State of the Environment
1997 REPORT

Part A

STATE OF THE ENVIRONMENT 1997 REPORT

TABLE OF CONTENTS

LIST OF MAPS

LIST OF TABLES

LIST OF FIGURES

Abbreviations

BP	Before Present
Ch	Chapter
CM	Centimetre
CBO	Citizen-based Organisation
CSO	Central Statistical Office
EEZ	Exclusive Economic Zone
EMA	Environmental Management Authority
ha	hectare
MALMR	Ministry of Agriculture, Land & Marine Resources
km	Kilometre
m^3	cubic metre
NGO	Non-Governmental Organisation
Sq	square
TED	Turtle Exclusion Device
UNDP	United Nations Development Programme

ACKNOWLEDGEMENT

Data and information used for the preparation of the Report were obtained primarily from published and unpublished reports of various sources. These were mainly the government ministries and statutory bodies engaged in the management, research and monitoring of the renewable (biological) resources under the control of the State and studies and consultancy reports on relevant subjects. Data and information were also derived from interviews and discussions with personnel of these agencies. The extraction and collation of most of this data and the interviews were done by Ms. Nicole Leotaud on behalf of the Environmental Management Authority.

The Environmental Management Authority is grateful for the input of individuals and their agencies who facilitated access to data and information for use in this report. Without their dedication and hard work over the years, the body of knowledge which now exists on the biological diversity of Trinidad and Tobago, notwithstanding its limitations, would not be available.

Special recognition must be given to Senator Dr. Julian Kenny, former Professor at the University of the West Indies who volunteered to share information and his expert knowledge on the biodiversity of Trinidad and Tobago.

Special mention must also be made of the various Divisions and Sections of the Ministry of Agriculture, Land and Marine Resources, in particular the Fisheries and Forestry Divisions which have responsibility for policy formulation and management of the country's renewable resources; the Departments of Environment and Agriculture of the Tobago House of Assembly and the Emperor Valley Zoo. The dedication and commitment of the staff of the Environmental Management Authority in the preparation and finalization of this report is highly commendable and cannot go unnoticed.

Notwithstanding the contributions of these agencies and individuals, the Environmental Management Authority remains responsible for any inaccuracies, misrepresentations or omissions in this document. The Authority advises that these would not have resulted from any deliberate action on its part.

EXECUTIVE SUMMARY

This report reviews the biodiversity resources of Trinidad and Tobago and the status of harvest and management of a few of the hundreds of species and the range of ecosystems exploited.

In compiling this Report, the Environmental Management Authority (EMA) has found considerable difficulty in accessing relevant and reliable data on resource exploitation.

The problem is partly on account of technical difficulties experienced by the main line Ministry in collection of data, partly on account of variability in the quality assurance of the sources of the data and partly because of major omissions in data collection, particularly on habitats and ecosystems. Reference to central sources of data such as the Annual Statistical Digest have not generally been helpful, largely on account of the summarised form of the Digest. Notwithstanding these constraints, the major concerns which have emerged are highlighted hereunder.

(i) The biological diversity of Trinidad and Tobago is relatively well documented with regard to species but poorly documented with regard to habitat and ecosystems. Although there are probably in excess of 10,000 species occurring within the area under the jurisdiction of Trinidad and Tobago only a small fraction of these are directly exploited while most habitats are utilised to varying degrees.

(ii) The average annual harvest (taken over periods during 1980 – 1996) of the living resources is principally from timber, fisheries and game and is valued at about $94,480,000.00.

(iii) Current knowledge does not permit monetary evaluation of the contribution of natural areas to the economy, but many areas have a major contribution to the welfare of the country through provision of services, potable water, soil conservation and recreation.

(iv) The principal threats to biodiversity include unrestrained population growth of 1%, mismanaged planned development, unplanned development, squatting, forest fires, domestic and industrial pollution and over harvesting of commercially important species.

(v) Management of biodiversity resources is primarily the responsibility of the Ministry of Agriculture, Land and Marine Resources. The control of exploitation is by primary legislation, much of which is antiquated and ineffectually enforced.

(vi) Legislation is being drafted to replace the Fisheries Act, the Forests Act and the Conservation of Wildlife Act, while new legislation is being drafted for a system of Parks and Protected Areas.

(vii) Rules have been drafted by the EMA for the designation of sensitive species and sensitive areas. Other draft EMA legislation which will impact on the conservation of biodiversity are the Certificate of Environmental Clearance Rules for designated activities and the Water Pollution Rule which will require sources of water pollutants to have a Permit from the EMA.

1.0 INTRODUCTION

The world community of nations has recognised the deep dependence of mankind on the living and non-living resources supporting the well being of nations as well as the range of negative effects on the natural environment brought about by increasing demands for goods and services and uncontrolled development. One of the agreements arising from the 1992 Earth Summit is the Convention on Biological Diversity, an agreement that was signed by over one hundred and fifty countries which objectives are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of these biological resources.

Biological Diversity, sometimes referred to as biodiversity, is a term derived from the science of ecology, that branch of biology, which deals with the relationships between organisms and their physical environment. The term encompasses the genetic components of organisms, the extant species, subspecies, varieties and the fossil record. It also includes the communities of organisms and the functional relationships of species and the natural habitats and systems in which they occur. While relatively easy to conceptualise biodiversity is difficult to measure and quantify.

Although the higher categories of biodiversity, such as major biomes and ecosystems, are broadly known and understood, the lower levels are less well known. Estimates of numbers of extant species vary widely between 10 and 50 million. It follows that estimates of rates of extinction of species, while probably significant in some systems, must also be uncertain. Actual numbers of species, whether living or fossil, depends on the scientific process of taxonomic study and the application of resources to the process of study. As may be expected, those areas of the globe poorly studied such as tropical forests and seas, will continue to yield significant discoveries of new forms. The lowest level of biodiversity, the genetic components of organisms, is the most poorly known and ironically potentially the most important to humanity.

It is important to conserve and manage the earth's biodiversity for many reasons. Soil, which is a product of both physical and biological processes, is the foundation of agriculture and therefore the principal support of global populations. The natural environment continues to play a major role in supplying the raw materials for an industrialised society, such as, the freshwater vital to both agriculture and industry and the space for growth of human settlements. In addition, the natural environment continues to yield an important range of products and services to human societies including timber and other forest products; natural chemical products of pharmaceutical potential and importance; fish and shellfish from the sea, lakes and waterways; degradation of human wastes and a wide range of recreational facilities for growing populations with expanded leisure hours.

Trinidad and Tobago as a signatory to the Convention on Biological Diversity is bound to certain requirements, one of which is the characterisation and management, not only of those species which are currently exploited, but of the entire diversity of forms, habitats and ecosystems falling

under the sovereignty of the nation. This includes the terrestrial environment of approximately 5000 sq km as well as the 75,000 sq km of marine environment forming the Exclusive Economic Zone or EEZ.

Although far from comprehensive and with many gaps and voids, the knowledge base of the biological diversity of Trinidad and Tobago is relatively extensive. Much of this knowledge, however, is of the terrestrial and nearshore environment and relates particularly to species. Several terrestrial, freshwater and marine habitats and ecosystems have been characterised qualitatively at variable levels of detail. Genetics of local species is poorly documented and mostly limited to plant material, particularly of crop and horticultural significance.

1.1 Species Diversity

In this report the principal elements of biodiversity are summarised, their major threats are described and current management thrusts are discussed. An evaluation of the use and management of biodiversity resource is made and policy and management imperatives are identified.

The biota, that is the flora (plants) and fauna (animals), of Trinidad and Tobago is continental, reflecting the geological origins of the islands, their relatively recent separation from the mainland, their position in relation to the Orinoco River and the influence of discharge from that river on nearshore water quality.

The terrestrial biota is mainly a relict continental biota, representative of what existed at the time of the separation of the islands from the mainland. In the case of Tobago this was at the end of the last Ice Age, approximately 11,000 to 13,000 years before present (BP). In the case of Trinidad this was at the inundation of the Icacos land bridge about 1500 years BP or about 500 AD. Unlike the oceanic islands to the north there is only slight development of island endemism, mainly in the form of island races and possibly subspecies.

Trinidad (4,820 sq km) is substantially larger than Tobago (303 sq km) and geomorphologically far more complicated. As a consequence there is a wider range of land form, local climate and ecosystems in Trinidad than in Tobago. The marine biota is representative of the Caribbean biogeographical province with a broad gradient between communities. This is typical of oceanic conditions at the northeast of Tobago and of estuarine conditions at Icacos and the mouth of the Orinoco River.

The flora is far better documented than the fauna. This is largely because the flora has been systematically evaluated and documented over a period of about 75 years. This documentation is in ‘The Flora of Trinidad and Tobago’ serially published by the Government of Trinidad and Tobago. Although essentially completed, there remains to be documented the grasses and ferns, some lower groups and micro organisms, and some marine algae. Work is in progress on both the grasses and ferns. It is estimated that there are about 2500 species of plants in 175 families in Trinidad and Tobago. The prominent families are the ferns, grasses, legumes and orchids. There are also about 300 exotic species, including several tree species, introduced over the past centuries.

The fauna is less well known or documented. The terrestrial vertebrates, including the freshwater fishes, and certain groups of insects, including aquatic insects, are best known. Large and important terrestrial groups such as the arachnids (the group to which spiders belong) and nematodes or roundworms are very poorly documented. The marine fauna is relatively well documented in the wider Caribbean literature and in several local studies covering sponges, corals, soft corals, polychaete worms, molluscs and crustaceans. There has not however been a recent updating of the marine fishes and mammals.

The numbers of species of animals existing within the terrestrial, freshwater, estuarine and marine environments over which Trinidad and Tobago exercises sovereignty are at present unknown. However, a crude estimate can be made on the basis of relative sizes of major taxonomic groupings covering wider areas or areas where documentation is more complete. There are perhaps 10,000 to 15,000 animal species dominated by insects, arachnids and roundworms.

On the basis of its size and the number of documented species, Trinidad and Tobago's biodiversity per unit area is relatively high. The large number of documented flora, approximately 2500 in 175 families **(Figure 1-1),** and vertebrate fauna, approximately 670 species in 137 families **(Figure 1-2)** demonstrate this.

1.2 Systems Diversity

Terrestrial systems are generally described on the basis of climate, soils and floral composition. **Map 1-1** demonstrates the range of these systems in Trinidad and Tobago. Estimates of the size and coverage of forested areas are provided in **Table 1-1** and **Fig. 1-3**.

Stream systems are characterised by stream flow, substrate and water quality; estuaries and wetlands by water quality and vegetation, marine systems are generally characterised by energy levels, illumination, water quality and sub-stratum. Trinidad and Tobago possesses the full range of these systems typical of latitude and land form.

MAP 1.1

TRINIDAD AND TOBAGO FOREST TYPES

Table 1.1

Estimates of sizes of forested areas in Trinidad and Tobago (Forestry Division, 1996).

	Area (hectares)	**% of total land area of T&T**
Production forest	125,625	24.5
Wildlife Sanctuary	17,076	3.3
Nature Reserve	398	0.1
National Parks	69,550	13.6
Areas protected as watersheds, windbelts, etc.	9,745	1.9
Other State Land over 90m contour	64,070	12.5
Private forests	56,000	10.9

Compiled from information obtained from the Ministry of Agriculture, Land and Marine Resources, Forestry Division.

FIGURE 1-3

Compiled from information from the Ministry of Agriculture, Land and Marine Resources, Forestry Division

SUMMARY BOX

- **Biological diversity or biodiversity encompasses the variability among living organisms and among the habitats and systems in which they occur.**
- **The wise use of the resources of biodiversity is important to support life on earth.**
- **Due to Trinidad and Tobago's relatively recent separation from the South American mainland, island endemism is not as well developed as the oceanic islands to the north.**
- **There is a wider range of land form, local climate and ecosystems in Trinidad than in Tobago.**
- **Based on size and number of documented species, Trinidad and Tobago's biodiversity per unit area is among the highest in the world.**

2.0 BIODIVERSITY RESOURCES EXPLOITED IN TRINIDAD AND TOBAGO

Only a small proportion of the total number of plant and animal species recorded for Trinidad and Tobago is actually directly exploited. In contrast, there is hardly a habitat or ecosystem in which there is not some demonstrable human intervention and use. The obvious and extreme cases are the built, agricultural and forest environments. Coastal areas are also heavily influenced by human activity.

2.1 Timber

Trinidad and Tobago is still relatively heavily forested, the bulk of the forests being State owned. Of the total number of plant species approximately 300 are tree species and of these only about 50 are commercially exploited. Of these eleven commercially exploited species are Class I species, 18 Class II and the rest Classes III and IV. In addition to the native species there are two introduced species which play an important role in production forestry. These are teak introduced about 80 years ago, and pine introduced about 50 years ago.

The official figure of total forested areas in Trinidad and Tobago is estimated at 230,000 ha. The bulk of this, some 125,000 ha comprise forest reserves, 85,000 ha other state forests and 20,000 ha are on privately owned lands. Of the fifty species of trees exploited, few occur in pure stands in the north east and south east of Trinidad. Cedar, crappo, olivier and mora dominate the harvest of native species. Table 2.1 shows the categories of exploited timber species.

Table 2.1

MAIN TIMBER SPECIES EXPLOITED IN TRINIDAD AND TOBAGO

Local name	Species	Family
CLASS I		
Acoma	*Sideroxylon quadriloculare*	Sapotaceae
Balata	*Manilkara bidentate*	Sapotaceae
Balsam	*Copaifera officinalis*	Leguminosae
Cedar	*Cedrela odorata*	Meliaceae
Cypre	*Cordia alliodora*	Boraginaceae
Locust	*Hymenaea courbaril*	Leguminosae
Mahogany*	*Swietenia macrophylla*	Meliaceae
Poui	*Tabebuia sp.*	Bignoniaceae
Roble	*Platymiscium trinitatis*	Leguminosae
Samaan*	*Samanea saman*	Leguminosae
Teak*	*Tectona grandis*	Verbenaceae
CLASS II		
Angelin	*Andira inermis*	Leguminosae
Crappo	*Carapa guianensis*	Meliaceae
Fiddlewood	*Vitex spp.*	Verbenaceae
Fustic	*Chlorophora tinctoria*	Moraceae
Galba	*Calophyllum lucidum*	Guttiferae
Guatacare	*Eschweilera subglandulosa*	Lecythidaceae
Laurier black	*Nectandra mortiniansis*	Lauraceae
Laurier canelle	*Aniba panurensis*	Lauraceae
Laurier cypre	*Ocotea oblonga*	Lauraceae
Mora	*Mora excelsa*	Leguminosae
Olivier White	*Terminalia amazonia*	Combretaceae
Pine*	*Pinus caribaea*	Pinaceae
Podocarp	*Podocarpus coriaceus*	Coniferae
Purpleheart	*Peltogyne porphyrocardia*	Leguminosae
Serrette	*Bursonima coriacea*	Malpighiaceae
Tapana	*Hieronyma caribaea*	Euphorbiaceae
Toporite	*Hernandia sorora*	Hernandiaceae
Yoke	*Astronium obliquum*	Anacardiaceae
CLASS III		
Mahoe	*Sterculia caribea*	Sterculiaceae
Cajuca	*Virola surinamensis*	Myristicaceae
Boisbande	*Richeria grandis*	Euphorbiaceae
Gommier	*Protium insigne*	Burseraceae
CLASS IV		
Blackheart	*Clathrotropis brachypetala*	Papilionatae
Kiskidee	*Visima cayanensis*	Hypericincae
Hogplum	*Spondias mombin*	Anacardiaceae
Wild chaitainge	*Pachira insignis*	Bombacaceae

* *introduced timber species*

Source: Forests Act Chapter 66:01

Exploited timber supports a thriving local sawmilling industry with 63 mills of varying capacity and technological advancement. The range of products include finished klin-dried board, construction grade timber, rough timber, form and boxing board. Some exotic species, for example appamat, mahogany and samaan from private forests and lands, also pass through these mills producing furniture-grade wood.

Map 2-1 highlights the log outturn for 1997. This is representative of the annual output of each conservancy, the largest outturn of 24,000 m^3 being from the South Central Conservancy and which is 12 times the outturn of the Northwest conservancy. In contrast, the log outturn recorded for the whole of Tobago was 219m^3. Of this 207m^3 were from private lands. Sawn wood production (Fig. 2.1) has increased from 20,000 m^3 in 1986 to approximately 60,000 m^3 in 1995 with a peak of 80,000 m^3 in 1989.

MAP 2.1

SUMMARY OF LOG OUTTURN IN TRINIDAD BY CONSERVANCIES FOR 1997

FIGURE 2-1

World Conservation Monitoring Centre, 1996-1997

About 9,000 ha of teak and 5,000 ha of pine are established as plantation forests at different localities (Map. 2.2). Teak plantations predominate in the South of Trinidad. Pine is sometimes harvested for use as poles. For the last seven years Teak has been exported in the round to India under a contract. An annual average of 14,000 m^3 of logs of minimum diameter 65 cm measured over four metres has been exported. Except for a few small stands of teak, there are no teak or pine plantations in Tobago.

MAP 2-2

2.2 Fisheries

The fisheries of Trinidad and Tobago are open access fisheries where there is no restriction on the numbers of persons who might invest in the industry. Although there are probably in excess of 600 species of fish, and over 100 species of crustaceans in the waters under the jurisdiction of Trinidad and Tobago, only about 50 species form the significant part of the catch landed and sold. In addition, a comparatively small number of these account for the bulk of the catch as indicated in Table 2.4. The commercially exploited species are listed in Table 2.2.

TABLE 2.2

COMMERCIALLY EXPLOITED FIN AND SHELL FISH SPECIES

Family	Local Name
Scombridae	Mackerels – Tunas (3 species) Kingfish Carite Bonito Wahoo
Decapod crustaceans (from order Decapoda)	Lobster (Atlantic spiny) Shrimp (5 species) Blue (callalloo) crab, Hairy crab
Bivalve molluscs (from the class Bivalvia- order Mytiloida)	Green mussel ("Green mok") Swamp mussel ("Mok") Mangrove oyster ("oyster")
Lutjanidae	Snappers – Red snapper (several species)
Pomadasyidae	Grunts
Istiophoridae	Sailfish – Marlin (blue and white) Spearfish
Xiphiidae	Swordfish
Coryphaenidae	Dolphin fish
Excoetidae	Flyingfish
Carangidae	Cavalli , Jacks
Carcharinidae (requiem sharks) Sphrynidae (hammerhead sharks)	Sharks – Smalltail Blacktip Brazilian sharpnose Scalloped hammerhead Smalleye hammerhead
Sphyraenidae	Barracuda
Serranidae	Grouper (several)
Sciaenidae	Croaker Salmon
Megalopidae	Tarpon
Mugilidae	Mullet

The fisheries of Trinidad and Tobago are extremely varied. Nearshore marine fisheries include nearshore artisanal fleets that exploit a range of pelagic and demersal species, employing a variety of methods and with a minimum of mechanization. These operate mainly in the Gulf of Paria but significant numbers of vessels also operate along the other coasts of both islands. The more important pelagic species in Trinidad include kingfish, carite, and several carangids, while in Tobago the more important pelagic species are dolphin fish, flying fish and jacks. Important

demersal species include snappers and groupers in both islands, shark, salmon, yellow croaker and shrimp in Trinidad and spiny lobster in Tobago.

In Trinidad, a comparatively small number of industrial-type trawlers operating mainly from Port of Spain and Orange Valley target shrimp, exploiting grounds in the Gulf of Paria, the Columbus Channel and the western part of the NorthCoast. Although these operations are geared particularly to production of exportable shrimp, they also deliver small shrimp to the local market, as well as saleable demersal species including snapper, shark, yellow croaker, salmon and other sciaenids. The official fishing vessel fleet size is 1483 (Table 2-3), the majority of which comprise pirogues, the smallest vessels of length 5 to 8m.

Table 2.3

FISHING VESSEL SIZE/CAPACITY
(Trinidad & Tobago)

Type of vessel	Numbers	Length (m)	Capacity (kg)
Industrial and semi-industrial trawlers	36	25 - 30 M	3270 - 26,900
Multipurpose vessels	12	10 - 15 M	4080 - 9072
Pirogues	1435	5 - 8	1565
TOTAL	**1483**		

Source: Fisheries Division, MALMR

Recent innovations include the use of multipurpose offshore vessels which exploit resources off the east coast of Trinidad and on the continental shelf near Guyana. These vessels operate with chilled storage and use a variety of methods including surface long lining, hand lining, fish pots and drift netting. Some of the fleet have specialized in surface long lining for sword fish and tuna for the export market. The areas exploited for marine fish species and the sites at which they are landed are illustrated in Map 2.3.

Game fishing for marlin and sailfish is another comparatively recent development, especially in Tobago where there are annual tournaments. While king fish, wahoo and dolphin fish are landed, the targeted species, marlin and sailfish are normally tagged and released. Game fishing forms a relatively important element of the tourism offering of Tobago. In both Trinidad (particularly near the Bocas islands) and Tobago, there is also a well established recreational fishery for both pelagic and demersal species.

MAP 2-3

Although it is often assumed that Taiwanese longliners exploit stocks of tuna in the Exclusive Economic Zone (EEZ) of Trinidad and Tobago this has not been demonstrated. Taiwanese far-water longliners operate throughout the world's oceans and use ports in the Caribbean for transhipment of frozen tuna to canneries. Some American swordfish longliners may however poach swordfish and tuna in the EEZ. Venezuelan offshore fishing craft regularly transit coastal waters of the north and east coasts of Trinidad and may in fact poach catches. Barbadian fishing craft occasionally poach in Tobago coastal waters and regularly in the EEZ.

Artisanal fishermen from Erin, Cedros and Icacos regularly poach shrimp in Venezuelan waters at the mouth of the Pedernales River. Previously the fishing treaty between Trinidad and Tobago and Venezuela permitted national craft to operate in defined areas subject to specific restrictions. This treaty has now been rescinded and replaced by a treaty recognising only a common fishing zone in the Columbus Channel.

There are no major estuarine fisheries except for the subsistence harvesting of fish, crabs and oysters, but there is a modest sport fishery in both the Caroni Swamp and in the mouths of the Nariva and Ortoire rivers. In freshwater there is a minor subsistence fishery for cascadu, guabine and tilapia - an introduced species. Two native freshwater species, the teta and the pui pui, are harvested from streams and swamps and exported as aquarium scavengers.

Fig. 2.2 demonstrates that fish catches recorded during 1986 to 1995 have tripled from approximately 4,000 metric tonnes in 1986 to 12,000 metric tonnes in 1995. The catches increased between 1986 and 1992 and fluctuated thereafter never falling below 10,000 metric tonnes. Records indicate that carite and kingfish are the major species landed but other mackerels, snappers and groupers are important elements of the harvests.

FIGURE 2-2

Food and Agriculture Organisation (FAO) 1995

2.3 Wildlife

The number of animal species directly exploited is a small fraction of the total fauna. These species include a few mammals – deer, lappe, agouti, tatu and quenk; certain finches kept as caged birds, some ducks, the iguana, (Table 2.4) and matte.

TABLE 2.4

EXPLOITED GAME SPECIES

Deer	*Mazama americana*
Agouti	*Dasyprocta leporina*
Lappe	*Agouti paca*
Tattoo	*Dasypus novemcinctus*
Quenk	*Tayassu tajacu*
Iguana	*Iguana iguana*

Hunting is generally pursued for sport but also for subsistence. A game licence is required for hunting a particular species. For this a fee is charged.

"Wild meat'", particularly the mammals, is considered a delicacy. It is one of the most expensive of proteins, its prices exceeding that of lobster. The annual game harvest is estimated at TT$5.5M compared with the annual average revenue from licences of TT$146,000.00 (Table 2.5)

TABLE 2.5

ANNUAL ESTIMATED REVENUE FROM GAME HARVESTS AND HUNTING PERMITS

SEASON	**90-91**	**91-92**	**92-93**	**93-94**	**(90-95)**	**96-97** ***(Tobago only)***
Revenue Generated from the Sale of Hunting Permits (TT$)	144,120	147,700	136,700	154,520	146,260	1,360
Estimated Revenue From Game Harvest (TT$)	5,507,706	5,588,375	3,774,612	5,592,309	4,680,221	11,628

Source: Wildlife Section, MALMR* (Note: deer, lappe and wildfowl are not included in the harvest for Tobago)

Many species are desultorily and erratically exploited. Some wild animals for example manicou, parrots, oropendolas and cocrico are officially considered vermin and are removed with various control (extermination) methods or other population management procedures.

2.4 Other Exploited Species

A number of other species of plants and animals are exploited for various purposes. Turtles and porpoises are a minor element of the 'fish' landings. Bats are among the animals taken for laboratory use and research. The uses and specific names of some of these animals are provided in Table 2.6.

TABLE 2.6

OTHER EXPLOITED ANIMAL SPECIES

USE	LOCAL NAME	SPECIES
Laboratory animals, reproductive biology research	Bats	*Carollia perspicillata* *Molossus ater* *Molossus major*
	Fish bat	*Noctilio leporinus*
	Vampire	*Desmodus rotundus*
Recreation (hunting)	Wild meat	Several species
Pet trade	Song birds (finches)	*Sporophila imtermedia* *Sporophila nigricolli* *Sporophila minuta* *Oryzoborus crassirostris* *Oryzoborus angolensis*
Pet trade	Parrot	*Pionus menstrus* *Amazona amazonica*
Curios, meat	Alligator	*Caiman crocodilus*
Meat, pet trade	Iguana, guana	*Iguana iguana*

Native plant species exploited comprise various shrubs, herbs and foliage utilised in craft and other domestic products. Some marine algae are harvested for beverage making. Table 2.7 is an indicative list of some of these floral species.

TABLE 2.7

SOME EXPLOITED NON-TIMBER PLANT SPECIES

USE	LOCAL NAME	SPECIES
Beverage making	Sea moss	*Gracilaria spp*
Orchid growing material	Tree fern	*Cyathea spp.* *Cnemidaria spp.*
Stem used in basket making	Tirite	*Iszchnosiphon arouma*
Petiole used in basket making	Moriche	*Mauritia flexuosa*
Basket making	-	*Various Bignoniaceae and Cycanthaceae*
Horticulture, export	Orchids e.g. Butterfly Cedros bee Yellow bee	 *Oncidium papilio* *Oncidium lanceanum* *Oncidium ampliatum*
Stems exported for production of Ryanex (insecticide)	Ryania	*Ryania speciosa*
Aphrodisiac	Bois bande (bark)	*Parinari campestris* *Roupala montana* *Richeria grandis*
Tanning of leather	Mangrove (bark)	*Rhizophora mangle*

2.5 Habitats/Ecosystems

There is not a part of the terrestrial environment of the country in which there is not some demonstrable human intervention and use of habitat. The obvious and extreme cases may be seen in the built, agricultural and forest environments. The coastal areas, prone to accelerated effects of natural erosion processes, have been particularly heavily influenced by human activity. Even where there is some attempt at protection of a particular habitat such as forest reserve or prohibited area and the species therein, there is invariably some illegal human activity with demonstrable effects. In contrast, the marine systems remain generally out of the reach of widespread perturbation by direct exploitative human activity, except where trawling activity takes place, where there are extensive coastal built developments or where there is marine mining activity.

SUMMARY BOX

- Of the large number of recorded plant and animal species in Trinidad and Tobago relative few are directly exploited
- Five species of mammals, some fishes and waterfowls are heavily exploited
- Carite, king and other mackerels are the fish species forming the bulk of the harvests
- “Wildmeat” fetches very high prices, consequently it is one of the most expensive proteins sold locally
- Beside species exploited for food, other plants and animals are taken for various domestic uses and laboratory research
- Almost all terrestrial and many coastal areas are impacted by human activity

3.0 THREATS TO THE BIODIVERSITY RESOURCES OF TRINIDAD AND TOBAGO

Threats to biodiversity and general habitat change, perturbation and degradation are by no means unique to Trinidad and Tobago. Natural terrestrial habitat has been progressively converted to built settlement, infrastructure, agricultural and forestry plantations. This has resulted from the development of agriculture, human settlement and culture, the dispersal of humanity to vast areas of the globe, and the conquest of communicable diseases. The problems faced by Trinidad and Tobago are widely experienced by other countries, even the highly managed metropolitan ones. In historical times there has been extensive conversion of forest lands to agriculture, especially sugar cane, cocoa, citrus and coconuts, as well as for human settlement and industry. Fortunately Trinidad and Tobago has been spared the excesses of the developmental processes experienced by many of its Caribbean neighbours and much of the land remains covered in forests, some of this in pristine state. To these man-induced threats must be added the natural phenomena of storms, hurricanes and volcanic activity to which the biota and ecosystems are vulnerable.

3.1 Threats to Habitats and Ecosystems

One of the threats faced is fragmentation of major ecosystems caused by the conversion of pockets of natural areas in response to the demands for agriculture and settlement. Fragmentation particularly affects larger animals and tree species which require larger spaces for maintenance of viable populations. This is not as serious a problem as experienced in other Caribbean States. It nevertheless is an important concern regarding a few tree and larger mammal species in islands as small as Trinidad and Tobago.

Two threats readily identified are industrialisation and poverty. Industrialisation can improve the economic well-being of the citizens, thus reducing the size and severity of the poverty problem. Industrialisation however, can bring with it a host of negative influences mainly through pollution of air, land and water. At the same time, it also makes demands on coastal land resources such as the removal of mangroves, dredging and the reclamation of wetlands and the shallow sub-littoral.

Poverty contributes to the squatting problem with its attendant negative effects. Squatting is accompanied by slash and burn cropping, forest and bush fires, and catchment degradation. Degradation inevitably leads to profound changes in the biota of the particular area affected; generally a drastic reduction of species numbers. Typical and highly visible examples of this are the fire climaxes seen in the foothills of the Northern Range, which consist mainly of coarse grasses, fire resistant palms and seasonal animal species. Irresponsible individual behaviour, inappropriate hillside agriculture, irregular and poorly managed physical development on slopes and indiscriminate quarrying activity also contribute to biodiversity reduction and loss. A collateral effect of this degradation is faster runoff, lower recharge rates of aquifers, loss of top soils, sedimentation of water courses and flooding. These all generally lead to reduction of species and habitat diversity as well as the unsightliness of scarred slopes.

3.2 Threats to Species

Species which are exploited are threatened not only by habitat degradation but also by their over exploitation. This applies through a wide range of species including timber species, tree ferns, orchids, freshwater fish and prawns, marine species especially demersal fish, cage bird species, game animals including deer, lappe, quenk, ducks and waterfowl. The effect is not one of species extirpation but of reduction of yield. This is particularly important in the case of Class 1 timber species such as cedar and mahogany, and premier commercial fish such as snapper.

Mismanagement of human and industrial wastes is also a serious threat, not only to human health, but also to water courses, wetlands and the nearshore aquatic environment. Many of the streams are chronically polluted with domestic and sewage wastes during the dry season creating anoxic situations and causing major changes in stream biota. Efforts at active regulation of discharge of hazardous or toxic wastes are to be intensified since these wastes may cause short term episodes, acute adverse effects (e.g. fishkills) or long term changes to the biota of streams, wetlands and the nearshore sub-littoral.

Some species and parts of the natural environment are under threat from the pressure of a growing population requiring additional space and a pest-free environment. As areas of natural environment decrease, species and habitat diversity diminish, and as human numbers are concentrated, pest species frequently increase in numbers. Some species are under threat for purely cultural reasons. Snakes for example are usually killed on sight and large spiders are similarly treated. Exotic species may threaten biodiversity by (out competing and) displacing native species from their niches.

SUMMARY BOX

- The spread of human settlements and increased demand for space has caused habitat disturbance and degradation
- Fragmentation of ecosystems particularly affects larger animal and tree species which require larger areas to maintain viable populations
- While industrialisation can improve the economic well-being of the country it may bring with it a host of negative impacts on air, land and water.
- Drastic reduction of species numbers is a typical consequence of habitat degradation and over exploitation

4.0 LEGAL, ADMINISTRATIVE AND POLICY FRAMEWORK FOR MANAGEMENT OF BIODIVERSITY RESOURCES

Management of the living resources of Trinidad and Tobago follows the conventional approach of most countries. This takes the form of a regulatory framework of laws, an institutional framework with responsibility for enforcement of laws, and a national approach or attitude to the management of living resources, reflected in a series of priorities or thrusts. Much of the existing legislation does not provide an adequate framework for contemporary management of these resources.

4.1 The Regulatory Framework

4.1.1 Primary Legislation

Three Acts constitute the primary legislation governing the exploitation of the biological resources of Trinidad and Tobago. These are the **Forests Act, Ch. 66:01,** the **Conservation of Wildlife Act, Ch. 67:01** and the **Fisheries Act, Ch. 67:51.** Both the Forests Act and the Fisheries Act date back to the early part of the century and have been amended from time to time. The Conservation of Wildlife Act is more recent dating back to 1958. The substance of these Acts consists of regulations, permitting exploitation, for example, the control of logging and sale of forest produce through the issuance of a Conservator's licence and a removal permit. Under the Forests Act some protection is given to ecosystems and habitats, and certain prohibitions are placed on entry and use of areas. These areas may be declared as Sanctuaries, Forest Reserves or Prohibited Areas and require a permit to enter, which also regulates activities to be carried out within them. Areas designated as Parks for which legislation has not yet been promulgated, fall informally under this Act.

The Conservation of Wildlife Act seeks to control the hunting of named species by outlawing certain methods of hunting, prescribing ‘a closed season’ for the whole country and all species, as well as outlawing the sale, purchase and possession of ‘wild meat’ during the closed season. The latter is at variance with the intent of wildlife farming by placing farmers who operate during this season in contempt of the Act.

While this Act provides for the establishment of game sanctuaries in which it is unlawful to hunt, there is no provision for the protection and management of other habitat which support species like cagebirds. Cagebirds are listed in the second schedule of the Conservation of Wildlife Act as a group which can be ‘taken’, that is, captured. This is highly inappropriate due to the sensitivity of these species to habitat destruction which has resulted in considerable declines in cagebird populations.

The Fisheries Act is the primary legislation governing fisheries in the territorial sea and internal waters of Trinidad and Tobago. Its regulations specify fish protection mechanisms such as net sizes and minimum size of fish to be taken and also prohibits fishing in certain areas. It provides no framework for the active management of the habitat of the fish species.

4.1.2 Related Legislation

There is an extremely wide range of legislation related to the above three Acts. This legislation may protect the environment generally, determine authority for enforcement, delimit boundaries of national sovereignty, prohibit the import or export of biological materials. These include the **Town and Country Planning Act, Ch. 35:01, Tobago House of Assembly Act, No. 40 of 1996, Customs Act Ch. 78:01, Archipelagic Waters & Exclusive Economic Zone Act No. 24 of 1986, Plant Protection Act of 1975**, and various pieces of legislation for import and export of live animals and fish. The **Environmental Management Act, 1995,** provides an overall co-ordinating and facilitating function in various aspects of environmental management, particularly pollution control. It also makes provision for the designation of environmentally sensitive areas and species. The **Marine Areas (Preservation and Enhancement) Act Ch. 37:02** provides for the delimitation of marine areas which includes adjoining land or wetlands.

Additional measures for the protection of natural resources, particularly forests exist under other national legislation and there is little indication that these have been aggressively used over time to complement initiatives on forest conservation. These include the **Agricultural Fires Act Ch. 63:02** which prohibits the setting of fires without authorisation; the **Sawmills Act Ch. 66:02** which requires a sawmill operator to obtain permission from the Director of Forestry; the **Summary Offences Act Ch. 11:02** which prohibits the destruction of trees and shrubs and the **State Lands Act Ch. 57:01** which gives responsibility to the Commissioner of State Lands for the management of all State lands. The Municipal Corporations Act 1990 gives Municipal Corporations responsibility for monitoring forests within their jurisdiction.

4.1.3 Enforcement

Breaches of the law are tried in the lower courts, and can in theory be brought by any police officer. In practice, the few prosecutions carried out each year under the Forests Act and the Conservation of Wildlife Act are done by Game Wardens or Forest Rangers. Records from the Ministry of Agriculture, Land and Marine Resources show that for the two year period 1995 – 1996 only two charged offences were laid by honorary game wardens, one in each year. Occasionally prosecutions of persons illegally importing animals are made under the Customs Act. Prosecutions under the Fisheries Act are rare, action being occasionally taken against large commercial trawlers and foreign fishing vessels.

4.1.4 International Treaties and Obligations

Trinidad and Tobago is a signatory to the United Nations Convention on the Law of the Sea (UNCLOS). This gives the country an Exclusive Economic Zone extending out from its archipelagic territorial boundaries. UNCLOS imposes on the State certain responsibilities concerning the management of exploitation of its living resources, requiring it to make certain rights available to third parties through negotiation. The country is also signatory to other Conventions and Protocols to enable the conservation of biological resources. For example, the United Nations Convention on Biological Diversity, the Ramsar Convention on Wetlands of International Importance and the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). The responsibilities and obligations under these are, include development of national strategies, plans and programmes; enactment of domestic legislation and establishment of administrative systems for trade.

4.1.5. Draft and Pending Legislation

Legislation has been drafted by the Ministry of Agriculture, Land and Marine Resources for a comprehensive Fisheries Act to replace the existing one. Draft Bills on Wildlife, Parks and Other Protected Areas and Sawmills are being finalised for submission to Parliament. Amendments to the existing Forests Act have been proposed by that Ministry, extending powers to management of private lands and to stronger control of harvesting practices. A revised new bill for the regulation of land use planning is in the final stages of parliamentary review. Rules are also being drafted by the EMA for the designation of environmentally sensitive areas and species.

4.2 The Institutional Framework

4.2.1 Line Ministries

The Ministry directly responsible for the wise use and management of the living resources of the country is the Ministry of Agriculture, Land and Marine Resources. Two divisions of this Ministry, the Forestry Division and the Fisheries Division are responsible respectively for the conservation of forests and wildlife, and the fisheries resources including shellfish. In the case of Tobago, various departments of the Tobago House of Assembly, are responsible for these functions. The Botanic Gardens, of the Ministry of Agriculture, Land and Marine Resources and the Zoological Society of Trinidad and Tobago which is funded by the Ministry, are involved in public education on the conservation of biota and scientific research.

Planning for the conservation of living resources is carried out at divisional and ministerial level in the Ministry of Agriculture, Land and Marine Resources and by the Tobago House of Assembly.

4.2.2 Secondary Ministries

The other Ministry involved with conservation of biological resources is the Ministry of Planning and Development to which the Environmental Management Authority is accountable. National policy planning and programme development is carried out by this Ministry.

4.2.3 Research and Monitoring

Research on the biota and the natural environment of Trinidad and Tobago is carried out by various institutions. The Ministry of Agriculture, Land and Marine Resources conducts research in the Forestry and Fisheries Divisions, the latter through Canadian funding conducting extensive stock assessments. The Institute of Marine Affairs conducts research on the nearshore and marine environments. The Department of Life Sciences of the University of the West Indies conducts research in biodiversity and ecosystem management of terrestrial, freshwater and marine environments. In Tobago the House of Assembly is responsible for environmental matters but as yet has minimal research capabilities.

4.2.4 Non-governmental and Citizen-based Organisations (NGOs and CBOs)

In Trinidad and Tobago there is a wide variety of non-governmental and citizen-based organisations involved in public education and conservation of biodiversity. These include service clubs, social clubs, trusts and action groups. Some commercial enterprises also sponsor or give various types of support to conservation initiatives in the country.

4.2.5 International linkages

Public and private institutions in Trinidad and Tobago have established official as well as informal links with a number of organisations involved in biodiversity conservation. Public institutions generally link with official funding and technical institutions, while the non-governmental and citizen-based organisations tend to link with similar groups internationally. Both the Ministry of Agriculture, Land and Marine Resources and the University of the West Indies maintain technical links with universities and research institutions abroad particularly in North and South America and the United Kingdom.

4.3 The Principal Management Thrusts

A glossary of terms describing the administrative areas managed under the different legislation is included at Appendix 1.

4.3.1 Forest Management

State forests consist of natural, secondary and plantation forests. These are categorised on the basis of use for timber production, (production forests managed through a system of conservancies) wildlife sanctuaries (Map 4-1 refers), nature reserves, national parks and watershed reserves. Production forest accounts for about 25% of the land area of the country, approximately

125,000 ha. Different systems of exploitation are employed including clear felling and replanting, open range management and cyclical harvesting. In all cases forestry officers are responsible for the processes, but inadequacy of staffing results in less than satisfactory management. Annually some attempts are made at reforestation of degraded areas. The areas replanted are substantially less than those lost.

MAP 4-1

4.3.2 Watershed Management

A small proportion of the upland areas of the country, approximately 2% of the land area, is retained for watershed protection. Management is essentially by prohibition of exploitation of timber but not of wildlife resources, and by prohibition of entry from time to time when there is a fire hazard. Alternatives for improved watershed management with input from local communities are being explored by a Task Force chaired by the Ministry of Agriculture, Land and Marine Resources.

4.3.3 Fisheries Management

The principal management thrust is directed at regulation of large scale mechanised trawling in territorial waters and the control of illegal fishing. Larger trawlers are restricted to certain areas with gear limitations, with a season restriction on trawling in certain parts of the north coast of Trinidad. Policing is done by the Coast Guard arm of the Ministry of National Security. Although all stock assessment studies indicate depletion of both demersal and pelagic nearshore stocks, no attempt is made at regulating artisanal fishing. This is largely because of the inadequacy of the existing legislation, the open access nature of the fishery, high unemployment in rural areas and subsidies to the fisheries sector. Subsidies have contributed to increased investment and participation in the sector and consequently to increased exploitation of species. There is some inherent discrepancy between provisions of the Fisheries Act and the existing Conservation of Wildlife Act where under the former, marine turtles can be legally harvested in the sea, while on beaches, they are protected under the latter Act. This has contributed to slaughter of nesting female turtles.

4.3.4 Wildlife Management.

The approach to wildlife management is through the implementation of existing legislation which requires hunting licences and returns of hunting data and by enforcement of a closed season. The inadequacy of the existing legislation, particularly the length of the hunting season, the absence of bag limits and the minimal hunting licence fees are acknowledged. Protection of non-game species is partly by prohibition under law and partly by regulation of entry to protected or prohibited sites.

4.3.5 Parks and Other Protected Areas

The only legally declared national park is the Chaguaramas National Park which is administered by the Chaguaramas Development Authority. Buccoo Reef and Bon Accord Lagoon are managed essentially as a marine park under the marine restricted areas legislation. The Forestry Division does have a National Parks Section, which manages some protected areas designated under the Forests Act e.g. North Oropouche and Matura, and Cleaver Woods.

4.3.6 Sensitive Areas and Ecosystems.

No environmentally sensitive areas are as yet designated under the Environmental Management Act. Certain areas, such as parts of the Nariva Swamp, informally have acquired this status under the Ramsar Convention on Wetlands, while several others have been declared prohibited areas under the Forests Act. Buccoo Reef and Bon Accord Lagoon, falling under the Marine Areas Act is a *de facto* sensitive area. It is envisaged that management of these sites when designated, will be affected in collaboration with other state authorities and local communities.

4.3.7 Sensitive Species.

No sensitive species have yet been designated under the Environmental Management Act. Several, however, may informally be considered *de facto* sensitive species in terms of public interest and involvement. These include some charismatic species, mainly mammals and birds. Although several species have become the focus of interest publicly, of special note are the Scarlet Ibis which is the National Bird, the Pawi, the manatee and the leatherback turtle.

SUMMARY BOX

- The major legislation for management of biological resources and ecosystems in Trinidad and Tobago consists of regulations permitting exploitation rather than being geared toward sustainable management.

- Like the primary legislation, legislation supporting the major Acts which regulate exploitation of biodiversity in Trinidad and Tobago are mostly antiquated and ineffective with low penalties.

- Multilateral Environmental Agreements to which Trinidad and Tobago is party impose a variety of obligations and responsibilities for the protection and wise use of biodiversity resources.

- The primary line Ministry with direct responsibility for the conservation of the living resources of Trinidad and Tobago is the Ministry of Agriculture, Land and Marine Resources.

- Local non-governmental institutions, citizen-based organisations, commercial firms and service clubs provide supplemental support for biodiversity conservation.

5.0 EVALUATION OF BIODIVERSITY RESOURCES AND MANAGEMENT

5.1 Data Bases/Data Access

Two of the major difficulties of evaluation of biodiversity resources, both species and ecosystems, are the relatively poor quality of the available database and the difficulty in readily accessing available data from the data generating and processing sources. Data on harvests of timber, forestry products, game or other wildlife are collected by the Forestry Division in a variety of forms. Most species data is in the form extracted from licences and permits. Some general indication of ecosystem use can be estimated from permits issued to visitors to specially designated areas. Data on fish and shellfish harvest is collected by the Fisheries Division from market records and from selected beaches. Records from the Customs Division and the Central Statistical Office (CSO) provide data on exports including timber and other forest products, fish and shellfish and live aquarium fish. Some minor exports such as live laboratory and pet trade animals are not captured in the annual reports of the CSO.

As there are no established ecosystem baseline studies nor consistent monitoring systems, it is impossible to measure long term changes, but trends may be discerned. One obvious discerned trend is the gradual transformation by fire of primary forests through secondary forests, lastro and grassland on many slopes. Similarly, there is the obvious trend of clearing of coastal vegetation and replacement with built development.

Because of gaps and voids in data, it is difficult to estimate the commercial value of harvested species. Compounding the problem, particularly with regard to timber, is the limited information on timber extraction from private lands and theft from State forests. In the case of wildlife, the harvest from illegal hunting is impossible to determine. Nor is it easy to quantify damage from activities such as indiscriminate killing of animals or destruction of habitats.

It is even more difficult to estimate the value of services provided by forest reserves, protected areas and other natural systems. These services are varied and include provision of water, soil conservation, flood minimisation, maintenance of air quality and recreation. These factors are included in the determination of GDP figures in some developed countries, but the available local data base simply will not support such estimation.

While the monetary value of the annual harvest of organisms can be derived, it is at present impossible to derive reliable figures of the numbers of persons directly and indirectly involved in exploitation and management of living resources. A crude estimate is attempted in **Table 5.1**.

TABLE 5.1

ESTIMATE OF PERSONS INVOLVED IN THE EXPLOITATION/ MANAGEMENT OF BIODIVERSITY

RESOURCE	DIRECTLY INVOLVED	SECONDARILY INVOLVED
Forest & forest products	63 sawmills	(NA)
Fisheries	13,000	50,000
Wildlife	8,000	22,300
Administrative/enforcement	178 (forestry personnel)	197 (honorary game wardens)

Source: Estimates derived by the EMA from records of the MALMR.

5.2 Forests

The figures provided in Chapter 2 on forested areas of Trinidad and Tobago may not be a true reflection of actual size for relatively rapid degradation has been obvious in a number of places. Some of the forest reserves, for example the Long Stretch Forest Reserve at Valencia, and the Windbelt reserve at Nariva have been degraded by squatting, quarrying, illegal logging and extreme fire seasons. The Forestry Division admits to encroachment and illegal logging in reserves in the eastern Northern Range, in the extreme south eastern area of Trinidad, as well as in its teak plantations. As the Forestry Division has no jurisdiction over private lands it is impossible to describe the state of such forests, although the country's major holding of mahogany is well maintained.

The system of licensing for extraction of forest products from State forests including stakes, foliage, herbs, horticultural species, raw materials for basket weaving and craft manufacture is not properly managed or enforced. As a consequence certain species are overharvested. Tree ferns for example, are becoming rare as are thatching palms.

Of critical importance to the conservation of forest resource is the annual fire problem, which was particularly severe in 1987 and 1995, and the management of reforestation. Although there is a system of permits for ignition of fires during the dry season the appointment of fire wardens has been irregular. Official policy on burning is to react only when private property e.g. homes are threatened. These fire seasons have accelerated the degradation processes. Table 5.2 provides information on the extent of fires including those occurring in previously untouched areas. Table 5.3.

TABLE 5.2

ANNUAL FOREST AND BUSH FIRES

YEAR	NUMBER OF FIRES	ESTIMATE OF NEW AREAS BURNT (ha)	TOTAL AREA BURNT (ha)
1987	502	-	21,420
1988	583	-	5,496
1989	146	33.50	971
1990	234	39.0	1103
1991	229	3.30	678
1992	413	50.92	2712
1993	228	58.90	1568
1994	256	36.15	2597
1995	516	673.70	7287
1996*	178	95.10	2664
1997*	156	-	446
TOTAL	**3441**	**990.57**	**46,942**

SOURCE: FORESTRY DIVISION, MALMR 1996 * unpublished data (1996-1997) from FRIM

There has been an on-going programme of reforestation of State lands: The total areas reforested have, however, been small in relation to the losses of forest cover (Table 5.3). No estimates are available of reforestation efforts on privately owned lands. Of the total 44,850 ha burnt in the ten-year period 1987 – 1996, 230 ha or 0.5% have been replanted.

TABLE 5.3

REFORESTATION RATES ON STATELANDS (1987 – 1996)

YEAR	Areas reforested (state) (ha)	Total Area Burnt (h)	COST $
1987	37.5	21,420	450,000
1988	25.3	5,496	260,000.00
1989	Nil	0.971	
1990	30	1,103	350,000
1991	36	0.678	385,000
1992	30	2,712	360,000
1993	15	1,568	118,000
1994	19	2,597	145,000
1995	12.5	7,287	146,400
1996	24.2	2,664	197,200
TOTAL	**166.7**	**44,848.649**	**1,701,600**

Source: Ministry of Agriculture, Land and Marine Resources

5.3 Fisheries

As the fisheries of Trinidad and Tobago are open access fisheries there is effectively no meaningful management of the resources. There is limited legislation under the Fisheries Act regulating gear dimensions of seines, gill nets and trawls but these have never been enforced.

While turtles may still be taken legally, there is some subsidiary legislation protecting turtles. This is generally ineffective in preventing collateral capture of turtles when gill nets are employed. Large trawlers are restricted to particular areas and are required to employ turtle exclusion devices (TEDs). This does not apply to artisanal trawlers. There is an initiative with the UNDP involving communities resident in turtle nesting areas to address this problem through compensation for nets destroyed in releasing turtles. Charges are occasionally laid by game wardens or police officers against persons offering for sale turtles and turtle meat out of the season.

There is no formal fisheries patrol as is found in many developed countries. Any enforcement of legislation regarding industrial trawlers and foreign fishing vessels is the responsibility of the Coast Guard which occasionally arrests both local and more often foreign poachers. Offences are tried in the Magistrates Court, where fines and seizure of catches are effected from time to time.

It is widely stated and believed that fish stocks have been severely depleted by overfishing and pollution. The only reliable scientific knowledge comes from studies carried out by the Fisheries Division and the Institute of Marine Affairs. There is good evidence from stock assessment studies that there is serious depletion of demersal stocks in the Gulf of Paria and around Tobago, and that some pelagic species may be at risk. Concerns have also been expressed about the decline of shrimp. However, as larvae are planktonic, stocks are recruited from spawnings taking place to the south east of Trinidad. There is anecdotal evidence suggesting depletion of stocks of lambie and lobster in Tobago, where there is an active export trade in the latter to hotel demands in islands to the north of Trinidad & Tobago.

5.4 Wildlife

In theory all wildlife is protected and a few may be hunted in season. A harvest census is carried out through a mandatory return of a form provided with the licence. In practice many other species are openly killed for sport. Poaching is common but not easily measured.

Game laws bear little relationship to modern wildlife management. The hunting season, an extended one of five months, was determined for administrative convenience and is unrelated to the biology of the target species. Moreover there are no bag limits. Enforcement of game law is the responsibility of the Forestry Division and is carried out through game wardens. There are 11 game wardens in the Division supported by a system of honorary game wardens. There are 275 positions of Honorary Game Warden

only 75 of which were functional in 1996 and 1997. The discrepancy is illustrated graphically in Figure 5-1. After the fires of 1987 hunting was banned for a period of two years, and although some illegal hunting continued stocks partially recovered.

FIGURE 5-1

Source: Forestry Division, MALMR

5.5 Ecosystems

While many taxonomic groups are comparatively well known, reliable documentation of habitats and systems is extremely uneven. Some key ecosystems are highlighted in Table 5.4. The recent reliable documentation that is available reflects individual academic research pursuits rather than systematic planned study based on general policy directive. Moreover there has not been any monitoring system nor revisiting of studied habitats or ecosystems. For example, Beard's review of the natural vegetation of the country has not been reexamined, while the current picture and maps of vegetation are based on 1968 aerial photography. Marine ecosystems are less well documented and although some broad studies were done on Buccoo Reef, Scotland Bay, Point Lisas and the Caroni and Nariva Swamps twenty years ago, there have been no updating of these or initiation of new study areas. Nariva Swamp is now the subject of an extensive review study commissioned by the Ministry of Agriculture, Land and Marine Resources.

TABLE 5.4

KEY ECOSYSTEMS

ECOSYSTEM	CHARACTERISTICS	LOCATION

Cloud forest	High rainfall/humidity/cloud – Stunted trees – many mosses and lichens	Summit of El Tucuche and Cerro del Aripo
Xerophytic forests	Low rainfall/extended dry season/deciduous trees and cacti	Chacachacare
Herbaceous swamp	Semipermanent inundation – specialized flora	Nariva Swamp
Savannah	Poor drainage/nutrient poor – specialized flora	Aripo – The Aripo savannah is the only remaining undisturbed savannah in Trinidad
Mangrove swamp	Tidally inundated – specialized and much reduced flora	Caroni, South Oropouche, Los Blanquizales, North Oropouche
River gorge	Water worn channels in bedrock	Guanapo gorge, Madamas gorge
Fringing coral reefs	Emergent reef crest with lagoon	Buccoo, Salybia
Offshore islands	Isolated with breeding sea birds	St. Gile, Little Tobago, Soldado
Rocky shore	Resident bedrock exposed by strong wave and current action – algal covered with many herbivores	North eastern Trinidad, Bocas area, Tobago
Caves	Cavities in rocky strata – total darkness – bats and invertebrates	Aripo Oropouche, Tamana

Source: Environmental Management Authority, Trinidad and Tobago State of the Environment (1996) Report

Dedicated ecosystem or habitat management is unusual in Trinidad and Tobago, although a few systems are designated and some effort is made at provision of management infrastructure. Buccoo Reef for example, has been provided with a management plan by the Institute of Marine Affairs and funding through the Tobago House of Assembly to employ personnel and equipment for a reef patrol. A similar plan is being developed for the Speyside reefs. In contrast, the Aripo Savannah while designated a Scientific Reserve using the IUCN Protected Areas Management Categories[1], has not been provided dedicated staff. Caroni Swamp has an evolved management structure embracing dedicated staff and private tour operators. Matura and Grand Riviere Beaches, turtle egg laying sites of importance, are similarly managed in season. All of the other systems, both terrestrial and marine, even including prohibited sites at Nariva Swamp are passively managed by uneven and desultory patrols.

5.6 Species

Some key and charismatic species of both flora and fauna are reproduced in Tables 5.5 and 5.6 from the State of the Environment (1996) Report. Most of the species listed are in fact protected by law, either the Conservation of Wildlife Act or the Forests Act. Some such as the manatee are rare, others such as the

[1] Category 1a: Strict Nature Reserve: protected area managed mainly for science.
Definition: Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

mapipire may be protected on State lands but legally killed on private lands; yet others such as the tree fern may be over exploited.

TABLE 5.5

KEY AND CHARISMATIC SPECIES - FAUNA

COMMON NAME	*SPECIFIC NAME*		FEATURES
Ocelot	*Felis pardalis*	**c**	Forests-rare
Manatee	*Trichechus manatus*	**c**	Nariva – small breeding herd
Howler monkey	*Aloutta seniculus*	**k**	Sentinel species for yellow fever virus
Otter	*Lutra longicaudis*	**c**	Rivers in north east Trinidad – rare
Scarlet ibis	*Eudocimus ruber*	**c**	The National bird
Humming birds	*{Several species}*	**c**	Flight, feeding and colours
Bay headed tanager	*Tanagra gyrola*	**c**	High altitude montane forest
Speckled tanager	*Tanagra guttata*	**c**	High altitude montane forest
Swallow tanager	*Tersina viridis*	**c**	High altitude montane forest
Red-bellied macaw	*Ara manilata*	**k**	Nariva swamp – palm forest
Pawi	*Pipile pipile*	**k&c**	Island race of piping guan – forests – rare
Diablotin or Oilbird	*Steatornis caripensis*	**k&c**	Cave roosting – Aripo, Oropouche and a few other caves in the Northern Range
Red-billed tropic bird	*Phaeton aethereus*	**c**	Breeding colony in Little Tobago & St. Giles
Mot mot	*Momotus momota*	**c**	Forest – usual form
Anaconda (Houilla)	*Euectes murinus*	**k**	Nariva – largest snake in western hemisphere
Mapipire zanana	*Lachesis muta*	**k**	Largest pit viper – rare
Leatherback turtle	*Dermochelys coriacea*	**c**	Largest marine turtle – significant breeding sites in north east Trinidad
Surinam toad	*Pipa pipa*	**k&c**	Only obligate water dwelling frog – direct development of eggs in brood pouches
Golden tree frog	*Phyllodytes auratus*	**k&c**	El Tucuche – possibly island endemic species
Mountain chicken	*Leptodactylus bolivianus*	**k**	Mayaro forest – largest frog in Trinidad
Freshwater sardines	*{Several general/ species}*	**k**	Gill breathing and highly sensitive to aquatic pollution
Cascadu	*Hoplesternum littorale*	**c**	Edible – deeply ingrained in folklore
Blind cave fish	*Rhamdia quelen*	**k**	Eyeless form of River catfish, Oropouche cave
Emperor butterfly	*Morpho peleides*	**c**	Size, habits and beauty
Black coral	*Antipathes atlantica*	**k**	Deep water–used in jewellery

c= Charismatic
k= Key

TABLE 5.6

KEY AND CHARISMATIC SPECIES - FLORA

COMMON NAME	SPECIFIC NAME		FEATURES
Tree fern	*Cyathea spp.* *Cnemidaria spp.*	**k&c**	Largest ferns in Trinidad and Tobago – used in orchid culture–over collected
Wild pine	*Aechmea dichlamydea* *Vriesia splendens* *Guzmania lingulata*	**c**	Epiphytic–forests–of horticultural interest because of floral form and beauty
Ground orchids	*Cyrtopodium parviflorum* Cyrtopodium punctatum *Pogonia rosea*	**k&c**	Showy but rare orchids – much over-collected
Cedros bee	*Oncidium lanceanum*	**c**	Cedros–showy fragrant orchid
Butterfly orchid	*Oncidium papilio*	**c**	Forests-unusual floral form and flowering habits.
Bladderwort	*Utricularia spp*	**k**	Aripo Savannah-carnivorous
Sundew	*Drosera capillaris*	**k**	Aripo savannah – insectivorous
Double Chaconia	*Warszewiczia cocinea CV David Au Young*	**c**	Island mutant form
Cedros balisier	*Heliconia marginata*	**k**	Wetlands – Cedros area
Mora	*Mora excelsa*	**k&c**	Hardwood occurring in pure stands in north east Trinidad

c= Charismatic
k= Key

Management at the species level in Trinidad and Tobago is by and large passive. Except in a few cases such as the leatherback turtle, manatee and pawi collaborative protective measures between active NGOs or CBOs and the Forestry Division have been introduced over the past decade. The Emperor Valley Zoo, the Royal Botanical Gardens and the Pointe-a-Pierre Wildfowl Trust are actively engaged to varying degrees in propagation of endangered species. There is a modest and not very successful private captive breeding programme both in Trinidad and Tobago. This is encouraged by the Ministry of Agriculture, Land and Marine Resources.

5.7 Policy Considerations

Policy is simply a guide to action and there are often different options available for the same objective. Ideally policy formulation examines a current status, determines the desired development path and analyses both the constraints as well as needs. As an overall national guide, the National Environmental Policy (1998) seeks to conserve the vitality and diversity of the country's natural environment by protecting the structure, functions and diversity of the natural systems on which our species depend. Appendix 3 provides additional information on the goal, objectives and basic principles espoused in the National Environmental policy which are in keeping with the objectives of the Convention

on Biological Diversity. The current status of the living resources and their exploitation having been reviewed in this report needs no further reference, except to highlight critical problems, where specific action is indicated.

In the management of living resources the overriding principle is sustainability of harvest and other use, as in the case of habitats or wider systems. These are what ultimately sustain human settlement. There is no doubt that direct harvest of species, particularly timber and fish and shellfish, plays an important role in the lives of many citizens. Sustainable harvesting assumes that there is some notional volume of a population of species which may be extracted or captured annually without causing the collapse of the population. This volume is sometimes referred to as the maximum sustainable yield. However the preferred option which takes into account natural fluctuations in populations, is the optimum sustainable yield which is invariably lower than the maximum sustainable yield.

Determining what may be extracted from a population of organisms is a technically demanding task, which is made more difficult as species diversity rises as is the case in the wet tropics. Methods of determination of potential yields range from crude guess work to sophisticated sampling and computer modelling.

In the case of living communities and larger ecosystems sustainable management seeks to set aside parts of the natural environment for preservation and limits the use of such areas to a notional carrying capacity of activities. Community and ecosystem management is considered to be far more difficult in a terrestrial environment than in a marine one and the degree of difficulty is population density dependent.

In managing biodiversity resources generally, it is axiomatic that management regimes be based on scientific knowledge of the particular resource, be it a single species, community or wider ecosystem. Even in the most developed countries the scientific knowledge of a particular case is more often than not imperfect and management is a compromise between scientific knowledge, past experience and inspired judgement. In countries such as Trinidad and Tobago where the knowledge base is poorly developed, and where experience is limited, the main thrusts must be in application of the precautionary principle, public education and enforcement of updated legislation.

The range of management options is wide. In the case of species, quotas, size, sex, seasons, localities, sale, licensing and other restrictive devices may be chosen. In the case of habitats and communities, the options range from totally prohibited wilderness areas, sanctuaries, reserves, protected areas, and parks to botanical gardens, zoos and private or trust reserves. As emphasised earlier, there are profound differences between management of terrestrial and marine resources, especially the unit costs of effort.

Resource management requires in addition, an informed and educated public. This is not easy to achieve amongst the economically disadvantaged in both rural and urban communities. It is even more difficult where this group forms a significant proportion of the public, as happens in Trinidad and Tobago where 36% of the population is said to live below the poverty line. This fact does not, however, negate the need to develop a balanced programme of effective legislation and enforcement with public education, the latter addressing both the nature and requirements of the law as well as the importance of the living resources of the country to its citizens. Nor does it minimise the current development of public education through official programmes, NGO/CBO initiatives and the media.

SUMMARY BOX

- Data accuracy, gaps and voids hinder confident estimates of the value of biodiversity resources
- More effective resource management and enforcement of laws are urgently required to reduce overexploitation of species and habitats
- In the ten-year period 1987-1996 less than one percent of total area burnt was reforested
- No meaningful management of fisheries is effected due to the open-access nature of Trinidad & Tobago's fisheries
- Fish stock assessment studies provide evidence of a serious depletion of demersal stocks in the Gulf of Paria and around Tobago. Some pelagic species may also be at risk.
- Illegal hunting is described as 'rampant' despite the licencing system and the closed season
- Reliable documentation of habitats and systems is available, not from systematic planned studies, but from individual academic research pursuits
- With the poorly-developed knowledge base on biodiversity resources in Trinidad & Tobago application of the precautionary principle, public education and enforcement of updated legislation must be the main approach to resource conservation.

6.0 MANAGEMENT IMPERATIVES

This report has identified some critical general problems, deficiencies and anomalies. Addressing these presents a matrix for development of a policy of sustainable management of the living resources of Trinidad and Tobago. The main issues, which have emerged, are highlighted hereunder. These are:

a) continuing degradation of natural areas, including protected areas

b) inadequate and ineffective use of preventive measures

c) ineffective rehabilitation efforts in reforestation of watersheds

d) unmanaged resource extraction rates reflected in depletion of stocks of prime species

e) multiple laws which are generally inappropriate, many having low penalties

f) overlapping jurisdictions and a lack of enforcement of existing legislation

g) inadequate provision of human resources for monitoring/control

h) erratic, incoherent and inadequate acquisition of data on resource extraction

i) un-systematic evaluation of the resources of biodiversity

These general issues point to a number of policy imperatives as follows:-

a) development of adequate and relevant modern legislation to replace the existing Forest Act, Fisheries Act and Conservation of Wildlife Act

b) development of proper Parks and Protected Areas legislation and establishment of a national system of such parks and protected areas

c) development of a comprehensive national system of monitoring of extraction of individual resources

d) a more integral working relationship between the Ministry of Agriculture, Land and Marine Resources and the University of the West Indies, as well as the provision of the manpower to effect production of reliable data and information

e) development of a national programme of reforestation related to actual depletion especially in the most important watersheds

f) development of a coherent biodiversity assessment programme

g) development and implementation of the domestic legislation required by the multilateral environmental agreements to which Trinidad and Tobago is signatory.

APPENDIX 1

GLOSSARY

Prohibited Area

A specified area, being part of a Forest Reserve or State Lands declared by the Minister by Order to be prohibited area. (Forests Act 66:01)

Protected Area

An area being managed for the conservation of biological diversity (Conservation of Wildlife Bill 1998)

Environmentally Sensitive Area

An area declared by notice under Section 41 of the Environmental Management Act (No. 2 of 1995) subject to specific restrictions and measures of protection as stated in the notice.

Conservancy

An administrative reference used by Forestry Division, MALMR to describe a geographical area that is managed as a unit and is under the control of an Assistant Conservator of Forests.

Watershed

The entire drainage area that contributes water to a River, wetland, aquifer or other body of water (US EPA 1993).

National Park

Protected area managed mainly for ecosystem protection and recreation (IUCN Protected Areas managed categories 1994)

APPENDIX 2

SOURCE MATERIAL

The literature available on the biota of Trinidad and Tobago is vast and runs to several hundreds of titles. Taking just the primary sources which includes books, monographs and journals a complete bibliography would run to over 50 pages of entries. There is an even larger volume of secondary sources and grey literature pertaining to policy and resource management. It is clear therefore that it is not possible to include in this State of the Environment Report any detailed treatment of the source materials. Readers' attention is however drawn to the bibliographies listed below and two recent consultancy reports dealing with biological diversity (Kenny) and management of resources (Leotaud).

Alpha Engineer and Design Limited (1992). ***Institutional Strengthening and Legal Infrastructure.*** *Technical Report. IADB Basic Environmental Studies (Jan – June 1991) under the Global Pre-Investment Programme ATN/SF: 3158/TT.*

Clubbe, CP and S. Jhilmit (1992). ***A Case Study of Natural Forest Management in Trinidad.*** *Paper presented at the 1992 Oxford Forestry Conference on Tropical Forests: Wise Management of Tropical Forests. March 30 – April 01, 1992. Oxford Forestry Institute, Oxford, England.*

Economic Commission for Latin America and the Caribbean (ECLAC).

Environmental Management Authority. ***Trinidad and Tobago State of the Environment 1996 Report, November 1997****. Port of Spain, Trinidad and Tobago.*

Institute of Marine Affairs, Technical Advisory Services. ***Environmental Data and Information Project. Marine and Coastal Areas. (Physical Oceanography, Water and Sediment Chemistry, Fisheries and Coastal Dynamics).*** *March 1998. Trinidad and Tobago.*

Kenny, J. Comeau, P. and Katwaru, L. (1997). ***A Survey of Biological Diversity: Trinidad and Tobago.*** *Study Commissioned by the United Nations Development Programme: Port of Spain. Trinidad and Tobago.*

Leotaud, Nicole. ***Biodiversity Conservation and Management in Trinidad and Tobago.*** *Study commissioned by the Environmental Management Authority, Port of Spain, Trinidad and Tobago. April 28, 1998.*

World Conservation Monitoring Centre. ***World Resources 1996 – 1997.***

APPENDIX 3

NATIONAL ENVIRONMENTAL POLICY – Goal, Objectives, Principles

2.1 Introduction

Article 4 of The Constitution of Trinidad and Tobago declares that every person in Trinidad and Tobago has the fundamental rights of – life and the enjoyment of property. Further, the Government of Trinidad and Tobago recognizes that humans influence and are influenced by their environment and that the natural and built environments affect their well-being. Government therefore accepts the responsibility to adopt policies and measures with a view to improving human health and the quality of life. Government also acknowledges that the following basic environmental, health and development principles are interdependent and in harmony with the Constitution of the Nation.

***Environment** – Humans have the right to live in an environment of a quality that permits a life of dignity and well being. We bear a solemn responsibility to protect the environment for present and future generations. This responsibility includes the careful planning and management of the natural resources of air, water, land, flora, fauna, among others, and the preservation of our historical heritage.*

***Health** – Health, which is a state of complete physical, mental and social well being, and not merely the absence of disease and infirmity, is a fundamental right and the attainment of the of the highest possible level of health is an important social goal for the country.*

***Development** – Economic and social development are essential to ensure an acceptable living and working environment. Development should be in harmony with ecological principles so that development is sustainable.*

2.2. Vision

The Government of the Republic of Trinidad and Tobago envisions a Trinidad and Tobago in which all people and institutions treasure the environment and voluntarily choose to act in a manner that ensures the protection, conservation and enhancement of the environment.

We foresee a time when all our people, rich and poor, young and old, show respect for nature, and share in the benefits of a healthy environment.

2.3 Policy Goal and Objectives

The Government of Trinidad and Tobago is committed to the constructive use and conservation of the environment for the promotion of economic and social development in order to maintain and improve the quality of life to which all citizens are entitled. However, the fundamental rights of the people are accompanied by certain responsibilities – solemn duty of all who reside within Trinidad and Tobago to protect the environment and natural resources for present and future generations. Consequently:

The goal of the policy is the conservation and wise use of the environment of Trinidad and Tobago to provide adequately for meeting the needs of present and future generations and enhancing the quality of life.

Government's approach to attaining this goal is to pursue a strategy of sustainable development, meaning improving the quality of human life while living within the carrying capacity of supporting ecosystems.

The specific objectives of the Policy are to:

a) *Prevent, reduce or eliminate various forms of pollution to ensure adequate protection of the environment and consequently the health and well-being of humans;*
b) *Conserve the biological diversity of the country and the stability and resilience o the ecosystems;*
c) *Undertake retrospective analyses or evaluations to correct past development decisions that might be inimical to the continued environmental health of the country.*

2.4 Basic Principles

Government's environmental policy will be guided by the following basic principles:

- ***Respect and Care For the Community of Life***
  An ethic based on respect and care for each other and for nature is the foundation of sustainable development. Development ought not to be at the expense of other groups or later generations, nor significantly threaten the survival of other species. The benefits and costs of resource use and environmental conservation should be shared fairly among different communities, among men, women and children, among people who are poor and those who are affluent and between our generation and those who will come after us.

All life on earth, with soil, water and air, constitutes a great, interdependent system – the biosphere. Disturbing one component can affect the whole. Our survival depends on the use of other species, but it is a matter of ethics, as well as practicality, that we try to ensure their survival and safeguard their habitats. Implementation of this principle requires that:

a) Citizens' groups, non-governmental and intergovernmental organisations incorporate the ethic of sustainability into their own policies and codes of conduct;
b) People in all walks of life incorporate the ethic into codes of personal behaviour and professional conduct.

- ***Improve the Quality of Human Life***

  The aim of development is to improve the quality of human life. It should enable people to realise their potential and lead lives of dignity and fulfilment. Economic growth is an essential part of development, but it cannot be a goal in itself.

  Development should result in long and healthy human lives, improved education, access to decent housing, adequate nutrition and safe water, political freedom, guaranteed human rights, cultural freedom and freedom from violence. Development is only real if it makes our lives better in all these respects.

- ***Conserve the Vitality and Diversity of Trinidad and Tobago's Natural Environment***

  Development should be conservation-based and must protect the structure, functions and diversity of the natural systems on which our species depend. The aims of policy should, therefore be to:

  a) Conserve life-support systems, i.e. the ecological systems that cleanse air and water, regulate water flow, recycle essential elements, create and regenerate soil and enable ecosystems to renew themselves.

  b) Conserve Biodiversity. This includes not only species of plants, animals and other organisms but also the range of genetic stocks within each species, and the variety of different ecosystems.

  c) Use renewable resources sustainably. These resources include soil, wild and domesticated organisms, forests, agricultural land, and the marine and freshwater ecosystems that support fisheries;

d) *Conserve non-renewable resources. The use of these resources including oil and gas as well as other minerals, will be optimised to obtain the best possible benefit of all citizens and without impairing the value of other resources.*

- ***Keep within the Country's Carrying Capacity***

There are finite limits to the carrying capacity of Trinidad and Tobago's ecosystems so that renewable resources must be used sustainably. This must be linked to a humane, proactive population policy, which seeks to stabilise the population. We must also recognise the special role of women and that the need for empowerment is integral to success in attaining sustainable development. In order to keep growth within the nation's carrying capacity, the following are required:

a) *National physical development and planning policies must address in a realistic way the need to stabilise population growth, reduce poverty and promote equal access to all national services. An ecological approach to human settlements planning must be implemented in order to make our villages, towns and cities clean, green and efficient. Strategies and plans must also be introduced to use agricultural land optimally;*

b) *Resource conservation, waste minimisation and recycling must be promoted as a way of life. Economic incentives, environmental taxes and "Green" consumer movements must become an acc4epted part of our environmental management strategy;*

c) *Family planning services must be strengthened and linked to improved care and education for mothers and children.*

- ***Change Personal Attitudes and Practices***

If the ethic for sustainable development is to be widely adopted, people must re-examine their values and alter their behaviour. Information must be widely disseminated through formal and informal education campaigns so that the required actions are widely understood.

Environmental education for children and adults must be integrated in education at all levels. Developmental assistance agencies must be encouraged to give more support for providing extension workers to help farmers, fishermen, forest workers, artisans, the urban and rural poor and other groups to use natural resources more productively and sustainably.

- ***Empower Communities to care for their own Environments***
  Local communities, environmental non-governmental organisations and community-based organisations provide the easiest channels for people to express their concerns and take action to create sustainable societies. However, such groups need the power to act. Communities should be given an opportunity to share in managing their local resources and the right of participate in decisions. Local government bodies, communities, businesses, non-governmental and community-based organisations and other interest groups should become partners with Central Government in decisions and projects which affect them, their environment, and the resources on which they depend.

  A national programme for achieving sustainability must involve all interest groups and seek to anticipate environmental problems. In this connection, it is hoped that a National Council for Sustainable Development will soon be established in keeping with commitments under Agenda 21[2]. This Council will provide a forum for Government, business and the environmental movement to have ongoing dialogue. This forum will help build confidence in industry by discussion of objectives, processes and practices and the open disclosure of the results of monitoring. It will be adaptive, continually re-directing its course in response to experience and to new needs.

[2] Agenda 21 is the global Action Plan coming out of the 1992 Rio Earth Summit.

2.3 Policy Goal and Objectives

The Government of Trinidad and Tobago is committed to the constructive use and conservation of the environment for the promotion of economic and social development in order to maintain and improve the quality of life to which all citizens are entitled. However, the fundamental rights of the people are accompanied by certain responsibilities – solemn duty of all who reside within Trinidad and Tobago to protect the environment and natural resources for present and future generations. Consequently:

The goal of the policy is the conservation and wise use of the environment of Trinidad and Tobago to provide adequately for meeting the needs of present and future generations and enhancing the quality of life.

Government's approach to attaining this goal is to pursue a strategy of sustainable development, meaning improving the quality of human life while living within the carrying capacity of supporting ecosystems.

The specific objectives of the Policy are to:

d) Prevent, reduce or eliminate various forms of pollution to ensure adequate protection of the environment and consequently the health and well-being of humans;
e) Conserve the biological diversity of the country and the stability and resilience o the ecosystems;
f) Undertake retrospective analyses or evaluations to correct past development decisions that might be inimical to the continued environmental health of the country.

2.4 Basic Principles

Government's environmental policy will be guided by the following basic principles:

- ***Respect and Care For the Community of Life***
  An ethic based on respect and care for each other and for nature is the foundation of sustainable development. Development ought not to be at the expense of other groups or later generations, nor significantly threaten the survival of other species. The benefits and costs of resource use and environmental conservation should be shared fairly among different communities, among men, women and children, among people who are poor and those who are affluent and between our generation and those who will come after us.

All life on earth, with soil, water and air, constitutes a great, interdependent system – the biosphere. Disturbing one component can affect the whole. Our survival depends on the use of other species, but it is a matter of ethics, as well as practicality, that we try to ensure their survival and safeguard their habitats. Implementation of this principle requires that:

c) Citizens' groups, non-governmental and intergovernmental organisations incorporate the ethic of sustainability into their own policies and codes of conduct;
d) People in all walks of life incorporate the ethic into codes of personal behaviour and professional conduct.

- ***Improve the Quality of Human Life***

  The aim of development is to improve the quality of human life. It should enable people to realise their potential and lead lives of dignity and fulfilment. Economic growth is an essential part of development, but it cannot be a goal in itself.

  Development should result in long and healthy human lives, improved education, access to decent housing, adequate nutrition and safe water, political freedom, guaranteed human rights, cultural freedom and freedom from violence. Development is only real if it makes our lives better in all these respects.

- ***Conserve the Vitality and Diversity of Trinidad and Tobago's Natural Environment***

  Development should be conservation-based and must protect the structure, functions and diversity of the natural systems on which our species depend. The aims of policy should, therefore be to:

  e) Conserve life-support systems, i.e. the ecological systems that cleanse air and water, regulate water flow, recycle essential elements, create and regenerate soil and enable ecosystems to renew themselves.

  f) Conserve Biodiversity. This includes not only species of plants, animals and other organisms but also the range of genetic stocks within each species, and the variety of different ecosystems.

  g) Use renewable resources sustainably. These resources include soil, wild and domesticated organisms, forests, agricultural land, and the marine and freshwater ecosystems that support fisheries;

h) *Conserve non-renewable resources. The use of these resources including oil and gas as well as other minerals, will be optimised to obtain the best possible benefit of all citizens and without impairing the value of other resources.*

- ***Keep within the Country's Carrying Capacity***

There are finite limits to the carrying capacity of Trinidad and Tobago's ecosystems so that renewable resources must be used sustainably. This must be linked to a humane, proactive population policy, which seeks to stabilise the population. We must also recognise the special role of women and that the need for empowerment is integral to success in attaining sustainable development. In order to keep growth within the nation's carrying capacity, the following are required:

d) *National physical development and planning policies must address in a realistic way the need to stabilise population growth, reduce poverty and promote equal access to all national services. An ecological approach to human settlements planning must be implemented in order to make our villages, towns and cities clean, green and efficient. Strategies and plans must also be introduced to use agricultural land optimally;*

e) *Resource conservation, waste minimisation and recycling must be promoted as a way of life. Economic incentives, environmental taxes and "Green" consumer movements must become an acc4epted part of our environmental management strategy;*

f) *Family planning services must be strengthened and linked to improved care and education for mothers and children.*

- ***Change Personal Attitudes and Practices***

If the ethic for sustainable development is to be widely adopted, people must re-examine their values and alter their behaviour. Information must be widely disseminated through formal and informal education campaigns so that the required actions are widely understood.

Environmental education for children and adults must be integrated in education at all levels. Developmental assistance agencies must be encouraged to give more support for providing extension workers to help farmers, fishermen, forest workers, artisans, the urban and rural poor and other groups to use natural resources more productively and sustainably.

- ***Empower Communities to care for their own Environments***
  Local communities, environmental non-governmental organisations and community-based organisations provide the easiest channels for people to express their concerns and take action to create sustainable societies. However, such groups need the power to act. Communities should be given an opportunity to share in managing their local resources and the right of participate in decisions. Local government bodies, communities, businesses, non-governmental and community-based organisations and other interest groups should become partners with Central Government in decisions and projects which affect them, their environment, and the resources on which they depend.

  A national programme for achieving sustainability must involve all interest groups and seek to anticipate environmental problems. In this connection, it is hoped that a National Council for Sustainable Development will soon be established in keeping with commitments under Agenda 21[3]. This Council will provide a forum for Government, business and the environmental movement to have ongoing dialogue. This forum will help build confidence in industry by discussion of objectives, processes and practices and the open disclosure of the results of monitoring. It will be adaptive, continually re-directing its course in response to experience and to new needs.

[3] Agenda 21 is the global Action Plan coming out of the 1992 Rio Earth Summit.