways for pollution may remain after construction is completed

RECOMMENDATION: Inspection of all excavations should be undertaken by Water Inspectors who will need training in groundwater protection measures. Quarrying and construction site blasting permits should be required.

ISSUE: Indiscriminate drilling and excessive mining (pumping) of the aquifer can deplete the freshwater head, resulting in seawater intrusion and irreparable damage. Monitoring of water extraction is insufficient.

RECOMMENDATION: Improved controls on water extraction from the aquifer are needed. No private wells should be allowed within 500 ft of public pumping wells, and no private wells should be allowed in the high priority areas above the aquifer selected by the Water Department (where public water supply hookups are available for an interconnect). Wells should be metered, licensed, and safe pumping rates fixed. Water users should be charged according to the quantity of water extracted.

REDUCING THE RISK OF POLLUTION *(continued)*

ISSUE: Monitoring is essential to sound water resource management but has too low a priority at the present time.

RECOMMENDATION: A comprehensive regime of groundwater monitoring, including consumer use practices and pollutant inputs, must be formulated at a scale appropriate to Anguilla and incorporated into the work plans of not only the Water Department but other departments as well. A monitoring system will provide necessary data to operate the water supply system at a lower cost with reduced risks and will also allow increased withdrawal rates at certain times of the year.

ISSUE: Public and private sector deficiencies in solid waste management pose continuing threats to groundwater.

RECOMMENDATION: To ensure that future solid waste disposal practices do not pose a threat, proper handling, collection and storage practices must be undertaken. Domestic waste must be collected on a regular basis with priority areas being those generators located within 500 ft of public wells, The Valley School, Quarter Well, Water Swamp and Long Bay areas.

ISSUE: Gasoline, diesel fuel and lubricating oils constitute a special class of potential pollutants (hydrocarbons) in The Valley area above the aquifer. Wherever possible, these risky hydrocarbon fueling and storage facilities should be moved elsewhere or monitored closely against leaks and accidental spill.

RECOMMENDATION: The DPW yard should be moved to Corito. The soil separator pit in the yard must be closed and relocated to an alternative disposal site away from water supply areas. The gasoline station must be regularly inspected and dip records reviewed to determine the presence of leaks. Storage of oils and gasoline in the DPW yard must end, and the tanks must be moved elsewhere (probably near the power station fuel storage area). Upon excavation of the tanks, contaminated soil should also be excavated and taken to the dump.

ISSUE: Septic tanks and sewage systems are not inspected during construction nor are they monitored once in place. Effluent is often not properly disposed of through tile fields. Sludge is removed from the tank, but not from the site. Commercial septic tanks often are under-designed and warrant recurrent monitoring to prevent pollution seepage to the aquifer.

RECOMMENDATION: Regular inspection of sewage systems needs to be conducted by the Departments of Environmental Health and Public Works. Septic effluent should be discharged into a tile field or an evapotranspiration bed -- not into a seepage pit or pit privy as is now the practice. All new septic systems should go through an approval process for design and be inspected during construction by the Departments of Environmental Health and Public Works. Larger facilities, such as schools, restaurants, hospitals, public buildings or other similar establishments, should be serviced with appropriately-scaled, larger capacity sewage treatment systems.

6.13 Beginning with The Valley, underground fuel (and other toxic liquid) storage tanks should be subjected to regular inspection with dip (and withdrawal) records to determine the presence of leaks. Tanks should be excavated and reinstalled as a double-walled system or with an equivalent liner. Leak detection warning devices should be required on all tanks regardless of ownership.

6.14 Hospital chemicals, drugs, radioactive materials and general hospital wastes must be inventoried, and the resulting debris disposed of, preferably through high temperature incineration.

6.15 A Hazardous Waste Management Plan for Anguilla should be a joint agenda item for the Departments of Public Works and Environmental Health, with a draft in circulation for review by the end of the current year and approval and implementation scheduled for 1994.

ISSUE THREE:
Anguilla's coastal inshore waters need protection from land-based sources of pollution -- numerous small problems can defy a single solution. What needs to be done?

In contrast to more mountainous and more developed neighboring islands, where rainfall, run-off and erosion results in turbid rivers, streams and polluted coastal waters, Anguilla has the good fortune of enjoying clean, clear coastal water with, at present, little evidence or threat of reduced coastal water quality. In selected areas, however, such as Sandy Ground and Little Harbour, there are some subtle early warning signs that all is not well.

This should be a matter of concern as islands like Anguilla, with a developed tourism sector, are especially dependent on both the reality and the perception of being well-endowed with a healthy ecosystem, luxurious coral reefs, exotic and colorful reef fish, and stable restful beaches with crystal-clear water. Furthermore, and wholly unconnected with tourism, smaller islands -- which lack "economies of scale" and redundant ecosystem elements -- require conservative and successful husbandry of their limited inventory of coral reefs, offshore cays, seagrass beds, beaches, dunes, and mangroves, all of which are key buffering factors in the high-energy coastal zone.

The key problem will be the additive and cumulative effects of pollution arising from a concentration of growth and development in the coastal zone. Sewage effluents (some treated, some not) from domestic, commercial, industrial (e.g., the tourism industry), and governmental facilities, combined with lesser inputs of run-off from landscaped and fertilized areas and with groundwater discharge (the seaward flowing seepage of nutrient-bearing water below the surface), would likely constitute the principal causes of deteriorating coastal water quality. Most polluted run-off water, when it reaches the sea, is laden with organic and chemical nutrients that simply over-fertilize coastal waters. The end effect is an initially invisible, incremental degradation of coastal habitats and marine communities.

The change can be very slow. Specific pollutants involved in this expanding land-to-sea flow include water-borne sediments, elevated nutrients (like nitrates and phosphates which act as fertilizers for marine plants), and -- only on occasion -- chemicals (like pesticides, chlorine used in sewage treatment works and laundries, film development fluids, cleaning acids, oil, paint solvents and discarded hydraulic fluids). Problems can arise also from brine (from reverse osmosis plants) and from hot water (from thermal desalination plants).

Unfortunately, there will be no loud and clear signal to warn about pollution effects on coastal reefs. Likewise, it is unlikely there will be scientific evidence dramatic enough for all to agree that specific, prompt action is needed. Prevention is far better than seeking a cure after the fact.

RECOMMENDATIONS:

6.16 A cooperative program to develop and maintain a coastal water monitoring regime should be established by the Departments of Environmental Health, Public Works, and Fisheries and Marine Resources. The regime should be designed to inventory and map point-source pollution discharges and establish coastal water quality baseline data reflecting normal and worst-case flood and drought conditions (see also Chapter 5, Recommendation 5.24). Assistance is available from regional agencies like the Caribbean Environmental Health Institute and the Caribbean Environment and Development Institute.

6.17 GOA should establish a policy requiring the proper handling and disposal of hazardous materials and waste petroleum products, in order to safeguard against future pollution of groundwater and

coastal waters and their associated habitats.

6.18 GOA should develop an oil- and hazardous-materials spill prevention and disaster response plan.

6.19 GOA should develop standards for vessel waste discharge in port, including bilge pumping and sewage and solid waste disposal.

6.20 GOA should adopt a sediment reduction and control policy to minimize the adverse effects of water pollution arising out of sand mining and marine construction projects.

POLLUTION RISKS TO ONE OF NATURE'S BEST HURRICANE BARRIERS -- CORAL REEFS

When devising strategies to reduce land-based sources of marine pollution to protect inshore water quality, primary concern should be focused on corals and on the complex reefs system they create. These systems, which function as natural protection against the impacts of storms and hurricanes, are especially sensitive to slight changes in water quality and water clarity. The reasons for this are many:

- Corals have a narrow temperature tolerance, and deviations affect growth.
- Corals have a limited salinity tolerance (32-36 percent), and too much salinity will affect growth.
- Corals require good light penetration for growth, and sediments suspended in the water reduce light levels for coral growth.
- Nitrates and phosphates make algae grow in the water which, in turn, cut off sunlight to coral communities.
  Nitrates and Phosphates also encourage macro-algae to crowd out corals on the reef.
- Corals are especially sensitive, like fish, to chlorine.
- Corals are easily stressed by all abnormal conditions which reduce growth and increase mortality.

Seagrasses are more or less affected the same way.

ISSUE FOUR:

The issue of waste management in Anguilla embraces solid waste, sewage, and wastewater flows, plus pollution prevention focussing on groundwater, coastal wetlands, beaches and human habitats -- an overwhelming task for too small a staff.

The Department of Environmental Health has a pivotal role to play in developing a full spectrum of environmental protection strategies and programs for Anguilla. However, based on recent consulting reports and evaluations[6], it is quite apparent that the Department does not have sufficient staff or resources to carry out its various assigned tasks, which are numerous. At the same time, these same departmental program planning documents reflect the concern of several experts about the effects on Anguilla's environment of accelerated development and various expanding waste streams.

At present, the Department has a skeleton staff of four (established posts) viz, Principal Environmental Health Officer, Senior Environmental Health Officer and two Environmental Health Officers, along with 15 persons in unestablished posts. The Principal Environmental Health Officer and the Senior Environmental Health Officer are trained at acceptable levels, whereas neither of the Environmental Health Officers are in possession of formal public health or environmental health training.

The following are the main functions of Environmental Health staff:

(1) Food hygiene -- inspection and licensing of food-handling establishments.
(2) Registration and certification of food handlers.
(3) Vector and pest control.
(4) Liquid waste/sewage treatment and disposal.
(5) Solid waste management -- refuse collection and disposal.
(6) Premises inspection/environmental sanitation.
(7) Beach and roadside cleaning.
(8) Occupational safety and health.
(9) Building hygiene.
(10) Latrine sanitation -- assistance for low income house-holds.

Among the above, this chapter is concerned principally with tasks (4) and (5), two of the largest and most complex responsibilities of the Department.

Sewage Treatment and Disposal. There is no central sewerage system on the island of Anguilla; consequently all wastewater/sewage is treated and disposed of on-site by means of septic tanks in conjunction with soakaways, pit privies or package sewage treatment plants. The septic tank is the most common method of disposal being used in approximately 81 percent of the households on the island. This facility has replaced most of the older privy systems and is now the mandatory facility for the treatment of sewage at all types of premises -- residential, commercial, industrial and governmental, with on-site disposal of effluent in soakaways.

Fourteen percent of households make use of the simple pit privy as a means of sewage disposal. This facility is found in all 14 districts of the island but is only used by households in the lower income bracket.

Septic Tank Design and Operation. There is a recommended septic tank design for use in Anguilla, but many builders deviate from this design. Furthermore, tanks often malfunction, and partially-treated effluent threatens the underground water supply. There is no inspection system in place to ensure that new septic tanks are built in keeping with the details of approved plans.

Package Sewage Treatment Plants. This system of treatment is used in Anguilla by most hotels, other commercial undertakings and some government institutions.

Currently, there are about 20 plants in operation on the island. All package treatment plants appear to be adequately maintained. In most cases, the effluents from the plants are used for irrigation of gardens and lawns. The Department of Environmental Health does not monitor or collect data on the quality of plant effluents or on operational performances.[7] Training and equipment to conduct such monitoring are urgently needed.

Solid Waste Collection and Disposal. Between 1983 and 1989, the amount of solid waste produced by Anguillian residents and tourists multiplied by a factor of four. Volumes have continued to expand since then and now have reached a daily load of about twelve tons. This unprecedented expansion severely stresses the already burdened system of collection and disposal.

Prior to 1989, solid waste was collected island-wide (there are three districts) by the Department of Environmental Health using two 10 cu yd non-compacting, side-loading trucks that were very inefficient. After 1989, the Department began to privatize collection in all three districts, a process which was completed by 1992. Collection of domestic solid waste is a free twice-weekly service while hotels, restaurants and other commercial undertakings, including building contractors, are required to make their own arrangements for waste collection.

Solid waste generated on the island is finally disposed of at the 10-acre Government-owned Corito disposal site. The site is part of a marl mining quarry with an average excavated depth of about eight feet, thus making it ideally adaptable as a sanitary landfill. However, landfills take machinery and none has been available. Until August 1992, the only method of disposal at the Corito site was by crude dumping and burning of waste. This left mountains of incombustible and partially-burned material behind, in addition to old appliances, derelict vehicles, and other forms of debris.

Incoming waste was dumped under the direction of the site supervisor in convenient piles for burning. Depending on the suitability of wind and rain conditions, burning was done twice weekly in the open air. No equipment was available except for the occasional use of a borrowed Public Works bulldozer to clear areas for incoming waste by pushing the residue and incombustible material into heaps.

In July 1992, a caterpillar 931 bulldozer was commissioned for full-time use in materials management at the disposal site, but before embarking on the actual transformation, it was deemed necessary to dispose of the accumulation of residue including derelict vehicles in trenches. Work on this trenching exercise was started, but the Caterpillar 931 machine proved unsuitable for trench digging although it worked well enough for all other landfill operations.

An agreement was reached between the Ministry of Works and the Ministry of Health for the large Public Works bulldozer to work on digging the trenches on a part-time basis. This arrangement never proceeded according to plan, however, and as the trash began to back up, burning had to be re-introduced.

Unfortunately, burning of waste in the open gives rise to smoke, odor and ash nuisances and is always the subject of complaint by hoteliers and residents leeward of the site. The problem remains unsolved.

Although solid waste may pose a potential threat to groundwater, especially when it is illegally deposited in informal dump sites or if it accumulates on the ground in rainy weather when collections are delayed, generally the disposal site at Corito is considered sufficiently removed from The Valley, South Hill, Water Swamp and The Quarter aquifer zones, as well as production well areas, to present no problems in this regard. Delayed or irregular collections, however, could be a problem, especially where waste generator sites are located within 500 feet of public wells, the Valley School, Quarter Well, Water Swamp and the Long Bay area.

RECOMMENDATION:

[The recommendations presented with Issue Two above -- Recommendations 6.5 to 6.16 -- are also relevant to this section of the *Profile*.]

6.21 One area currently overlooked by the Department of Environmental Health as a part of its mandate and which should be addressed as soon as possible is the matter of public education, particularly in areas of septic tank design and use, sludge removal and disposal, water conservation, litter, toxic chemical waste handling, waste lubrication oil disposal, and the like.[8] It is important that responsibility for community outreach and information dissemination tasks in the public health sector not be left to those who lack a sense of mission about community health and a technical understanding of the various conservation issues about which the public needs to be educated.

KEY THEMES OF CHAPTER 6

- A clean water supply, reliably delivered at an affordable cost, is essential to Anguilla's future. But rising demand, limited supply, pollution effects, distribution problems, and conservation issues all make this goal more difficult to accomplish than in the past.

- Anguilla's rainfall is low (about 40 in per year on average), as well as unpredictable and erratic -- falling mostly in the latter half of the year as short pulses in sudden storms. Furthermore, the island's karstic limestone base is ill-suited to efficient groundwater storage of rainfall. There is, however, a small, thin underground pool of freshwater which has been tapped since the 1930's by a series of public wells, principally in The Valley area. Pumping rates at the ten wells are approaching their maximum, risking seawater intrusion which could effectively destroy the aquifer. Surface pollution also threatens, and monitoring is needed.

- More stringent water conservation measures need to be considered. Government policy should encourage or require roof catchment and cistern use, a practice that is currently employed for about 75 percent of the buildings, providing about 30 percent of the island's potable water needs.

- The water production and distribution system needs to be upgraded and expanded, with future needs largely serviced through desalination rather than through additional high-risk withdrawals from the already overloaded well field in The Valley.

- Nitrates levels in Anguilla's groundwater supply are rising, not to an excessive level but sufficient to be a warning signal for concern. What is being observed is an early stage chemical pollution problem arising from some combination of agricultural wastes and wastewater effluent run-off from domestic and commercial sewage disposal systems which is seeping -- untreated -- into the groundwater.

- An adequate groundwater monitoring system is needed to prevent over-pumping and incursion of saltwater in the aquifer. Withdrawals need to metered and recorded; development proposals need to consider water requirements as part of an EIA review process subject to development control standards.

- Design standards for septic tanks and other sewage treatment facilities in the new Building Code need prompt implementation, and a phase-in strategy for upgrading previously exiting systems will be required, along with a long-term program of public education aimed at making the community more aware of the consequences of abusing the system. Septic effluent should be discharged to an approved septic tile field or an evapotranspiration bed, not into a seepage pit or pit privy as is now the practice.

- The principal causes of deterioration of coastal water quality are land-based sources of pollution, with a slight assist from vessel-generated wastes. A modest monitoring program to inventory point-source and non-point source pollution sources and to establish coastal water quality baseline data is needed. Training, equipment, and improved laboratory facilities will be required.

REFERENCES - CHAPTER 6
WATER QUALITY, WASTE MANAGEMENT and POLLUTION CONTROL

1 Howarth, B. and N. Robins, 1988. Contributions to the UNESCO hydrogeological atlas of the Caribbean islands. Vol. 3: Anguilla. Report WD/88/30. Prepared for the Overseas Development Administration by British Geological Survey. Keyworth, Nottinghamshire, UK.

2 (a) CBCL Limited, 1989. Anguilla water development plan stage 1 (132/11571): The water development plan. Final report 85350 (volume 1). Prepared for CIDA. Halifax, Nova Scotia.

(b) CBCL Limited, 1989. Anguilla water development plan stage 1 (132/11571): Background report on options, strategies, and costs. Final report 85350 (volume 2). Prepared for CIDA. Halifax, Nova Scotia.

3 See note 1.

4 See note 2; also:

(a) Archer, A., 1991. Report on consultancy services for wastewater management and improvement of Environmental Health Department. UNDP/PAHO Environmental Health Development Project, Anguilla.

(b) Halcrow, Sir William and Partners, 1966. Report on the water resources of St. Kitts, Nevis and Anguilla and on their development. Vol. IV: Anguilla. London, UK.

5 See note 2.

6 See note 4a; also:

(a) Griffith, C., 1991. An interim report on the United Nations Development Program and Pan American Health Organization solid waste management project for Anguilla.

(b) Jonah, C., 1991. Environmental health development project, Anguilla. Environmental health profile. ECA-CWA-010/81.1/2865-91. Prepared for UNDP/PAHO/WHO.

7 Hughes, R., 1992. A review of measures to mitigate the impact of tourism on groundwater resources of the island of Anguilla.

8 See Session 1 (Community Participation/Education) of the National Solid Waste Management Workshop held in Anguilla 13 -14 August, 1987.

7. TOURISM

TOURISM: ANGUILLA'S LEADING GROWTH SECTOR

The economy of Anguilla has expanded at a relatively rapid pace since the early 1980s. Throughout this period of growth, tourism has played a leading and pervasive role, affecting virtually every aspect of Anguillian society, the island's physical infrastructure and the Territory's image of its future. The task ahead is to ensure the socio-economic and environmental sustainability of this success story in the longer term.

In its recent (1992) planning report on "Tourism and Economic Development in Anguilla", the World Tourism Organization (WTO) reports overwhelming evidence that "... tourism has functioned as the engine of economic growth of Anguilla" and accounts for "... approximately 60 percent of GDP, directly and indirectly ...." Tourism also produced the greatest multiplier effects on other key sectors, especially banking, construction, communications, transport, and -- as might be expected -- on domestic employment levels.[1]

Customary explanations to account for this most recent tourism success story in the Eastern Caribbean focus mostly on the advantages arising out of Anguilla's late start, its inventory of superb beaches, and its image as a fresh newcomer compared to other islands in the region. The simultaneous boom in neighboring St. Martin/St. Maarten supposedly also helped, as upgraded sea and air transport facilities made nearby Anguilla more accessible. Improved access meant a surge of inquiring investors and day visitors who might one day return, having "discovered" Anguilla as an attractive, uncrowded, unpolluted alternative. In tourism industry language, Anguilla was a natural "new destination".

It was, of course, not quite this simple. Other factors, including the calculated and orderly evolution of a positive tourism development policy by the Anguillian Government, helped shape both the physical and economic framework and the marketing strategy for the new tourism sector. The policy aimed at an upscale market niche of discriminating (later called "green") visitors who favored a low-key, high-quality non-urban, small island setting. There are two reasons why this worked. Both are subtle and antecedent, arising as they do from the environmental "truthfulness" of the Anguilla tourism product and from the sales package offered for that product. They are more or less symmetrical.

In the first place, Anguilla provides the proper backdrop for an idealized, tropical island experience. It is not an isolated, single island with an urban center, but an assemblage of dispersed communities and mostly open landscapes, surrounded not just by the sea but by a family of smaller cays, islets and islands that, along with St. Martin and St. Barthelemy, form an international community of islands sharing a common submarine platform, fishery, and horizon.

Anguilla has no urban zone, but in a quiet, reassuring way the loom of the lights of the urban area of St Martin are visible in the distance, only a short ferry ride away to duty-free shopping. But on Anguilla itself there are few distractions and virtually no impediments to seeing, feeling and appreciating its insular heritage of interlaced dry tropical flora and fauna sounds, colors, fragrances and textures. With its low profile, long arcuate beaches, clear air and horizon to horizon panoramic perspectives, the island engenders and reinforces a visitor's feeling of satisfaction at having found a place less frenetic and more natural and open than other more developed Caribbean locations.

In this regard, Anguilla is somewhat unique in the OECS region as there are no mountains to restrict views of the ocean, only low open landscapes with seascape backdrops punctuated by distant offshore cays, yachts and the occasional cluster of wheeling seabirds marking the location of a school of fish. These multivariate images are almost never static because moving distant

clouds, sailing yachts, fishing boats, and other inter-island vessel traffic provide the visitor to Anguilla with a remarkable panorama, an almost cinematic wide-screen effect that is one of the island's natural weapons in its battle for a share of the Caribbean tourism market.

Secondly, Anguillians themselves are a remarkably resilient people whose personal history of doing more with less, of conserving scarce water, and of surviving droughts, hurricanes and other unwanted guests, has shaped a culture inseparable from the landscape and its surrounding seascapes. Anguillians share a peculiar charisma that arises out of adversity and offers the island's visitors a very special place, as well as the joy of discovering what one poet has called "... the genius of the place." There is a strong seafaring tradition and an independence of person that is rooted in a long-standing tradition of land ownership and more subtle linkages with the larger community of Anguillians, many of whom live elsewhere but have not spiritually left their home behind.

BRIEF HISTORY OF TOURISM IN ANGUILLA

Tourism planning in Anguilla dates from early 1972 when the Shankland Cox Partnership was selected by the British Overseas Development Administration to prepare a tourism development plan for the island. The resulting report[2] outlined for the first time the tourism development potential of Anguilla.

The Shankland Cox planning document also recognized the need for developing the island's infrastructure, including an island-wide water system (which did not exist at the time) as well as infrastructure for electrical distribution, sewage disposal, roads, and communications. It further recommended the creation of marine reserves, a "coastal land development authority" to control growth in the coastal zone, and education and training programs to prepare Anguillians for tourism-related employment. Despite its far-reaching recommendations, some of which are valid to this day, the plan was far too complex -- conceptually and financially -- for Anguilla at that time.

TOURISM STATISTICS FOR ANGUILLA

Facilities (end of 1992)

426 hotel rooms
112 hotel rooms under construction
61 guest house rooms
323 villa or apartment units

Visitors (1992)

24,500 tourists
61,100 day visitors

Occupancy (1992)

65% - high season occupancy
45% - average occupancy for 1992
70+% - average occupancy rate for the Caribbean

Employment (1992)

1,000+ hotel employees
1,000+ secondary/support system employees

The Government of Anguilla's first venture in the direction of tourism development took the form of a fairly straight-forward marketing plan prepared in 1976. It focussed principally on attracting foreign investment and tourists through a targeted advertising campaign. The plan pointedly acknowledged the risk of so-called mass tourism marketing for Anguilla and recommended an alternative approach that favored the "up-scale" tourism market. A Director of Tourism was subsequently appointed, and the Territory entered the industry with a two fold strategy: (1) to attract external private sector investors and (2) to promote the island as a new, low-key, unspoiled, up-scale destination.

In 1981, the first formal tourism plan, covering a three year period, was adopted. It promoted an image of Anguillian tourism as small and selective, and called for a marketing strategy aimed at the upper end of the market, the premise being that this approach would attract longer-staying tourists making higher than average daily expenditures. Some concern was expressed about the linkages of tourism to the national economy and about the need to encourage:

- foreign investment,
- community development,
- cultural preservation,
- conservation,
- employment generation,
- revenue generation, and
- market diversity.

During the period 1981-83, many of the plan's objectives were accomplished, including increased local and foreign investment, decreased unemployment, increased tourist arrivals, and market diversification. Other forward-looking objectives proved more elusive and were not so readily achieved, such as the implementation of a marine conservation program, preparation of development control procedures, execution of training programs, reorganization of the Department of Tourism, creation of a Hotel Licensing Board and a Tourist Advisory Board, and establishment of a licensing system for tourism-related services in order to maintain standards and encourage investment. In retrospect, the time frame for these more complex or controversial tasks was simply too short, and in some cases funding was not available.[3]

By 1985, a short-term action plan prepared by the Caribbean Tourism and Research Development Center estimated that approximately 60 percent of the population was employed either directly or indirectly by the tourism sector, making tourism by far the most important employment-generating sector in the economy.[4] At the same time, the Government recognized the need for a more carefully structured and executed tourism policy if it was to ensure full and continuous employment for Anguillians. The result was the Tourism Policy of 1985 which, among other recommendations, called for the preparation of a physical development plan (see also Chapter 3) with zoning provided for tourism amenities such as national parks, marine reserves, and historical/cultural sites.

In the July 1985 policy document, Government accepted responsibility for forming a Board of Tourism, monitoring manpower usage, restricting expatriate work permits, and providing infrastructure such as roads, water and electrical power. It would also monitor the pace of development and limit hotel construction to structures which were less than 75 rooms and not over three floors. Casinos were prohibited.[5]

The 1985 policy document highlighted the need for additional study and review of the tourism sector, resulting in another planning document (the Hastings report) with a series of proposals for the five-year period 1987-1991[6], including the following:

(1) no further hotel development to be approved until the end of 1991 to avoid overtaxing water, power, and labor supplies;

(2) strengthening the Development Board to improve its capacity to offer economic appraisal and marketing services to Anguillian investors;

(3) appointment of a marketing and sales promotion officer within the Department of Tourism;

(4) focusing market promotion on Canada, the Caribbean, and Europe to diversify away from the dominance of the United States;

(5) marketing support for older Anguillian-owned hotels and guest houses;

(6) training of Anguillians for the hotel industry as a priority;

(7) establishment of an awareness campaign to enhance community understanding of tourism; and

(8) initiation of a campaign to combat a serious and growing garbage and litter problem.

It is noteworthy that for the first time many of these policies were addressing some of the side effects generated by the tourism industry.

The Hastings report appeared in February, 1987 and was generally adopted by Government as the official tourism plan for the years 1987 to 1991. Most of the recommendations (summarized above) were simply brought forward but within a new context, one that suggested slowing down the growth rate of hotels until the utility and labor sectors could catch up. One old agenda item re-emphasized by the report was the inadequacy of existing planning machinery and controls (see Chapter 3).

As the fifth year of the 1987-1991 tourism plan approached, the Government of Anguilla elected to seek external assistance for a sector update. It was successful in enlisting the assistance of UNDTCD (the United Nations Department of Technical Cooperation and Development) which arranged a consultancy with the World Tourism Organization. Field work was done by the contractor in late 1991 with a final report issued in June, 1992 entitled *Tourism and Economic Development in Anguilla: A Tourism Strategy for the 90's*. This WTO document covers a broad spectrum of issues, similar to its predecessors, and reinforces rather than redirects most prior policy positions. But it also offers more environmental specificity and addresses resource depletion, system overload, and environmental management needs linked to enhancing productivity within an industry increasingly at risk of losing its "newness" attraction in the global market place.

Key suggestions in the report include[7]:

- limiting hotel construction to 40 to 50 rooms per year;
- limiting hotel size (40 to 80 room range);
- leasing, rather than selling, land to foreigners;
- developing marine recreational facilities;
- discouraging the use of noisy, motorized activities such as jet skis;
- developing land use planning and zoning controls;
- encouraging building designs that reflect Caribbean architectural styles;
- promoting environmental education programs at various levels;
- completing an "environmental profile" for the island;
- completing management plans for historic sites and parks;
- expanding marine resource management programs;
- encouraging tourism's linkages with other sectors;
- requiring waste water treatment and recycling; and
- developing sewage treatment for The Valley aquifer area.

ISSUE ONE:

Anguilla's tourism development to date has had few adverse effects. Its early approach to the industry, with an emphasis on low density and small scale, account for some of this good fortune. However, continued growth, even at a reduced pace, should not be at the expense of the environment or involve excessive risk of overuse or damage to key resources. What needs to be done to develop sustainable tourism -- Anguillian style -- for the future?

Anguilla has, for the most part, escaped many of the adverse social and environmental impacts that larger-scale, high-volume tourism has brought elsewhere in the region. This did not, of course, just happen. It clearly required a series of sound tourism planning decisions, steady support from government, and continuing public and private sector cooperation regarding investment policy, construction standards, infrastructure development, and advertising promotion.[8]

Anguilla was fortunate to have the luxury of shaping its initial tourism strategy within a very favorable setting -- one unpolarized by environmental or social controversies arising from earlier development mistakes or excesses. It also had the advantage of being able to observe in retrospect and learn from a broad spectrum of tourism planning experiences in sister islands in the region. Forerunners in the industry -- like Barbados, St. Thomas and Antigua, for example -- opted for tourism styles and policies which differ significantly from those ultimately selected in Anguilla. Oftentimes the experiences of others can be useful, as they undoubtedly were in Anguilla.

On a less positive note, however, the continued absence in Anguilla of even preliminary procedures for resource inventories, conservation planning, and formalized environmental impact assessments has permitted a generation of private sector development activity to modify the island's landscape and coastal zone, with virtually no prior baseline resource assessments and no monitoring of aggregate or cumulative environmental effects. This, in turn, has provided few opportunities for Anguillians to analyze lessons learned from its first decade of tourism growth -- lessons that might help shape the next phase of development.

The lack of an established, island-wide policy for environmental protection, focusing on managing the island's modest stock of natural and cultural resources, will tend to place Anguilla's currently successful "unspoiled destination" tourism strategy at greater and greater risk. Most of the risk will result from subtle, yet cumulative impacts that eventually diminish the supporting, and mostly free, services provided by the natural environment to the tourism sector.

The resource base of a small island system like Anguilla experiences often dramatic change when it is quickly brought on stream to support an entire new industry that expands the population base and elevates use levels of almost everything. These resources, whether natural or cultural, are not inexhaustible, nor are they indestructible. Their official custodian, on behalf of the people of Anguilla, is the island's elected government, which is charged with both using these resources and protecting them with a sense of proportion, social conscience, and husbandry. The tough issue is how to make them last?

The experiences of other small islands in the Eastern Caribbean region with emerging or maturing tourism sectors suggest that postponing the planning and implementation of a conservation strategy and delaying the start of simple, first-stage resource management programs -- all vital development tools -- will likely result in serious damage to the working ecosystem, with eventual adverse effects on the tourism sector and associated government revenues.[9]

Government must lead in this task of enlisting the private sector, including NGOs, to find ways to protect the environment that will not injure, diminish or conflict with the island's existing tourism style and market niche. If it does not move more aggressively in this direction, the Territory increasingly places the quality of life enjoyed by resident Anguillians at risk, and it could provoke a slow decline in the number of higher-paying tourists.

RECOMMENDATIONS:

7.1 Anguilla's tourism industry and its prospects for the longer term would be greatly strengthened by the immediate shaping of an environmental management policy framework. For a truly integrated approach that reflects the broad and basic dependency of tourism upon the environment, it seems appropriate to combine both sectors -- tourism and the environment -- under the aegis of a single ministry.

Specific recommendations on this matter can be found in Chapter Two (Recommendations 2.1 and 2.2), where a new Ministry of Tourism, Natural Resources and the Environment is proposed.

7.2 Regardless of where any prospective environmental unit is located within the administrative structure of Government, staffing is likely to be a significant stumbling block as specialized, although not highly technical skills, are required, many of which are attainable only through experience in the field (*in situ*). If the tourism industry is to be persuaded to reduce its impact on Anguilla's environment throughout the next phase of industry growth, it will do so only if GOA environmental regulators are sufficiently well qualified to be respected as professional resource managers. But even a very small cadre of professional and technical personnel takes years, not months, to mature. Extended tutelage and field experience is very important as neither Mother Nature nor a tourism industry manager is likely to be tolerant of those lacking required skills and expertise.

A small but continuing selection, placement and environmental training program begun immediately is more likely to be useful than a larger, more comprehensive scheme launched at a later date. Therefore, an immediate start on this important preparatory staffing task is recommended.

7.3 Government should move boldly to set in motion a community-based resource inventory and review involving both public and private sector participants and institutions. Technical support should be available via OECS, UNDP, or one or more of the regional NGOs with requisite expertise. The *Anguilla Environmental Profile* could be used as a starting point to refine, quantify, and evaluate those natural and cultural assets that are:

(i) under-utilized;
(ii) over-utilized;
(iii) at risk from (ii); and
(iv) at risk from pollution or degradation.

7.4 Once the resource inventory is completed, the resulting documentation assembled on specific resource types and units -- especially information regarding threats and value -- will facilitate a badly needed, more rigorous examination of the tourism industry's linkages to and degree of dependence on the environment. The effort to systematically identify and assess the *value* of undeveloped and under-developed resources of potential value to the tourism industry (directly as a service of some type or as attractions or amenities) will enable Anguilla to build genuine "sustainability" into its longer-range plans for supporting tourism as the continuing engine of economic growth (while avoiding the cyclical down-swings experienced elsewhere).

The tourism industry should be invited to find ways for it to become a financial contributor to the process of protecting

the very natural resources it uses to attract and entertain its clientele. NGOs (national, regional and international) should also be invited to do the same with resources of concern to them.

7.5 Because Anguillian tourism has become so important to the economy, there is a risk that policy makers and even resource managers will occasionally find themselves having to balance industry values and interests against community values and the public interest. These are not necessarily the same under all circumstances. There is, therefore, a need to avoid becoming preoccupied with compelling industry demands for increased access to both renewable and non-renewable resources.

In effect, an awareness of the importance of environmental quality to the tourism sector in Anguilla should not distract attention from the fact that the underlying goal of any institutionalized resource planning and management framework is to focus, not on tourism *per se*, but on sustaining a high quality of life for Anguillians as a people and only secondarily on tourists as their guests. In this context, the pursuit of "sustainable tourism" relates both to the host (and host environment) as well as to the visitor.

Planning for both host and visitor as resource users in this search for "sustainability" means confronting the often subtle, unintended side effects of the development process -- namely, adverse social and environmental impacts. Environmental planning then requires translating community values and life style preferences into improved environmental standards, monitoring programs, and resource management priorities.

To assist Government in addressing these complicated issues, a small, senior-level advisory group to provide guidance on broad environmental policy matters is recommended (see Recommendations 2.2 and 2.3 in Chapter 2).

Such a formalized "environmental quality council" or "environmental advisory committee" could customarily be expected to prepare an annual "state of the environment" report" for Government and for public review. The form of such a report is not as important as the function. Sometimes this service is provided more informally by the NGO community.

ISSUE TWO:
One of the challenges ahead for Anguilla in the tourism sector is to identify ways to improve its package of natural and cultural attractions (or amenities). Can ecotourism, nature tourism, or endemic tourism help maximize economic and ecological benefits to the Territory?

The first phase of Anguilla's extraordinary success story with tourism is about over. What lies ahead? The Territory now faces the less glamorous tasks of taking stock, evaluating the previous effort, planning the next steps, designing a product development plan, and shaping a marketing strategy that carefully provides gradual growth. "Growth" in this context refers not only to the number of hotel rooms or number of tourists to fill them, but orderly growth across a broad spectrum, including public services and amenities, human resources, and the Territory's institutional structure. It also includes development of an environmental protection strategy to support and contain changes in the tourism sector.

It has been adequately demonstrated in numerous tourism studies from around the world that increasing the volume of tourists without concern for equivalent growth of a country's supporting systems and services can quickly become a counterproductive strategy. Damage to the landscape, cultural impacts, and pollution from the waste products of increased numbers of people can both reduce the value of tourism assets and diminish the quality of life for residents. Meanwhile, the incremental costs arising from expanded services, impact mitigation, and waste management tend to offset any additional revenues generated from greater numbers.

One consideration is fairly obvious for Anguilla. For any growth and especially for maintaining the existing level of tourism at sustainable levels over any length of time -- particularly in the face of competition from nearby island destinations -- Anguilla will need to operate its tourism industry on a broader and more solidly developed base of natural and cultural resource "assets", many of which -- while not unrecognized in the past -- have been used primarily as a passive backdrop for the tourism product delivered to date. In short, as the Caribbean Tourism Organization has repeatedly reminded its members:

> *the tourism product comprises much more than just the accommodations sector; it also includes the national and infrastructural assets of the country.*[10]

A common problem for tourism planners and managers is to fall into the trap of assuming these assets or amenities (mostly common property under public management) are incidental to the real, and more quantifiable, core of the tourism sector, namely, hotels and rooms, tourist arrival figures, bed nights, occupancy rates and, of course, industry receipts, taxes, and fees paid to government as revenue. But the so-called "amenities backdrop" is in fact a vital ingredient that helps produce the cash flow from tourism. It is one that requires imaginative governmental leadership, inclusion within the development planning process, broad public participation, and supporting institutions (like a National Trust or public authority). It often works best with joint public and private sector partnerships for both planning and building a constituency as well as for operational management and funding.[11]

This can generate a broader base of community support since any combination of public and private investment made, for example, in a local system of parks and protected areas, would serve the community, ensure natural and cultural area protection, aid environmental education, and also serve tourism by adding an ecotourism dimension to Anguilla's tourism market niche.[12]

What is ecotourism? In its most basic terms, it is an environmentally-focused visitor experience that has educational benefits for the tourist and economic benefits for the host community. It engenders local participation in *managing* the resource which should suffer no damage or loss; in fact, the resource should be en-

hanced by the management process.[13] In this regard, ecotourism is more than a new name for nature tourism (simply an observational focus on nature) and should not be confused with it.

Ecotourism carries a much broader spectrum of activity, touching cultural resources and, in effect, embracing such human ecological attractions as historical and archaeological sites, museums, research facilities, and other institutional vehicles offering non-formal education, festivals, boat races, and even some kinds of adventure tourism events. Recent experimental initiatives and case studies on ecotourism are very affirmative about its promise as an effective economic alternative to mass tourism for ecologically-concerned, small communities in the 1990's.

Ecotourism has one problem which arises from the obvious conflict for the resource manager (and management institution) when trying to run, for example, a marine reserve for both protection and use. There are no easy answers. In a place like Anguilla, guarding against irreversible damage while encouraging use will require the establishment of preliminary, yet rational use levels bearing some relationship to "carrying capacity" -- a difficult but useful concept. Certainly, many potential ecotourism attractions (or amenity sites) have serious constraints or limits. But customized resource management plans are not yet in place. Nor are site boundaries or the mission of management institutions clearly delineated.

This is especially worrisome because many, if not most, of the natural and cultural amenity sites are very important in a small island like Anguilla -- not because it must make do with a more limited inventory (which is true) but because these things are the stuff and substance of national identity, the means for engendering a real sense of place, history, belonging and continuity. Taken together, these are the so-called amenities package -- the real foundation of what an island like Anguilla could offer that is *uniquely Anguillian.*

Quite recently, a number of offshore tourist destinations have been refining a new conceptual framework for addressing the development of domestic attractions (or amenities) as relevant not only to tourism but also to national pride and local identity. Called "endemic tourism," this new resource planning and development approach may assist Anguillian planners and decision-makers in meeting these new challenges for it recognizes that:

- each individual destination or people and their surrounding landscape have a special character, and
- a particular character or identity may well constitute the primary tourism attraction of a destination because it integrates intrinsic ecological, cultural, historical, and institutional values.[14]

The basic idea is grounded in the Greek root *endemos*, which means "belonging to a people" and the word *endemic* which, despite its association with wildlife, universally means "peculiar to a particular people or locality ... native to a country or place."

The concept of endemic tourism therefore goes well beyond ecotourism. It recognizes that the cultural framework and characteristics of communities, however informal, have great value as tourism assets, whether the culture is indigenous or introduced as an amalgam. In opening the door to a broader base of amenities development potential, even for small places like Anguilla, it raises the required environmental ante as the integrative setting for other endemic features, many of which are closely and intrinsically interconnected in both historic and real time. Quality tourism in this context requires a quality environment in virtually every respect.

To be successful, therefore, there must be clear evidence everywhere that government and the people both have a kind of pact with nature, and with each other about things like water quality, waste management, architectural standards, pollution and litter control, scenic landscapes, beautification. For the up-scale, quality-minded visitor to want to return, there must be reassuring evidence that nothing -- neither governmental sloth or oversight or excessive private sector greed -- is going to prevent or divert pub-

lic and private investment for effective custodial care of these domestic, common property (amenity) resources that can be shared with the visitor from overseas.

RECOMMENDATIONS:

7.6 Planned growth in Anguilla's tourism sector should actively focus on ecotourism as a new direction. Adding an ecotourism dimension to Anguilla's traditional tourism portfolio would be greatly enhanced if an environmental action plan were in place as an outgrowth of this *Environmental Profile.* Organizing an Ecotourism Council, with public and private sector participation, to set priorities and assist in implementing an attractions (amenities) development plan should have a high priority.

7.7 Formalizing a system of custodial care of selected natural and cultural resource sites -- perhaps under the aegis of a national park structure -- would help build public confidence in the second stage of Anguilla's tourism development. Shaping a park system for Anguilla in itself can be a strong vehicle for reaching new markets sensitive to the kind of environmental quality implicit in the Anguilla tourism product.

7.8 Sandy Ground could be an excellent, highly visible test case in integrated, waterfront amenity redevelopment and endemic tourism planning. However, without a site specific plan, it is quite likely that Sandy Ground will become just another seaport town with little character and much congestion. The driving force of a renewal program should be the historical character of the village, which can be reinforced by a museum and the development of a sailboat racing center and annual regatta (see also Chapter 8).

PONDS, BIRDS AND ECOTOURISM: LOOKING AHEAD

The Government of Anguilla is the official patron and custodian of more than a dozen significant coastal wetland areas, known locally as salt ponds and recognized internationally as important aquatic habitats for a variety of migratory birds. As *"keeper of the ponds"*, the Anguillian Government confronts an old, yet also modern dilemma, namely, how to manage the ponds so as to serve both visiting birds and visiting tourists whilst also reigning in but not -- at least not yet -- prohibiting certain injurious but traditional local uses of the ponds. Prejudicial practices have included sand mining, clear-cutting mangrove stands for charcoal production, conversion to waste disposal sites, and landfilling to modify the shallow wetland as *terra firma* or fastland, to be developed as "new" land.

Perhaps half the "salt ponds" are under increased pressure from sand mining or as informal trash disposal sites, with subtle incremental reductions in size due to dumping along the peripheries. In the absence of a wetland conservation strategy and with little or no monitoring or protection activity by GOA, most if not all of the larger, more accessible ponds and their buffer zones of dark green mangrove forests are gradually being diminished in size and quality. They will eventually disappear as sediment trapping wetlands important to nearby coral reefs and to resident and migratory wildlife which need the habitat and the food supply provided by the pond as an active wetland. A wetland habitat protection and enhancement program is needed. At least one accessible mangrove fringed shallow pond should be carefully "developed" with elevated wooden walkways and an observation platform so tourists and others can observe waterfowl, wading birds and other wildlife associated with salt pond habitat

7.9 Inviting an off-island academic institution or environmental research group to establish a research station or tropical training facility in Anguilla -- linked, for example, to a marine park -- could attract a different kind of ecotourism clientele. There are already nine islands in the region with successful scientific research stations catering to visiting students and investigators.

KEY THEMES OF CHAPTER 7

- Early tourism development in Anguilla has been very successful in increasing local and foreign investment, decreasing unemployment, and increasing tourist arrivals. It is by far the most important employment-generating sector in the economy.

- Tourism development in Anguilla has also thus far successfully avoided many of the social and environmental impacts associated with mass tourism marketing. What is now needed is an updated tourism planning effort that focuses not only on the accommodations sector but also incorporates a broader-based amenities development approach.

- As is true of all tourism destinations, the tourism product in Anguilla comprises much more than the accommodations sector; it also includes the national and infrastructural assets of the country which, taken together, provide the foundation of what an island like Anguilla can offer that is uniquely Anguillian.

- As Anguilla moves toward developing and promoting selected natural and cultural resource attractions or amenities, it will need to give attention to predicting optimum use levels and user impacts. This suggests a need for careful management of amenity sites and for development of an overall visitor impact mitigation strategy.

- Delays in investing in conservation programs and in the shaping of a comprehensive environmental management strategy for the Territory present an escalating risk not only to Anguilla's limited stock of unique resource amenities but also to the island's highly specialized tourism niche.

- Planned growth in Anguilla's tourism sector could easily focus on ecotourism as a new direction. This would mean, however, that Anguilla will eventually find it necessary to adopt a more positive, interventionist program of environmental protection and enhancement. In fact, adding an ecotourism dimension to Anguilla's traditional up-scale tourism portfolio would be greatly enhanced if an environmental action agenda were in place as an outgrowth of this *Environmental Profile*.

- Longer-range tourism planning may need to go beyond ecotourism to embrace an "endemic tourism" approach in order to protect Anguilla's singularly Anguillian attractions, which reflect its distinctive cultural, ecological and institutional makeup.

REFERENCE NOTES - CHAPTER 7
TOURISM

1 (a) WTO/UNDTCD/UNDP, 1992. Tourism and economic development in Anguilla: A tourism strategy for the 90's. Final report (rev.). Prepared for the Government of Anguilla.

(b) Anguilla Government, 1990. Statistical review of tourism, 1990. Statistical Unit, Ministry of Finance. The Valley, Anguilla.

2 Searle, D., 1972. Anguilla: An outline development plan for tourism. Prepared by The Shankland Cox Partnership. London, UK.

3 Anguilla Government, 1981. Anguilla tourism plan, 1981-1983. The Valley, Anguilla.

4 Caribbean Tourism and Research Development Centre, 1985. Anguilla -- short term action plan for the tourism sector. Report for the Government of Anguilla.

5 Anguilla Government, 1985. Tourism policy. The Valley, Anguilla.

6 Hastings, J., 1987. Anguilla: Review of the tourism sector in 1986, and proposals for the years 1987-1991-inclusive. Prepared for the Government of Anguilla.

7 See note no. 1(a) above.

8 Wilkinson, P., 1993. Tourism policy and planning in the Eastern Caribbean: Anguilla, Barbados, Dominica, and St. Lucia. York University. North York, Ontario, Canada.

9 (a) Holder, J., 1990. The Caribbean: Far greater dependence on tourism likely. *The Courier*, 122(July-August):74-79.

(b) *The Economist*, 1989. Third-world tourism: Visitors are good for you. March 11, 1989:19-22.

(c) See also note no. 8 above.

10 Holder, J., 1987. The pattern and impact of tourism on the environment of the Caribbean. Paper presented for workshop sponsored by the Banff Centre of Management, Caribbean Conservation Association, Caribbean Tourism Research and Development Centre, and Caribbean Community Secretariat. Dover Convention Centre, Barbados, April 6, 1987.

11 Shafer, E. and J. Zeigler, C. 1991. Amenity resources policies to improve rural economic growth through tourism. Unpublished paper. Pennsylvania State University, University Park, Pa.

12 Dixon, J. and P. Sherman, 1990. Economics of protected areas: A new look at benefits and costs. Island Press, Washington, DC.

13 Renard, Y., 1991. Strategies for increasing community involvement in ecotourism. Paper presented at Caribbean conference on ecotourism. Belize, July 9-12, 1991.

14 Pacific Asia Travel Association, 1992. Endemic tourism: A profitable industry in a sustainable environment. Pacific Asia Travel Association. New South Wales, Australia.

8. ANGUILLA'S HISTORICAL AND CULTURAL HERITAGE

"[We must] focus the attention of all Anguillians and those from abroad who live amongst us on certain historical events and trends that have helped to make our community what it is. This focus must not start with that momentous day in 1967, but instead it should lead up to that historic event and it should help us to understand those faceless Anguillians who lie in unmarked graves, who, in all their trials and frustration, helped to build a community on 35 square miles of island which we now consider home. ... a glimpse into this sometimes obscure past can help to foster a keener sense of history which can only give us a greater feeling of belonging and oneness with our community. At the very least it should serve as a reminder that we, like our forebears, are merely passers by, and that the slap of the surf on our beaches and the cries of the Daveys in the rocks will still continue when we too are faceless and forgotten."[1]

ISSUE ONE:
Expanding economic development in Anguilla is placing increased pressures on the island's surviving archaeological sites, historic landmarks, and indigenous architectural features.

Two decades ago, in 1973, an English journalist wrote, "The first man to reach Anguilla probably walked there. He left no cave paintings or crude carvings, or any rich store of Stone Age artifacts to mark his passing". It was a description most Anguillians would have agreed with at the time, the president of the Anguilla Archaeological and Historical Society (AAHS) later noted.[2]

That was changed, however, in 1979 when a team of visiting archaeologists, invited to Anguilla by the Ministry of Natural Resources and Tourism, clambered down the steel ladder in the Fountain Cavern and bumped into a petroglyph of the Supreme God of the Arawaks, Jocahu Bagwe Maorocon. Over the next 48 hours the team discovered, purely from observations of the island's surface, more pre-Columbian settlements per square mile than exists on most other islands in the Lesser Antilles -- including important ceramic-period sties at Sandy Ground, Sandy Hill, Cove Bay, Maundays Bay, Rendezvous Bay and the Little Harbour promontory, plus several small middens. In all 19 sites were identified, three of them designated as major.

By 1985, primarily through the efforts of the Anguilla Archaeological and Historical Society which was established in 1981, an additional 13 Amerindian sites were located, including important, large village sites at The Forest and Shoal Bay North. Unfortunately, the Shoal Bay site and those at Sandy Hill, Sandy Ground and Rendezvous have now been mostly disturbed and greatly reduced in size. The Forest site, still largely intact, is the last known, extensive Amerindian settlement in Anguilla. Recently, another six sites were added to the inventory, plus 10 recorded for Dog Island and one on Scrub Island (see Figure 8.1 for location of most sites; location of all sites available in files of the Anguilla Archaeological and Historical Society but all were not available for the Profile Project).

The pace of building development in recent years, coupled with the lack of financial resources for archaeological survey and salvage work, has resulted in many of Anguilla's archaeological resource sites being largely or totally destroyed; additional sites remain seriously threatened, primarily by expanding resort development. Of the 60 acres of prime sites inventoried by AAHS in 1982/83, only 15 acres remained in 1992.[3]

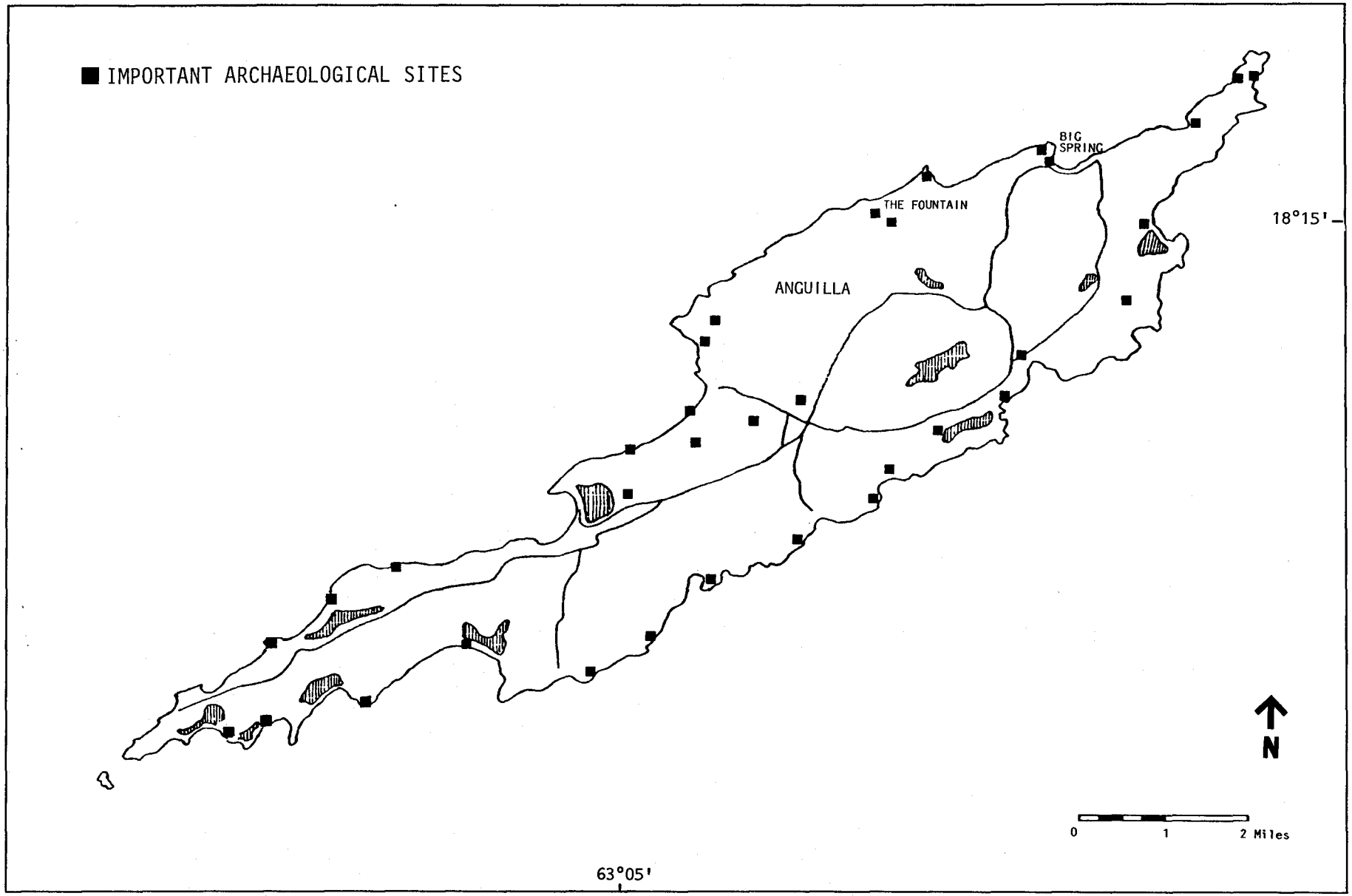


Figure 8.1. Location of important archaeological sites in Anguilla.

It is said that when the first European settlers arrived in Anguilla in 1650, they found nothing but "alligators [probably iguanas] and other noxious animals".[4] Yet, as the investigations of the last decade have shown, there are ample clues at sites scattered around the island to confirm that at least periodic Indian occupation occurred, probably in significant numbers, during pre-Columbian times. While these early Indian inhabitants left no large ruins behind, the collective evidence indicates that Anguilla has one of the richest archaeological heritages in the region.[5]

Following the arrival of European settlers in the Caribbean, it eventually became apparent that Anguilla was too small and too arid to support large-scale development as a plantation colony, as occurred elsewhere in the region. This, in part, accounts for the fact that there are few visible physical remains of the historical past surviving on the island -- the larger estate houses and sugar works which dominated the major sugar-producing islands and the more massive military fortifications constructed to protect important economic investments simply were not characteristic of Anguilla.

A preliminary survey of historic sites carried out in 1979, in conjunction with the archaeological survey mentioned above, concluded that the island was impoverished with respect to historical sites and monuments.[6] (The 1979 inventory of historic sites has not yet been followed up with a more systematic, detailed survey.) Even in 1979 -- prior to the surge in development in the 1980's -- several prominent historic sites, such as the Old Fort at Sandy Hill and the Mount Fortune Plantation House, had already been destroyed. Other sites were badly deteriorated and overgrown.

The most important historic sites surveyed in 1979 were (see Figure 8.1):

- Wallblake House (then scheduled for conversion as a museum, a plan since cancelled) (see also box, page 120);
- the cemetery of the plantocracy behind the Road Salt Pond (today it is largely overgrown and uncared-for);
- the slave cemetery near the airport (the site is little known today and is not maintained);
- former great houses at Road Salt Pond (in use, presumably the White House) and at Lower South Hill (abandoned);
- early churches (such as The Valley Methodist Church, St. Augustine's Church at Sandy Ground, and the Anglican Church at the Copse, all of which have been preserved and continue to be well-maintained by their congregations); and
- the French landing sites at Katouche and Rendezvous Bays, which also have scenic values.

Sites not surveyed in 1979 include:

- ruins of plantation sugar works at Lower South Hill (Hughes Plantation), next to the present Skiffles Resort (the site is still much as it was in 1979);
- similar but more fragmented ruins, including a mill-round, below Sandy Hill; and
- ruins of what may be an old "redoubt" (a simple fortification) from the seventeenth century at Brimegin.

Examples of vernacular architecture can still be found in Anguilla. Over two decades ago, a tourism development report[7] made note of a series of houses of architectural significance in Sandy Ground and recommended that they be restored. Unfortunately very little now remains of the "old" Sandy Ground, even as it existed as recently as the early 1980's. Notable exceptions are the old Methodist Mission House (probably the oldest house in Sandy Ground) and the White House, finished in 1906 and still lived in by the island's current Chief Minister.

Another resource of historical importance in Sandy Ground is the Salt Factory, a shingle-roofed wooden building with ramps to the pond and salt flats. Although no longer used for salt export, the building is still in useable condition and has potential for conversion to a museum and/or visitor center.

Many buildings of architectural merit in Sandy Ground exhibit some features that are distinctively West Indian in style -- e.g., cut stone foundations with wood frame and board construction, pitch roofs and shingles, decorative railings and fretwork -- but as the community continues to develop, the charm and architectural integrity of the area is increasingly at risk from intrusions of incompatible buildings and features.

Additional examples of vernacular architecture are still present in the lower or North Valley area, from the Public Works Department to Crocus Hill. Two remarkably well-preserved houses stand out, known collectively as the Hodge Homestead.[8] The only other important historic building in The Valley area is the Factory, opposite Wallblake House, that still houses the original Cotton Gin. There are also some good examples of West Indian-style "country houses" still surviving in rural areas.

A survey of marine archaeological resources has not yet been undertaken in Anguilla, although there is no reason why the Territory should not have an inventory of shipwrecks comparable to that in Anegada to the west and Barbuda to the east, both of which have fairly extensive underwater archaeological resources. These historical marine resources need protection similar to that afforded terrestrial sites (see also Issue Two below).

Two sites of historical/cultural importance stand out in Anguilla.

(1) **The Fountain** (see box, opposite page). One of two cave sanctuaries with major petroglyph groupings in Anguilla, the site also has the advantage of being relatively undisturbed. Indeed, for some time after the discovery of the petroglyphs in 1979, the finding remained a well-kept secret, as the archaeology team had warned Government officials that the only other petroglyph of the Arawak God Jocahu discovered in the Caribbean -- in Cuba -- had been removed from the island and deposited in a museum in the United States.

Eventually, with the assistance and support of concerned Anguillians and the Archaeological and Historical Society, the Government took action to protect the site. In 1985, GOA announced the purchase of a four and three-quarter acre site surrounding the cave and creation of the Fountain National Park; in 1987, the Fountain National Park Development Committee (FNPDC) was formed to manage funds for the development of the cave and park facilities. Two years later, a report was issued comprised of a number of scientific studies of the site and a plan to modify the cave and park in order to preserve, protect and exhibit the underground environment and petroglyph area. The objective was to create an attraction to lure visitors, protect the natural environment, and provide a source of revenue.[9]

Unfortunately, although a national park was created, it remains a "paper park" as no legislation was enacted to formally authorize its establishment, nor have its boundaries been officially gazetted. The area has not been properly protected or developed, and the recommendations of the government-appointed committee (FNPDC) have generally not been acted on because of fiscal constraints.

The potential of this unusual site, however, remains unquestioned by the many scientific experts and park planners who have explored it over the years. To most Anguillians, however, the site is remembered more as a source of precious water than as a unique natural area or significant archaeological find.

(2) **Big Spring.** Another important petroglyph site was discovered in 1988 on a rock overhang with fresh water at Big Spring in Island Harbour. This land is already owned by Government which presumably will facilitate action to protect the site. At present, it is still being used as a refuse dump; it is unfenced and therefore unprotected. The cost of developing the Big Spring site would be considerably less than the cost projections associated with The Fountain -- most immediately, the area would benefit from the erection of proper fencing and the execution of an archaeological survey. Like The Fountain, Big Spring has potential as

A VISIT TO THE PROPOSED FOUNTAIN NATIONAL PARK AS IT COULD BE ...[10]

Access to Fountain National Park is by a new north-coast road. If additional land can be obtained, cars can be left on Park property near this road .... The alternative plan would be to enter on a private road from the Park's southern boundary and circle away from the area where Fountain Cavern is located below ground. The road ends at a car park, where automobiles, rented cars and taxis can be left during the period the visitor is on Park premises.

The visitor walks from the car park to the Visitor Center, enters the building, and purchases a cave tour ticket. While waiting for a tour to begin, he can view an Arawak Indian collection and then move to a covered veranda of the Visitor Center where he can be seated overlooking a native-plant garden.

The tour begins on the veranda, when a guide gives an introduction to Anguilla, the Park, and the cave. The group then walks through a lighted tunnel to the cave entrance. (The natural cave entrance hole is not used, so that this feature can be preserved intact. This entrance will be seen later on the cave tour.)

After entering the cave, visitors bear to the right on a trail which leads to three impressive stalagmites in the center of the cave room. The group and guide then follow the trail around these formations, where they have a view of a blue pool, lighted under water, off to the right. A second view of the large stalagmites is seen from the reverse side at a grouping point where the guide describes the natural cave features.

The group then continues slightly downward around an embankment toward the second pool of the cave. Visitors view this lighted pool, moving around it on a flowstone bank, until they come to a stopping and viewing platform for the outstanding carved stalagmite, Jocahu. A second lighting effect illuminates this feature as Arawak and Anguillian history are described.

Visitors then proceed upward toward the natural entrance of the cave. They stop at a platform which allows viewing of the other petroglyphs of the cave. The special lighting features the etched designs in the rock, as the guide continues the interpretive program. After this viewing, the group continues on a trail which returns to the tunnel entrance.

Upon exiting the cave, visitors who may not have had time to view the museum collection may do so, or they may purchase mementos of Fountain Cavern and Anguilla in the Visitor Center gift shop.

Visitors may return to the car park or walk northward toward the sea, where there is a facility for changing to bathing suits in order to enjoy the fine beach and sea bathing. For visitors who have only a short time available, the cave may be seen in an hour. For others, an enjoyable day can be spent visiting the cave, visitor center, museum, native-plant gardens and oceanside.

The experience will be a fine introduction to the natural history of Anguilla, and will also show the archaeology and anthropology of the island -- from its ancient roots to the Anguilla of today.

a tourism amenity, and could help to stimulate development of the Island Harbour area.

RECOMMENDATIONS:

8.1 Anguilla's tourism development should be more closely associated with the attributes of the island's surviving historic sites and with its pleasing architecture, museum development, restored buildings and similar amenity features. To this end, Government tourism planners should consider development of a "cultural tourism" plan that identifies resources, needs, opportunities and strategies for taking full advantage of the Territory's historical and cultural assets. Where appropriate, GOA tourism officials should join forces with the Archaeological and Historical Society and the emerging National Trust to identify funding and other forms of support which enable AAHS and/or the National Trust to help develop high priority historic sites with tourism amenity potential.

8.2 As part of the proposed environmental impact assessment process (see Chapter 3, Recommendation 3.7), Anguilla should require cultural resource surveys by professional archaeologists prior to approval of major development projects. Each survey would identify all historical resources located at or nearby the proposed development site, assess their significance, and make recommendations for measures (e.g., salvage archaeology) that help mitigate unavoidable impacts.

8.3 Anguilla needs a detailed national inventory and assessment of important historic buildings and sites. Additionally, all remaining terrestrial archaeological sites should be surveyed with data entered on maps prepared by the Department of Lands and Survey and then maintained for use in reviewing environmental impact assessments. A priority classification system should be put in place as the basis for ranking sites within the framework of an integrated national heritage protection policy (see also Recommendations 8.6 and 8.8).

Although of a lesser priority, it is also important that historic shipwrecks be recognized as non-renewable resources requiring protection and management in the public interest. A first step would be the identification of funding to commission a full survey and inventory of shipwreck sites occurring in Territorial waters. This might be done as a part of the new marine parks program (see Chapter 5, Issue Two).

8.4 The development of the Fountain National Park needs to be reassessed as a national priority and sufficient resources earmarked for its protection, development, and management, including a survey of the cave fauna (which may be endemic) and the cave ecology. Legislation officially demarcating the park needs to be put in place, including regulations for management of the park. This is an ambitious undertaking, but some feasibility planning has already been accomplished, and Anguilla now needs to move ahead in identifying donor support for development of the park as a tourism attraction and recreational amenity for visitors and residents alike.

While not of national park stature, the Big Spring archaeological site also needs protection. Most immediately, the area needs to be fenced in and an archaeological survey undertaken. The site is at serious risk if current land use practices continue.

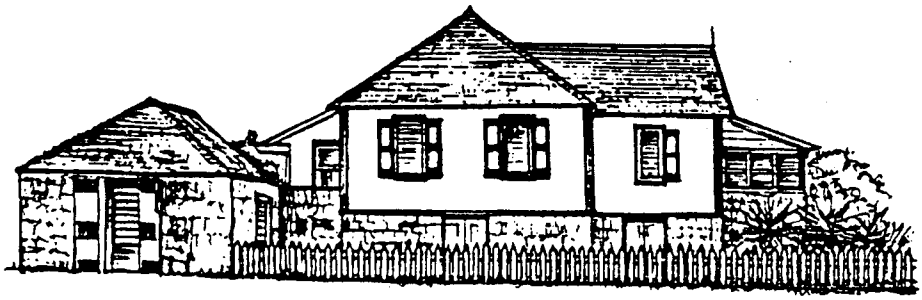
8.5 In light of more recent efforts to officially launch the Anguilla National Trust (see Issue Three below), the responsibilities of the existing Fountain National Park Development Committee and the National Museum Development Committee (see Issue Two below) could

gradually be shifted to and integrated within the overall program framework of the new Trust. The Trust will have revenue-generating capabilities not available to the existing committees which had functioned without budgets or funds, a situation that many pointed to as a serious impediment for both of these government-appointed bodies.

THE WALLBLAKE HOUSE of ANGUILLA[11]

It is almost as if time has stood still for the old Wallblake Estate House standing serenely apart from this latter half of the 20th century amidst its stolid guardians of old stone walls and tall Spanish bayonet trees. Indeed the old mansion does have a mystic characteristic about it that exudes a quality of permanence and calm and an indestructible link with the past which only the sensitive who walk around and through it can feel. Very few of us who are caught up in the hustle and bustle of making a living ever stop to ponder the historic symbol that is Wallblake House and the importance it played in the Anguilla of the 19th century and especially the early 20th century....

... we know that the old house was built in 1787 because of a brick placed in the northern side of the old kitchen and bakery on which that date was carved and is still faintly visible. We do not know, however, how long it took to build and how much expertise it required or how much labor, but here again we do know that it must have taken at least eighteen months to build (possibly much longer) because of the cut stone involved, some of which may have come from East End or even Scrub Island, and the lime used to hold the stone together, which had to be made from burnt coral and shells and then mixed with molasses and marl. The woodwork in the superstructure must have taken long and careful labor with the beading of each board used in the double panelling of each partition and especially in the intricate carving involved in decorating the edges of the tray ceiling with "roping" (tray ceilings are so called because they look like inverted trays suspended from the roof, and roping because they look like rope tacked onto the edges to hide irregularities). So at least we know that the construction of this old house must have taken a large number of skilled stone-masons (especially when one looks at the cistern) and skilled carpenters among which there may have been shipwrights as well as gangs of unskilled labor....



Since 1959*, apart from very brief visits by Catholic priests [the house and surrounding property were willed to the Catholic Church in 1976], and temporary usage as a place of worship, Wallblake House has remained largely idle and empty. In 1978, it was leased by the Government of Anguilla to house the Department of Tourism, which was largely responsible for extensive renovations of the old house and an almost complete renovation of the kitchen with its unique chimney.

Since the lease was terminated, Wallblake House has reverted to being the rectory of the Roman Catholic Church. In an island where hurricanes and economic change have removed so much of Anguilla's structural historical heritage, Wallblake remains an intact symbol of what once was. It is therefore the duty of all Anguillians ... to ensure that this beautiful mansion continues to grace the present with memories of the past.

* For a full accounting of the building's history, see the article from which these excerpts are taken.

ISSUE TWO:
Although some positive steps have been taken in the last decade, Anguilla does not yet have a well-defined or adequately-supported policy for its surviving archaeological and historical resources.

Since the late 1970's, the Government of Anguilla has taken the initiative and provided crucial resources on a number of occasions to advance historical resource development in the Territory. For example, the first archaeological/historical resource survey in 1979 was carried out under the sponsorship of Government. The more recent provision of the old Customs House for a proposed museum, sponsorship of a wreck-salvage operation (see Issue Three), a UNDP-funded archaeological cataloguing project (1992-93), and support for the establishment of a National Trust all represent positive leadership by the Government of Anguilla in the area of historical resource development.

An Antiquities Ordinance (No. 13 of 1983) was enacted a decade ago to provide protection for "listed" historic buildings and archaeological sites and artifacts. Unfortunately, there has been little effort to implement the provisions of this legislation, and therefore, at the present time, important historical resources are afforded little protection.

HISTORIC PRESERVATION AND RESTORATION PROGRAMS MUST BE PERCEIVED AS POSITIVE THRUSTS -- NOT RESTRICTIVE TO EITHER PUBLIC OR PRIVATE SECTOR INITIATIVES.

The preparation of the "list" called for in the Antiquities Ordinance is particularly important because national consensus and an officially-sanctioned inventory of priority sites is a prerequisite to informed decision-making about the preservation, use, and development of these resources. The "list" could take the form of a "National Trust Registry of Historic Places" (assuming recent efforts to launch the Anguilla National Trust are carried forward), and could not only identify known sites but also evaluate and rank them according to significance, condition, preservation needs, and reuse potential.

The Registry can be an important planning tool; without it, future management decisions about the use of historical/cultural resources will tend to be fragmented and lack a strong central focus, and may well fail to develop necessary links with other sectors such as tourism.

Community input in the process of ranking and evaluating sites for inclusion on a National Registry is important because broader-based, long-term support of historical resource protection programs will require a change in community attitudes about this resource sector and its significance to Anguilla. Without wider public support, it will be difficult for Government to impose or enforce development controls for historically-important buildings or other privately-held property -- or to divert public monies for the acquisition of land, sites or buildings as part of a heritage protection strategy (at the present time, there is no public trust fund for Government acquisition of such resources).

The preservation of traditional architectural features and other vernacular building forms also needs to be affirmed as a development control goal of Government. The employment of economic and other incentives can be used to encourage design controls and adaptive reuse or restoration of historic buildings.

Such incentives do not necessarily have to be initiated by Government. For example, a group of property owners in a given area, who see an economic advantage to historic preservation, might join together as a an informal group to establish and monitor local standards

and controls. There would be no official sanction to such action, but it might serve as a force for creating public interest and support (this has already occurred with a relative amount of success in Basseterre, St. Kitts, where a "Basseterre Beautiful" Committee was formed under the leadership of the Chamber of Industry and Commerce). In any event, protection and restoration of vernacular architecture and historic buildings needs to be presented as a positive activity, almost a prestigious one, and must not be seen as restrictive to the intentions of private property owners.[12]

Museum development is another heritage issue which has received mixed attention for more than a dozen years. One museum consultant, making a visit to Anguilla in 1982, stated that "Anguilla should develop a strategy to correlate heritage, education and tourism through the development of its archaeological resources and their safeguard by [establishment of] a museum ...."[13] Even before this report, the Department of Tourism had set up a combined office, handicraft display center and mini-museum in the historic Wallblake House (see box, page 120) but this effort was abandoned in 1980 when the tourism office was relocated.

Seven years later, the Archaeological and Historical Society, working with Government, identified the vacant old Customs House in The Valley as the best available public building suitable for conversion to a National Museum. In 1988, the Government granted AAHS permission to use this building and appointed a National Museum Development Committee to assist with its development. Plans were drawn for conversion of the building (estimated at approximately US$100,000), and partial funding was secured to begin the renovation. It is hoped that the building will be ready to open it to the public by the end of 1993.

At the present time, Government has not committed operational funds for the museum, nor have personnel been identified to staff the facility. There is no development plan, nor a clear concept of how the National Museum fits into a larger heritage protection program. While the Archaeological Society has cooperated with Government during the last four years in moving the museum project forward, it does not, under present policies, have the financial or human resources or an interest in taking over responsibility for management of the National Museum. Under these circumstances, museum development and management can, most logically, be viewed as the eventual responsibility of the new National Trust (see Issue Three). There are many examples in the Eastern Caribbean of national museums which were established and then operated under the aegis of an NGO (Antigua, Nevis, Grenada, St. Kitts) or a National Trust (St. Lucia, Montserrat).

RECOMMENDATIONS:

8.6 Existing legislation for the protection and restoration of historical resources needs to be more aggressively implemented. The establishment of a "National Trust Registry of Historic Places" should be considered as part of a legal framework for heritage protection, with the Anguilla National Trust taking the lead in developing the Registry. National landmarks, historical/archaeological sites, and architectural features listed on the "Registry" should be protected. Public input needs to be solicited in the process of selecting, evaluating, and ranking sites for inclusion on the National Registry.

The existing land-oriented antiquities law might be updated at some point to address issues of shipwreck site protection, search and salvage procedures, artifact disposition, and recreational diving on historic wreck sites.

8.7 Buildings, sites, or other landmarks included on the National Registry should be properly identified as such, with signs posted informing the public that they are protected and that artifact removal, defacement or similar acts are illegal. Signs are also needed at the airport and seaports advising the public

that it is illegal to export Anguillian antiquities.

8.8 The Government should work with appropriate NGOs and community groups to secure more extensive support and commitment for its program of historical/cultural resource development. Broader consensus might be achieved through development of a comprehensive "national heritage protection policy". The authority, responsibilities, and expertise of the National Trust (see Issue Three), NGOs, and GOA agencies involved in some aspect of historical/cultural resource management could be clarified and integrated through development and adoption of such a national policy.

8.9 The Government of Anguilla needs to give serious consideration to preparation and adoption of a national museum development plan. In the near-term, attention needs to focus on the National Museum to be housed in the old Customs House. Issues of operational funding, staffing needs, training requirements, and the like need to be dealt as soon as possible, either through the existing Museum Development Committee or the new National Trust.

A national museum plan should evaluate other museum sites which have been proposed for Anguilla, for example, an Amerindian Museum at the Fountain National Park[14] and a Salt and Marine Heritage Museum in the presently unused former Salt Factory at Sandy Ground.

ELEMENTS OF EFFECTIVE HISTORICAL RESOURCE MANAGEMENT PROGRAMS:

(i) A COMPREHENSIVE NATIONAL POLICY TO BRING TOGETHER ISSUES RELATED TO HERITAGE PROTECTION UNDER A COHESIVE OPERATIONAL PROGRAM.

(ii) CLEAR LINES OF RESPONSIBILITY FOR THE MANAGEMENT OF HISTORICAL AND CULTURAL RESOURCES.

(iii) ADEQUATE LEGISLATION TO PROTECT HISTORICAL AND CULTURAL RESOURCES.

(iv) COMMUNITY CONSENSUS ON HOW HISTORICAL RESOURCES ARE TO BE USED AND DEVELOPED IN THE NATIONAL INTEREST.

ISSUE THREE:

Until recently, Anguillian NGOs interested in the "environment" have been focused primarily on archaeological, historical, and marine-related issues. More recent interest in activating a National Trust should be energetically pursued as Anguilla needs a strong institutional vehicle to implement broader-based environmental and heritage protection programs.

Anguilla's oldest environmental non-government organization (NGO) is the Anguilla Archaeological and Historical Society, founded in 1981 "to protect and preserve Anguilla's past cultural heritage". The Society is managed by a Board of Directors elected every two years. Its membership has ranged from a low of 20 to over 100 persons, with a proportional representation of one-third Anguillians, one-third foreign residents, and one-third visitors or tourists. The Society employs no staff, has no office, and is dependent on the volunteer work of an energized core of committed members. Revenues are primarily based on membership fees and solicited donations.

Since its establishment over a decade ago, the Society has been the leading force for archaeological resource development in Anguilla and has been active primarily in identifying archaeological sites, carrying out salvage work, preserving collected artifacts, and interacting with other archaeologists in the region. Until recently, the Society was the only environmental NGO in Anguilla, and, as such, its program agenda often extended beyond its primary archaeological research interests. For example, AAHS is the local NGO coordinator for the UNDP-funded "Environmental Profile Project" (1992-93). The Society has also been actively involved in two government-appointed committees -- the Fountain National Park Development Committee and the National Museum Development Committee -- and has assumed a leadership role in both these efforts. It also was a major proponent for enactment of a National Trust Ordinance in the late 1980's.

The only other environmental NGO in Anguilla is the Marine Heritage Society (MHS) which was founded in 1990. The group was set up specifically to raise funds for and supervise the removal of several unsightly shipwrecks in Road Bay, which were eventually relocated and sunk as an artificial reef. It has, from time to time, provided advisory services to GOA's Department of Fisheries and Marine Resources and co-sponsored recent Easter Monday boat races.

A most promising sign of renewed concern for resource conservation has been the recent interest in activating the Anguilla National Trust (ANT). Anguilla's Trust Ordinance (No. 7, 1988) is not unlike similar legislation enacted throughout the Caribbean. It charges the Trust with protecting and promoting the natural and cultural heritage of Anguilla and empowers it with authority to raise funds, acquire property, and manage the use of the property it holds.

In 1991, the Trust received funding from the Caribbean Conservation Association, under a grant from the U.S.-based MacArthur Foundation, to assist in developing the Trust and establishing a national "heritage" program. A part-time executive director was employed and a few cultural projects implemented, primarily related to theater productions.

However, at the present time, the Trust lacks a sufficient institutional structure for assuming its proper leadership position in Anguilla. It was only in early 1993 that the Governor appointed GOA members to the Trust Council, the legal governing body of the organization (the AAHS had already appointed two members to the Council). Final organizational steps should be completed shortly, leading to the more difficult task of shaping an institutional development plan and an interim program implementation plan.

The national trust institutional structure has been used successfully elsewhere in the Caribbean and is a particularly appropriate organizational vehicle for establishing conservation support in a country that lacks a broadly-focused environmental NGO. In most Caribbean countries, the national trust -- although established by legislative authority -- functions very much like an NGO, that is, it is membership-based, operates in the private sector (as well as the public sector), has a broad environmental agenda, and raises external funding on the strength of its quasi-independent status.

At the present time, the future role of the Anguilla National Trust is predicated on:

(i) its ability to take immediate steps that clearly demonstrate the Trust's long-term viability,

(ii) the effectiveness of the planning process in the months ahead to build an appropriate institutional structure, and

(iii) the Trust's capacity to ultimately generate public and private sector support and commitment within Anguilla for its program goals and priorities.

RECOMMENDATIONS:

8.10 Immediate steps need to be taken to fully establish Anguilla's National Trust, an organization whose potential role in resource conservation is substantial. Sufficient attention must be paid to institutional development prerequisites or the Trust's long-term viability will be at risk. For example, the Trust should:

- prepare an institutional development plan which articulates long-term goals and objectives;
- identify revenues and program funding, including preparation and approval of an annual operational budget;
- prepare a staffing plan, including as a first priority a job description and delineation of job responsibilities for the executive director;
- develop an annual program plan which focuses on strategies and activities for a 12-month period; and
- identify a source of technical support for program planning, fund raising, and institutional development.

8.11 Until such time as the National Trust is fully functional and in a position to manage programs and property, the continuing role of the Archaeological and Historical Society in resource conservation and heritage protection in Anguilla should not be undervalued. Its role, however, will undoubtedly change as the Trust matures institutionally and assumes its leadership position in the Territory.

To a lesser extent this is also true of the Marine Heritage Society. MHS's focus on marine resources is important in Anguilla where the island's maritime heritage is widely appreciated and where the healthy status of marine resources is essential to economic well-being. There might eventually be some redundancy or overlap in the programs of the Marine Heritage Society and an active National Trust, and therefore it may be appropriate at some later point to fold the MHS action agenda into the larger program plan of the National Trust. But until the Trust is in a position to assume leadership for marine-focused conservation programs, a viable and active Marine Heritage Society is not unimportant.

ISSUE FOUR:
Anguilla's historical heritage does not lie only in buildings, a museum, burial grounds, or archives, but also in its people's sense of place and well-being.

There appears to be a general consensus that traditional values and behavior are being altered in Anguilla today, largely due to the influence of television from North America and the changes stimulated by the rapid economic growth of the 1980's. For example, while historically mothers and grandmothers stayed at home to raise children, today the marketplace has been opened to these women who are often working more than one job. This, in turn, has raised concerns about how the children of Anguilla are to be taught traditional moral and family values. There are troublesome trends in recent statistics about increased juvenile delinquency, child abuse, sexual violence, and homelessness. The figures are low, but the trend is worrisome.[15]

In the face of the forces of change which now touch the daily lives of all Anguillians, a renewed emphasis on the island's shared traditions and its common historical outlook should not be overlooked in attempts to preserve and defend the more tangible evidence of Anguilla's past. While the island has a limited inventory of important historical landmarks, it does have a number of impressive cultural traditions which need to be counted as a part of Anguilla's surviving heritage -- along with the bricks and motor, the shards and bones of antiquity. The tradition of boat building and boat racing, cultural festivals and carnival, the central unifying force of the sea, the village-focused sense of community, folk art and crafts, music, literature, theater, and architecture -- all need to be nourished and preserved for the Anguillians yet to be.

RECOMMENDATION:

8.12 Oral history recordings provide a means of documenting the island's social history, and more needs to be done to promote this type of historical research.

KEY THEMES OF CHAPTER 8

- As the pace of development has quickened in Anguilla during the last decade, the island's surviving archaeological sites, historic landmarks, and indigenous architecture are increasingly at risk. For example, of the 60 acres of important archaeological sites inventoried by the Archaeological and Historical Society in 1982/83, only 15 acres remained in 1992.
- As a consequence, cultural resource surveys by professional archaeologists are needed prior to approval of major development projects, with time allowed for salvage archaeology, if necessary, before construction begins.
- Anguilla's first national park -- at the Fountain Cavern -- is a cave and natural spring remembered by most Anguillians as a source of precious water; but it also is a unique natural area and contains an important archaeological find, making it an appropriate choice for development as a tourism amenity. Anguilla needs to take steps to legally establish the park and identify donor support for its development.
- Generally speaking, Anguilla's tourism package could be enriched by linking tourism more closely with the attributes of the island's surviving historical and cultural heritage. Development of a cultural tourism plan would help to identify resources, needs, opportunities and strategies for taking full advantage of Anguilla's historical and cultural assets in future tourism planning and marketing.
- The establishment of a "National Trust Registry of Historic Places" -- which lists, evaluates, and ranks the importance of Anguilla's surviving historical resources -- would strengthen Anguilla's 1983 Antiquities Ordinance which has not yet been implemented. An opportunity should be provided for community input in the process of adding sites to a National Registry, for without wider public support for historical resource protection programs, it is difficult for the Government to impose or enforce development controls for historically-important buildings or other privately-held property on which historical artifacts are located.
- Examples of traditional West Indian architecture can still be found in Anguilla, but the importance of preserving these indigenous buildings and architectural features needs to be more positively asserted as a development control goal if they are to survive into the twenty-first century. Incentives for preserving and restoring important buildings do not necessarily have to be initiated by Government but might come from the private sector.
- Government and interested NGOs and community groups could work together to draft a national policy that brings together issues related to heritage protection under a cohesive operational program with clear lines of responsibility for the management of historical and cultural resources. The role of the new National Museum within the Territory's larger heritage protection program needs to be reviewed, and an operation plan for its development, funding, staffing, and management needs to be worked out.
- Together, Government and Anguilla's environmental NGOs can find ways to cultivate and nurture a more active public/private sector partnership. Such partnerships elsewhere in the Caribbean have resulted in joint programs (for museum, archival, and historic site development) which have strengthened and advanced resource conservation goals.
- Final organizational steps will be completed in the near future for the official launching of the Anguilla National Trust, which was created by ordinance in 1988. More difficult tasks will follow, including the shaping of an institutional development plan and program implementation strategy. The Trust's potential role for protecting and promoting the natural and cultural heritage of Anguilla is substantial, and it is important that those who assume Trust leadership in the months ahead move quickly to build an effective institutional structure, targeted program goals, and adequate community support.

REFERENCE NOTES - CHAPTER 8
ANGUILLA'S HISTORICAL AND CULTURAL HERITAGE

1 Carty, D., 1985. Address to the Anguilla Archaeological and Historical Society by the President (31 May).

2 See note 1.

3 Douglas, N., 1992. Environmental, archaeological and historical components recommended to be included in a proposed "strategic review" of Anguilla's resources. Prepared for the Government of Anguilla.

4 Mitchell, D., n.d. Anguilla: From the archives 1650-1750. Anguilla Archaeological and Historical Society. The Valley, Anguilla.

5 Figueredo, A., *et al.*, 1980. Preliminary reconnaissance survey report on the archaeological and historical resources of Anguilla, West Indies. Prepared for the Government of Anguilla by Islands Resources Foundation. St. Thomas, USVI.

6 See note 5.

7 Searle, D., 1972. Anguilla: An outline development plan for tourism. Prepared by The Shankland Cox Partnership. London, UK.

8 Smith, A., 1992. Hodge Homestead. *Anguilla Life*, vol. 5, no. 1.

9 Gurnee, J. (ed.), 1989. A study of Fountain national park and Fountain cavern. National Speleological Foundation.

10 Gurnee, J., 1989. A proposed visit to Fountain national park. In: Gurnee, J. (ed.), A study of Fountain national park and Fountain cavern. National Speleological Foundation.

11 Excerpts taken from: Carty, D., 1985. Wallblake House: An Historic Past. In: Anguilla Archaeological and Historical Society Review, 1981-1985.

12 Towle, J. (ed.), 1985. The uses of historical resources in Eastern Caribbean development Report of a workshop held at Brimstone Hill, St. Kitts, October 21-23, 1983. Island Resources Foundation St. Thomas, USVI.

13 Whiting, J., 1983. Anguilla country visit report. Consultant's report prepared for UNESCO

14 See note 9 above.

15 Strategic Review Workshop (February 11-12, 1993), convened for discussion of the Interim Strategic Review Report for Anguilla.

BIBLIOGRAPHY

ANGUILLA ENVIRONMENTAL PROFILE

AGRICULTURE

Caribbean Development Bank, 1983. Regional forestry sector study country report, Anguilla. Bridgetown, Barbados.

Fiester, D., *et al.*, 1977. Anguilla. In: Agricultural development in the Eastern Caribbean: A survey. Prep. for USAID, Washington, DC.

Hodge, M., 1992. Agriculture in Anguilla. St. Kitts and Nevis Teacher's College of Further Education, Division of Teacher Education.

Matadial, W., 1986. Soils and agricultural potential of Anguilla. CARDATS, St. Vincent.

ARCHAEOLOGY AND PALEONTOLOGY

Anguilla Archaeological and Historical Society, 1984. The constitution of the Archaeological and Historical Society. The Valley, Anguilla.

Budd, A., K. Johnson, and J. Edwards, 1989. Miocene coral assemblages in Anguilla, B.W.I. and their implications for the interpretation of vertical succession on fossil reefs. *Palaios*, 4:264-275.

Cope, E., 1868. (discussion of exhibited Anguilla rodent remains). *Proc. Acad. Nat. Sci.*, 20:313. Philadelphia.

Cope, E., 1969. Synopsis of the extinct mammalia of the cave formations in the United States, with observations on some Myriapoda found in and near the same, and on some extinct mammals of the caves of Anguilla, W.I., and of other localities. *Proc. Amer. Phil. Soc.*, 11:171-192.

Cope, E., 1869. (discussion of exhibited Anguilla rodent remains). *Proc. Acad. Nat. Sci.*, 21:92. Philadelphia.

Cope, E., 1883. On the contents of a bone cave. *Smithsonian Inst. Contrib. to Knowledge*, 25(2):1-30.

Douglas, N., 1985. Anguilla's Fountain Cavern. Anguilla Archaeological and Historical Society. The Valley, Anguilla.

Douglas, N., 1985. Surface archaeology of Anguilla: Summary of the monitoring of 10 sites. Anguilla Archaeological and Historical Society. The Valley, Anguilla.

Douglas, N., 1990. The Fountain: An Amerindian ceremonial cavern on Anguilla, its petroglyphs and other finds related to surface archaeology of Anguilla's major beach sites. In: Pantel, A., I. Vargas Arean, and S. Obediente, eds., Proceedings of the Eleventh Congress of the International Association for Caribbean Archaeology, pp 141-145.

Douglas, N., 1991. Recent Amerindian finds in Anguilla. In: Ayubi, E. and J. Havisar, eds., Proceedings of the Thirteenth International Congress for Caribbean Archaeology, pp. 576-588.

Drooger, C., n.d. Foraminifera from the Tertiary of Anguilla, St. Martin and Tintamarre (Leeward Islands, West Indies). Kon. Nederlandse Akad. Weten., Pr. Ser. B, 54:54-65.

Figueredo, A., *et al.*, 1980. Preliminary reconnaissance survey report on the archaeological and historical resources of Anguilla, West Indies. Prepared for Govt. of Anguilla by Island Resources Foundation. St. Thomas, USVI.

Havisar, J., 1991. Development of a prehistoric interaction sphere in the northern Lesser Antilles. *New West Indian Guide*, 65(3 and 4):129-151.

Howe, M., 1919. Contributions to the geology and paleontology of the West Indies. I: Tertiary calcareous algae from the islands of St. Bartholomew, Antigua and Anguilla. Carnegie Inst., 291:9-19. Washington.

Leidy, J., 1859. [Fossils from Sombrero Island]. *Proc. Acad. Nat. Sci.*, 11:111. Philadelphia.

Leidy, J., 1868. Notice of some vertebrate remains from the West Indian islands. *Proc. Acad. Nat. Sci.*, 20:178-180. Philadelphia.

McFarlane, D., 1991. The search for Anguilla's giant rodent. *Terra*, 30(2).

McFarlane, D. and R. MacPhee, 1989. Amblyrhiza and the quaternary bone caves of Anguilla, British West Indies. *Cave Science*, 16(1):31-34.

Petersen, J. and D. Watters, 1991. Amerindian ceramic remains from Fountain Cavern, Anguilla, West Indies. *Annals of Carnegie Museum*, 60(4):321-357.

Pregill, G., 1992. Systematics of the West Indian lizard genus *Leiocephalus* (Squamata: Iguania: Tropiduridae). Univ. Kansas Mus. Nat. Hist. Misc. Publ. (84):1-69.

Watters, D., 1989. Archaeological implications for Lesser Antilles biogeography: the small island perspective, pp. 153-166. In: C. Woods, ed., Biogeography of the West Indies, past, present and future. Sandhill Crane Press. Gainesville, Florida.

Watters, D., 1991. Archaeology of Fountain Cavern, Anguilla, West Indies. *Annals of Carnegie Museum*, 60(4):255-319.

Vaughan, T., 1919. Fossil corals from Central America, Cuba, and Porto Rico, with an account of the American Tertiary, Pleistocene, and recent coral reefs. *Bull. Smithsonian Inst.*, 103:1-524.

ECONOMIC DEVELOPMENT

Anguilla Government, 1979. The salt industry in Anguilla. *Govt. Info. Serv. Bull.*, 2(3):8-12.

Anguilla National Accounts Statistics, 1984-1987.

Anguilla Government, 1991. Five year development program, 1991-1995. Development Planning Unit, Ministry of Finance. The Valley, Anguilla.

British Development Division, 1983. Anguilla airport development. Pre-feasibility study for the development of a new airport site.

Caribbean Development Bank, 1985. Economic memorandum on Anguilla. Prepared by Economics and Programming Dept. Bridgetown, Barbados.

Eastern Caribbean Central Bank, 1990. Economic and financial review. Vol. 8, no. 3 (Sept.). Prepared by the Research Department.

Eastern Caribbean Central Bank, 1991. Report and statement of accounts for the financial year ended 31 March, 1991.

McElroy, J. and K. deAlbuquerque, 1985. Anguilla. In: Latin America and Caribbean contemporary record. Volume III(1983-84):687-693. Holmes and Meier. New York, NY.

Mokoro Limited ... Consulting Services for the Third World, 1993. Anguilla strategic review. Interim report (February). Prepared for Govt. of Anguilla.

Radian International Corporation, 1978. Anguilla - an economic overview. Coral Gables, FL.

Talwar, O., 1987. Development experience and possibilities in Anguilla. Paper prepared for the Government of Anguilla by the Interregional Adviser on Development Planning, Department of Technical Co-operation for Development, United Nations Secretariat. New York.

ENVIRONMENTAL HEALTH

Archer, A., 1991. Report on consultancy services for wastewater management and improvement of Environmental Health Department. UNDP/PAHO environmental health development project, Anguilla.

Cambers, G., 1988. Regional sewage disposal and coastal conservation studies. Vol. III: Regional survey of coastal conservation. United Nations Economic Commission for Latin America and the Caribbean.

Griffith, C., 1991. An interim report on the United Nations Development Program and Pan American Health Organization solid waste management project for Anguilla.

Jonah, C., 1991. Environmental health development project, Anguilla. Environmental health profile. ECA-CWA-010/81.1/2865-91. Prepared for UNDP/PAHO/WHO.

Pan American Health Organization (PAHO), 1987. National solid waste management workshop, Anguilla (13-14 August, 1987).

ENVIRONMENTAL PLANNING

Adams and Associates, 1977. A preliminary assessment of the effects of an oil refinery and other developments on the future of Anguilla. Prepared for Petro Caribe Group. St. Thomas, USVI.

Anderson, P., 1987. Proposed Shoal Point [Shoal Bay East] marine park. Unpubl. rpt., Dept. Lands and Survey. Anguilla.

Anderson, P., 1987. Sandy Island proposed interim policy. Unpubl. rpt., Dept. of Lands and Survey. Anguilla.

Airports Authority Group - Transport Canada, 1987. Wallblake Airport land use plan. Prepared as part of CIDA's Caribbean Airports Project.

Halcrow Caribbean Limited, 1983. Anguilla airport development: Pre-feasibility study for the development of a new airport site. Prepared for British Development Division. Bridgetown, Barbados.

International Maritime Organization, 1992. Sub-regional oil spill contingency plan for the island states and territories of the wider Caribbean region.

U.S. Government, Department of the Navy, 1979. Dog Island environmental reconnaissance study. Tippetts-Abbett-McCarthy-Stratton (TAMS) and Ecology and Environment, Inc.

FISHERIES AND MARINE/COASTAL RESOURCES

Abernethy, C., 1985. Coastal erosion in Anguilla. Prepared for British Overseas Development Administration.

Anguilla Government, 1978. Draft policy on fishing and fisheries development in Anguilla. Min. Nat. Res. Tour. The Valley, Anguilla.

Bellairs Research Institute (McGill Univ.), 1990. A survey of marine habitats around Anguilla, with baseline community descriptors for coral reefs and seagrass beds. Prepared for Dept. of Agriculture and Fisheries., Govt. of Anguilla. St. James, Barbados.

Cambers, G., 1992. Evaluation of the UNESCO coastal monitoring programme in the Lesser Antilles. Prepared for UNESCO COMAR COSALC I project: Beach and coastal stability in the Lesser Antilles.

Caribbean Association of Industry and Commerce (CAIC), 1985. Pilot project for the marketing of fish in Anguilla. Grant proposal to the Canadian Association for Latin America and the Caribbean. St. Michael, Barbados.

DuBois, R., 1980. Anguilla fisheries. Unpubl. rpt. prepared for Eastern Caribbean Natural Area Management Program. St. Croix, USVI.

Goodwin, M., 1988. A project to implement a marine parks programme for improved management of marine resources in Anguilla, West Indies. Prepared for Govt. of Anguilla, Ministry of Agriculture and Fisheries by Caribbean Conservation Association with South Carolina Sea Grant Consortium. Charleston, SC.

Goodwin, M. and G. Cambers, 1983. Artificial reefs: A handbook for the Eastern Caribbean. CIDA.

Goodwin, M., *et al.*, 1984. An assessment of the mariculture potential of indigenous eastern Caribbean brine shrimp. Prepared for USAID by Island Resources Foundation. St. Thomas, USVI.

Goodwin, S. and M. Goodwin, 1992. Anguilla's marine resources: Threatened treasures. Prepared for Govt. of Anguilla by Coastal Images and South Carolina Sea Grant Consortium, with support from the U.S. Fish and Wildlife Service. Charleston, SC.

Jackson, I., 1981. A preliminary management strategy for the utilization of the critical marine resources of Anguilla. Prepared for Eastern Caribbean Natural Area Management Program. St. Croix, USVI.

Jones, T., 1986. The fishing industry of Anguilla 1985. Prep. for Govt. of Anguilla and Commonwealth Secretariat.

Meylan, A., 1983. Marine turtles of the Leeward Islands, Lesser Antilles. *Atoll Research Bulletin*, 278:1-23. Smithsonian Institution. Washington, DC.

Olsen, D. and J. Ogden, 1981. Management planning for Anguilla's fishing industry. Draft report prepared for Eastern Caribbean Natural Area Management Program. St. Croix, USVI.

Peacock, N., 1973. A proposal for a marine parks scheme for Anguilla. Unpubl. rpt. by the Marine Biologist for Antigua and Barbuda.

Salm, R., 1980. Anguilla: Coral reefs and the marine parks potential. Consultation on the selection and design of marine parks and reserves. Prepared for ECNAMP and Govt. of Anguilla.

Stephenson, A., 1987. Anguilla fisheries development plan, 1987-1997. Dept. of Fisheries and Marine Resources, Govt. of Anguilla. The Valley, Anguilla.

Wells, S., 1988. Extracts from: Coral reefs of the world. Vol. 1: Atlantic and Eastern Pacific. Prepared by the IUCN Conservation Monitoring Center, in collaboration with UNEP. Cambridge, UK.

FLORA AND FAUNA

Anguilla Government, 1979. The birds of Anguilla. *Government Information Service Bulletin*, 1(12):6-11. The Valley, Anguilla.

Barbour, T., 1914. A contribution to the zoogeography of the West Indies, with especial reference to amphibians and reptiles. *Mem. Mus. Comp. Zool.*, 44(2):312-313. Harvard Univ.

Barbour, T., 1923. West Indian investigations of 1922. Occ. Pap. Mus. Zool, (132):1-7. Univ. of Michigan

Baskin, J. and E. Williams, 1966. The Lesser Antillean *Ameiva*. Stud. Fauna Curacao Carib. Is., 89:143-176.

Beard, J., 1949. Extracts from: The natural vegetation of the Windward and Leeward Islands. Clarendon Press. Oxford, UK.

Boldingh, I., 1909. A contribution to the knowledge of the flora of Anguilla. Recueil. Trav. Bot. Neerl., 6:1-34.

Bond, J., 1971. Birds of the West Indies. Collins Clear Type Press. London.

Box, H., 1940. Report upon a collection of plants from Anguilla, B.W.I. *J. Bot.*, 78:14-16.

Censky, E., 1986. The reptiles of Anguilla. Report to GOA. Carnegie Museum of Natural History. Pittsburgh, PA.

Censky, E., 1988. *Geochelone carbonaria* (Reptilia:Testudines) in the West Indies. *Florida Sci.*, 51(2):108-114.

Censky, E., 1989. *Eleutherodactylus johnstonei* (Salientia:Leptodactylidae) from Anguilla, West Indies. *Carib. Jour. Sci.*, 25:229:230.

Censky, E. and D. Paulson, 1992. Revision of the *Ameiva* (Reptilia:Teiidae) of the Anguilla Bank, West Indies. Ann. Carnegie Mus., 61(3):177-195.

Cope, E., 1861. On the reptilia of Sombrero and Bermuda. *Proc. Acad. Nat. Sci.*, p. 312. Philadelphia.

Cope, E., 1862. Synopsis of the species of *Holcosus* and *Ameiva*, with diagnoses of new West Indian and South American Colubridae. *Proc. Acad. Nat. Sci.*, 14:60-82. Philadelphia.

Cope, E., 1869. Seventh contribution to the herpetology of tropical america. *Proc. Amer. Acad. Sci.*, 11:147-169. Philadelphia.

Davis, S., *et al.*, 1986. Plants in danger, what do we know? Threatened Plants Unit, IUCN Conservation Monitoring Centre. Published by IUCN. Gland, Switzerland and Cambridge, UK.

Douglas, G., 1986. Report on the vegetation of the Fountain Cavern National Park. Prepared on behalf of the Anguilla Archaeological and Historical Society.

Dunn, E., 1934. Physiography and herpetology in the Lesser Antilles. *Copeia* (3):105-111.

Genoways, H., 1989. The bats of Fountain Cavern, p. 22. In: J. Gurnee, ed., A study of Fountain National Park and Fountain Cavern, Anguilla, British West Indies. Nat. Spel. Found. Closter, New Jersey.

Government Information Service, 1979 (October). Anguilla: The land, climate and flora. The Valley, Anguilla.

Halewyn, R. van and R. Norton, 1984. The status and conservation of seabirds in the Caribbean. In: Croxall, I., *et al.* (eds.), Status and conservation of the world's seabirds. ICBP technical publication no. 2. Cambridge, UK.

Harris, D., 1965. Plants, animals, and man in the outer Leeward Islands, West Indies. Publications in geography, vol. 18. University of California Press. Berkeley, CA.

Henderson, R. and B. Crother, 1989. Biogeographic patterns of predation in West Indian colubrid snakes, pp. 479-518. In: C. Woods, ed., Biogeography of the West Indies, past, present, and future. Sandhill Crane Press. Gainesville, Florida.

Henderson, R. and R. Sajdak, 1986. West Indian Racers: a disappearing act or a second chance? *Lore*, 36(3):13-18.

Howard, R. and E. Kellogg, 1987. Contributions to a flora of Anguilla and adjacent islets. *Jour. Arnold Arboretum*, 68:105-131.

Jones, L., 1989. Distribution and systematics of bats in the Lesser Antilles, pp. 645-660. In: C. Woods, ed., Biogeography of the West Indies, past present and future. Sandhill Crane Press. Gainesville, Florida.

King, W., 1962. Systematics of the Lesser Antillean lizards of the genus *Sphaerodactylus*. *Bull. Florida State Mus.*, 7(1):1-52.

Lazell, J., 1964. The reptiles of Sombrero, West Indies. *Copeia*, 1964:716-718.

Lazell, J., 1972. The anoles (Sauria, Iguanidae) of the Lesser Antilles. *Bull. Mus. Comp. Zool.*, 143(1):1-115. Harvard Univ.

Lazell, J., 1973. The lizard genus Iguana in the Lesser Antilles. *Bull. Mus. Comp. Zool.*, 145:1-28. Harvard Univ.

Lazell, J. and E. Williams, 1962. The anoles of the eastern Caribbean (Sauria, Iguanidae). *Bull. Mus. Comp. Zool.*, 127(9):451-478. Harvard Univ.

McLaughlin, J. and J. Roughgarden, 1989. Avian predation on *Anolis* lizards in the northeastern Caribbean: an inter-island contrast. *Ecology*, 70(3):617-628.

Oldfield, S., 1987. Fragments of paradise. A guide for conservation action in the U.K. dependent territories. Prepared for British Assoc. of Nature Conservationists. Pisces Publications. Oxford, UK.

Phillips, C., *et al.*, 1989. Caribbean island zoogeography: a new approach using mitochondial DNA to study neotropical bats, pp. 661-684. In: C. Woods, ed., Biogeography of the West Indies, past, present and future. Sandhill Crane Press. Gainesville, Florida.

Roughgarden, J., 1991. Origin of the eastern Caribbean: data from reptiles and amphibians. Transactions, 12th Caribbean Geology Conference.

Roughgarden, J. and S. Pacala, 1989. Taxon cycle among Anolis lizard population: Review of evidence, pp. 403-432. In: D. Otte and J. Endler (eds.), Speciation and its consequences. Senauer Association.

Roughgarden, J., J. Rummel, and S. Pacala, 1983. Experimental evidence of strong present-day competition between the *anolis* populations of the Anguilla Bank -- a preliminary report, pp. 499-506. In: A. Rhodin and K. Miyata, eds., Advances in herpetology and evolutionary biology. Mus. Comp. Zool. Cambridge.

Sajdak, R. and R. Henderson, 1991. Status of West Indian racers in the Lesser Antilles. *ORYX*, 25(1).

Underwood, G., 1962. Reptiles of the eastern Caribbean. *Carib. Affairs* (new series):1-192.

Williams, E., 1952. A new fossil tortoise from Mona Island, West Indies and a tentative arrangement of the tortoises of the world. *Bull. Amer. Mus. Nat. His.*, 99(9):545-560.

Williams, E., 1969. The ecology of colonization as seen in the zoogeography of anoline lizards on small islands. *Quart. Rev. Biol.*, 44(4):345-389.

GEOGRAPHY

Barnett, Captain E., 1859. The West India pilot, Vol II. The Caribbean Sea from Barbados to Cuba. Published by order of the Lords Commissioner of the Admiralty. London.

Directorate of Overseas Surveys, 1972. Anguilla with Dog Island and Scrub Island. Ser. E803, 1:25,000. Ministry of Defense, United Kingdom.

Eastern Caribbean Natural Area Management Program, 1980. Anguilla: Preliminary data atlas. ECNAMP, St. Croix, USVI.

GEOLOGY

Anguilla Exploration Company. Ltd., 1974. A proposal to explore the offshore hydrocarbon and mineral potential within the territorial waters of the territory of Anguilla. South Hill, Anguilla.

Bristol Exploration Club, 1972. Anguilla's karstic conundrum. *Bellfry Bulletin*, no. 292:41-43.

Christman, R., 1953. Geology of St. Bartholomew, St. Martin, and Anguilla, Lesser Antilles. *Bull. Geol. Soc. Amer.*, 64:65-93.

Earle, K., 1923. Report on the geology of St. Kitts-Nevis, BWI, and on the geology of Anguilla, BWI. Crown Agents for the Colonies. London.

Exploration Consultants Ltd., 1987. Petroleum potential of the north-east Caribbean with special reference to Anguilla, Dominica, St. Kitts and Montserrat. UNDP.

Goodell, H., n.d. Reconnaissance geology and geophysics of the Fountain Cavern, Anguilla, British West Indies. Dept. of Environmental Sciences, University of Virginia. Charlottesville, VA.

Gurnee, J. (ed.), 1989. A study of Fountain national park and Fountain cavern. National Speleological Foundation. Closter, New Jersey.

Julien, A., 1866. On the geology of the key of Sombrero, W.I. *Ann. Lyceum Natur. Hist.*, 8:1-28.

McFarlane, D., 1989. A preliminary catalogue of the caves of Anguilla, British West Indies. Section of Mammalogy, Natural History Museum of Los Angeles County.

McFarlane, D. and R. MacPhee, 1992. The caves of Anguilla, British West Indies. Anguilla Archaeological and Historical Society. The Valley, Anguilla.

Martin-Kaye, P., 1959. Reports on the geology of the Leeward and British Virgin Islands. By authority of the Governor, Leeward Islands.

Pregill, G., 1982. Summary of caves, sinkholes and overhangs on Anguilla. Investigated by the San Diego Natural History Museum and Smithsonian Institution.

Spencer, J., 1901. On the geological and physical development of Anguilla, St. Martin, St. Bartholomew, and Sombrero. *Quart. Jour. Geol. Soc.*, 57:520-533. London.

Vaughan, T., 1926. Notes on the igneous rocks of the northern West Indies and on the geology of the Island of Anguilla. *Jour. Washington Acad. Sci.*, 16(13):345-358.

GOVERNMENT

Anguilla Government, 1988. Anguilla, decisions of the House of Assembly on the report of the Constitution Review Committee.

Anguilla Government, 1988. Anguilla, report of the Constitution Review Committee.

Anguilla National Alliance, 1989. The Anguilla National Alliance manifesto for the 1989-1994 administration.

HISTORY AND CULTURE

Anguilla Government, 1979. Anguilla: Brief historical background of events to the present day. *Govt. Info. Serv. Bull.*, 1(10):5-13. The Valley, Anguilla.

Anguilla Government, 1979. Anguilla: 1650-1700. *Govt. Info. Serv. Bull.*, 2(3):2-6.

Anonymous, 1982. A complex fifteen years. Anguilla: A summary of events between 1967 and 1982.

Anonymous, 1984. St. Christopher, Nevis, and Anguilla: The story of their discovery, separate administrations, amalgamations and situation as of September, 1984.

Bannis, P., 1978. A Visit to Sombrero. Government Information Service, July 1978. The Valley, Anguilla.

Carleton, C., 1976. Anguilla: Church and State. Government Information Service. The Valley, Anguilla.

Carleton, C., 1977. Anguilla: Ten Years On: 1967-1977. Government Information Service. The Valley, Anguilla.

Carleton, C., n.d. Anguilla and Malawi. Government Information Service. The Valley, Anguilla.

Carty, D., 1978. Wallblake House: An historic place. Government Information Service. The Valley, Anguilla.

Carty, D., 1985. Address to the Anguilla Archaeological and Historical Society by the President (31 May).

Choisit, R., 1980. Anguilla: An illustrated chronology of events.

Douglas, N. (ed.), 1986. Anguilla Archaeological and Historical Society review, 1981-1985. AAHS. The Valley, Anguilla.

Government Information Service, 1978 (November). Historical notes on churches in Anguilla. The Valley, Anguilla.

Government Information Service, 1981. Anguilla's link with Slough [United Kingdom]. The Valley, Anguilla.

Government Information Service, 1984. Church of England in Anguilla. The Valley, Anguilla.

Government Information Service, n.d. Carnival in Anguilla. The Valley, Anguilla.

Gumbs, L., 1978. Shipwrecks and canons in Anguilla. Government Information Service. The Valley, Anguilla.

Mitchell, D., n.d. Anguilla, from the archives 1650-1750. Anguilla Archaeological and Historical Society. The Valley, Anguilla.

Petty, C., 1983. Anguilla: Where there's a will there's a way.

Petty, C. and N. Hodge, 1987. Anguilla's battle for freedom, 1967-1969. Petnat Publishing Co. Ltd.

Smith, A., 1992. Hodge homestead. *Anguilla Life*, vol. 5, no. 1.

Webster, R., 1987. Scrapbook of a revolution. Seabreakers Ltd. Anguilla.

Westlake, D., 1972. Under an English heaven. Simon and Schuster. New York, NY.

Winchester, S., 1985. The sun never sets: Travels to the remaining outposts of the British Empire. Prentice Hall Press.

Wulson, E., 1978. Anguilla (A university project). Sun City, Arizona.

SAND RESOURCES

Halcrow, Sir William and Partners, 1973. Anguilla sand resources. Prepared for Overseas Dev, Admin., Foreign and Commonwealth Off. London, UK.

Halcrow, Sir William and Partners, 1974. Anguilla sand resources. Supplementary report. Prepared for Overseas Dev. Admin., Foreign and Commonwealth Off. London, UK.

Hill, J. C. and Associates Ltd., 1975. Report on the sand resources. Prepared for Min. Overseas Dev. London, UK.

TOURISM

Anguilla Government, 1985. Tourism policy #2. Ministry of Tourism. The Valley, Anguilla.

Caribbean Tourism and Research Development Centre, 1985. Anguilla -- short term action plan for the tourism sector. Report prepared for the Government of Anguilla.

Dean, Compton, 1980. Coastal aspects tourist development at Cove and Maunday Bays, Anguilla, West Indies. Maundays Bay Development Co. Ltd.

Dixon, J. and P. Sherman, 1990. Economics of protected areas: A new look at benefits and costs. Island Press, Washington, DC.

Economic Commission for Latin America and the Caribbean (ECLAC), 1985. Tourism and environment in Caribbean development with emphasis on the Eastern Caribbean. WP/ETCD/L.85/2, ECLAC/UNDP.

Hastings, J., 1987. Anguilla: Review of the tourism sector in 1986, and proposals for the years 1987-1991-inclusive. Prepared for Govt. of Anguilla by the CFTC Tourism Development Adviser.

Holder, J., 1987. The pattern and impact of tourism on the environment of the Caribbean. Paper presented for workshop sponsored by the Banff Centre of Management, Caribbean Conservation Assoc., Caribbean Tourism Research and Development Centre and Caribbean Community Secretariat. Dover Convention Centre, Barbados, April 6, 1987.

Holder, J., 1990. The Caribbean: Far greater dependence on tourism likely. *The Courier*, 122(July-August):74-79.

Lascelles, R., 1977. Report and recommendations to the Government of Anguilla on tourism. London, UK.

Lindberg, K., 1991. Policies for maximizing nature tourism's ecological and economic benefits. International conservation financing project working paper. World Resources Institute, Washington, DC.

McCann, T., 1982. Anguilla tourism development status report. Unpubl. rpt. prepared for Island Resources Foundation. St. Thomas, USVI.

Pacific Asia Travel Association, 1992. Endemic tourism: A profitable industry in a sustainable environment. Pacific Asia Travel Association. New South Wales, Australia.

Renard, Y., 1991. Strategies for increasing community involvement in ecotourism. Paper presented at Caribbean conference on ecotourism. Belize, July 9-12, 1991.

Richardson, L., 1987. Anguilla: Review of the tourism sector in 1986, and proposals for the years 1987-1991 inclusive. Prepared for Govt. of Anguilla. The Valley, Anguilla.

Rogerson, Dewe Ltd., 1980. An assessment of opportunities and current problems. Prepared on behalf of the Anguilla Tourist Information Office. London, UK.

Searle, D., 1972. Anguilla: An outline development plan for tourism. Prepared by The Shankland Cox Partnership. London, UK.

Shafer, E. and J. Zeigler, c. 1991. Amenity resources policies to improve rural economic growth through tourism. Unpublished paper. Pennsylvania State University, University Park, Pa.

Smith, P., 1978. Anguilla - summary and comment on certain aspects of tourism development. London, UK.

The Economist, 1989. Third-world tourism: Visitors are good for you. March 11, 1989:19-22.

Ward, C. and C. Carty, 1988. Discover Anguilla. Michael Friedman Publishing Group.

Wilkinson, P., 1993. Tourism policy and planning in the Eastern Caribbean: Anguilla, Barbados, Dominica, and St. Lucia. Funded by Social Sciences and Humanities Research Council of Canada. York Univ. North York, Ontario, Canada.

WTO/UNDTCD/UNDP, 1992. Tourism and economic development in Anguilla: A tourism strategy for the 90's. Final report (rev.) prepared for the Government of Anguilla.

WATER RESOURCES

CBCL Limited, 1989a. Anguilla water development plan stage 1 (132/11571): The water development plan. Final report 85350 (volume 1). Prepared for CIDA. Halifax, Nova Scotia.

CBCL Limited, 1989b. Anguilla water development plan stage 1 (132/11571): Background report on options, strategies, and costs. Final report 85350 (volume 2). Prepared for CIDA. Halifax, Nova Scotia.

Halcrow, Sir William and Partners, 1966. Report on the water resources of St. Kitts, Nevis and Anguilla and on their development. Vol. IV: Anguilla. London, UK.

Howarth, B. and N. Robins, 1988. Contributions to the UNESCO hydrogeological atlas of the Caribbean islands. Vol. 3: Anguilla. Report WD/88/30. Prepared for the Overseas Development Administration by British Geological Survey. Keyworth, Nottinghamshire, UK.

Hughes, R., 1992. A review of measures to mitigate the impact of tourism on groundwater resources of the island of Anguilla.

UNESCO, 1989. Extract from status of the hydrogeological maps of the Caribbean Islands.

WETLANDS

Pritchard, D., 1990. The Ramsar Convention in the Caribbean (with special emphasis on Anguilla). Published by the Royal Society for the Protection of Birds. Bedfordshire, UK.