REPORT

ON

# INVENTORY OF THE PROBLEMS OF THE ENVIRONMENT IN TRINIDAD & TOBAGO

(UNEP/ECLA PROJECT)

by

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# INVENTORY OF THE PROBLEMS OF THE ENVIRONMENT IN TRINIDAD & TOBAGO

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# 1. INTRODUCTION

## 1.1 The Project

A general survey of the environmental problems and inadequacies of Trinidad & Tobago was undertaken during the period 9-11 September 1974. A List of the Persons in recent contact with the Consultant is at Appendix I. However, much of the following report is based on the Consultant's own knowledge of his home country (Trinidad & Tobago) and his experience in the environmental field, both at home and abroad.

This survey is a part of the overall Inventory of The Problems of The Environment in Latin America being carried out by the UN Environment Programme in collaboration with the Economic Commission for Latin America.

Many people in governmental and other posts who were interviewed or who are known to the Consultant all express a concern for the environmental problems and inadequacies that do exist and that will inevitably grow as the country develops.

A List of reference documents used is given at Appendix II.

## 1.2 Description of Trinidad & Tobago

Trinidad & Tobago is a 2-island State in the Caribbean lying at the north-eastern corner of Venezuela. Trinidad itself, the most southerly link in the Caribbean chain of islands, is located at $10^{\circ}$ 30' North Latitude and $61^{\circ}$ 45' West Longitude; and Tobago is located 22 miles to the north-east.

Trinidad is 1,864 sq. miles in area, and about 50 miles north-south by 37 miles east-west. Its flora, fauna and geological structure are similar to those of the Orinoco region of South America. Its green surface offers a variety of scenes - forested hills in the north, well-cultivated plains elsewhere, and numerous rivers and streams. The population was 905,930 in 1970.

Tobago is 116 sq. miles in area, and about 26 miles long by 7½ miles at its greatest breadth. The island is of volcanic origin surrounded by attractive beaches and much cleaner coastal waters than Trinidad's. The population was 39,280 in 1970.

The dry season is January to May and the average annual rainfall is around 80 inches. The average annual temperature is about 76° F.

The capital is Port of Spain in the north-west, and Trinidad is most noted for its oil resources and a fun loving way of life. After years of British colonization the 2-island state became independent on 31 August 1962. Appendix III gives some basic data of the country, and a graph of population projections is at Appendix IV. Unless otherwise mentioned, all references in this report are to the larger island of Trinidad.

## 2. HUMAN SETTLEMENTS (HABITAT)

### 2.1 Water Supply

The first comprehensive programme of development of the water resources of Trinidad & Tobago was established in 1950, when 15 mgd was being supplied to a population of 620,000. From 1953 to 1965 production was increased from 16 mgd to 47 mgd. In the latter year, the Water and Sewerage Authority was formed by amalgamating six water authorities. In 1970 engineering consultants submitted a report on the entire subject entitled "Trinidad & Tobago Water Study".

At present there are 60 separate water supply systems supplying 60 mgd as follows:

Surface - 22 mgd (most from Navet in the south and Hollis in the north)

Groundwater - 30 mgd (most from Northern Valleys and Alluvial Fan in the north)

The types and numbers of water services are:

| | | |
|---|---|---|
| Direct Connections | 115,000 | 500,000 |
| Stand Pipes | 5,200 | 470,000 |
| Truck-borne | - | 30,000 |
| Total | 120,000 | 1,000,000 |
| | Services | Population |

Waste and loss are considered high, and together with fire-fighting, vary between 5-50% as "unaccounted-for" water. Water quality is well controlled, but supplies to both the greater Port of Spain area in the north and San Fernando in the south are inadequate. The expansion of Navet with a new low dam will provide 7 mgd more to the south in 1976, while the Caroni-Arima project due for completion in 1980 will provide 60 mgd to the north and south.

Due to oil price increases and, as a consequence, a rise in national revenue, Trinidad plans some heavy investment into industry in the Point Lisas area. The real constraint to that development is water supply to meet the industrial needs of 63 mgd in 1980 and thereafter. (See Appendix V for Water Supply Information).

2.2 Sewerage

During the years 1962-65 Government undertook an island-wide sewerage project which involved sewers and treatment plants for Port of Spain (sewage lagoons), San Fernando (trickling filter) and Arima (trickling filter). Detailed information on this subject has been submitted with this report.

In other smaller communities and for some institutions, small sewerage systems exist. Trincity, between Port of Spain and the airport, is an example of this. Outside of these areas the homes are served with septic tanks and soakaway pits, while rural homes without a pipe-borne supply use the pit privy. (An anti-hookworm privy programme by Government has been relatively successful).

There is a need for an expansion of sewerage facilities and an improvement in their maintenance and operation. The Port of Spain sewage lagoons for instance, are badly in need of desludging.

Although some industrial wastewater is received in the sewerage systems, much remains to be done in this area when they are expanded. The whole question of industrial waste disposal, especially for old industries, remains somewhat unconsidered as the country's waterways become more polluted.

## 2.3 Drainage

In a country with a high annual rainfall in the north where most of the population lives, drainage problems do exist and they can be acute. The run-off from the northern range of hills has to cross major roads (e.g. Eastern Main Road) to join watercourses to run to sea. Due to housing development on higher ground many drains and culverts are no longer adequate, and flash flooding of various roads (e.g. Saddle Road to Maraval) is not uncommon.

Almost as serious, is the lack of drain, canal and river maintenance. The responsibility falls on the shoulders of more than one authority (e.g. County Councils and Ministry of Works) and this causes confusion. In addition, budgets and manpower are totally inadequate.

## 2.4 Refuse Disposal

Refuse collection and disposal are local government responsibilities. Collection for most neighbourhoods is three times a week. The major problem is in central Port of Spain where "dust-bins" are routinely spilled by stray dogs before early morning collection crews arrive. In some areas where collection is by contractor, there are instances of unsatisfactory collection or transportation.

But the real problem is in disposal. Throughout the country disposal is by dumping or land-filling. Because of the lack of soil cover and organized procedures, the method is not sanitary. Spontaneous combustion also leads to constant fires; and between the odours and the smoke, downwind of these disposal areas is heavily air-polluted. The worst example is the Beetham Housing Project in eastern Port of Spain, downwind of the disposal area which is south of the Beetham Highway in the Laventille Swamp.

Public place cleaning leaves a lot to be desired. In the dry season more street washing needs to be done while the maintenance of parks and other places should be intensified.

There is a serious need for an up-to-date professional study of soild waste management throughout the country, from waste generation to disposal.

## 2.5 Town and Country Planning

The Town and Country Planning Department in the Ministry of Planning and Development is strong and relatively well staffed. In 1971 as many as 2,865 plans for new buildings were approved, most of these being dwelling houses.

A Master Plan for the country exists and building zones for residences, industry, etc. are clearly indicated, thus forming the basis for site approval. A new document under consideration is entitled "Planning for Development: The National Framework".

However, squatters' houses continue to mushroom throughout the hilly areas of the urban belt stretching 30 miles from Chaguaramas (west of Port of Spain) to Arima in the east all along the foothills of the state-owned northern mountain range. These squatter areas, although gradually supplied with electricity and water, generally lack the roads, drainage, sewerage and physical layout desirable for the average community. Of course, the houses themselves are unapproved by any authority.

The oldest of such areas, the slums of Laventille in east Port of Spain, is being re-planned and re-developed by the Urban Re-development Council. However, unless more modest housing can be provided for the growing population there will soon be many areas requiring re-planning and the provision of comprehensive infrastructural works and services.

## 2.6 Housing

While the Ministry of Housing is the controlling body over housing, a National Housing Authority exists to step up the development of Low Cost Housing Schemes to meet the growing demands of the population. Many middle and upper-income houses continue to be built by their owners on freehold land in suburban areas.

Meanwhile, applications for new houses and other buildings are considered by public health inspectors in accordance with the environmental health regulations for building sanitation.

## 2.7 Community Sanitation

Community sanitation does not appear to be receiving the same measure of attention as before, due probably to the failure of local government councils to modernize their approach and to expand their staff and facilities to meet the continuing increase in population and buildings. The inspection of residential property and other field activities of public health inspectors appear to be sacrificed for office approvals of house applications, etc.

The cleaning of public places is regular but not often enough, and official pest control measures are limited to aedes aegypti mosquito control work. In the overall effort at community sanitation, a much more professional approach will be needed in the future. Certainly a new appreciation for the community environment and an up-graded effort are long overdue. It is time that the inherited colonial attitude, that the community belongs to somebody else, be replaced by a new sense of civic pride.

## 2.8 Development Projects

South-West Tobago: The south-west end of Tobago, with the airport, some hotel development, and the tourist attraction of Buccoo Reef, has been recognized as an ecologically sensitive area requiring the highest quality of environmental planning. Development is going ahead but wastewater outlets are not being permitted to the Buccoo Reef area. The proposed sewage treatment plant will outlet off the south coast.

Point Lisas Industrial Port: An industrial port is proposed for the Point Lisas area near Couva on the west coast of Trinidad towards the south. Plans are for separate but common sewerage and industrial waste systems. Strict control is going to be needed to prevent environmental pollution by the major industries planned for the area.

Chaguaramas Development Project: A Chaguaramas Development Authority was formed in 1972 to develop the entire north-west peninsula of Trinidad. The development project is expected to include residential areas, commercial area, hotel development, and some light and marine-oriented industries. Recreational areas, including a national park, are also proposed. At a public enquiry into the developmental plans for the area, a considerable interest was shown in environmental preservation and protection. Such considerations are essential to the long term tourist (local and foreign) benefits from the development of the peninsula.

### 2.9 Other Problems

School Sanitation: In general, overcrowding, poor lighting and ventilation, inadequate sanitary facilities, and lack of a rigid house-keeping schedule are the main school environment problems. There is no recognized School Environment Programme, and most school environments do not receive the specialized and consistent attention they deserve.

Port Sanitation: Sanitation at the seaport of Port of Spain could be improved. There is no possible connection between ships and the local sewer system, so that ships' sewage is routinely discharged into the port's waters. The collection of solid waste from the area is not always prompt, and improper storage of goods (covered and in the open) only allows the rodent problem to continue unabated. A shortage of sanitary facilities is yet another weakness. Meanwhile, airport sanitation is satisfactory, although there is the dumping of refuse from planes and hotels on the banks of the Caroni River.

## 3. HUMAN SETTLEMENTS (HEALTH AND WELFARE)

### 3.1 Environmental Pollution

Trinidad's interest in its growing industrial pollution dates back many years. In 1958 a committee was appointed "to examine the problems of the pollution of rivers, inland and coastal waters and

agricultural land by oil, sewage and effluent from factories and mills, and to recommend such measures of control as may be necessary in the overall interests of Trinidad & Tobago". The Committee reported in 1960 that "at present the pollution nuisance has not reached substantial proportions". However, they warned that "immediate steps must be taken to initiate schemes whereby pollution is controlled and minimised" in view of the continuing industrial and housing developments in the country.

The Committee's work led to the island-wide sewerage scheme of 1962 to 1965. Then in 1970 a similar committee was again formed and found that there was enough pollution from oil and other causes to warrant legislative and other action by the government and the major industries.

In 1972 another committee was appointed "to consider the problems posed by industrial wastes in Trinidad & Tobago". Wastes from the following local industries were considered problematic: sugar, rum distillery, cement, petroleum, quarrying, bakeries, laundries, bauxite transfer, etc.

More recently (in 1973) an Anti-Pollution Council was formed and its interim report recommends a strong and broad environmental control programme to combat pollution and other problems. Its terms of reference and membership are given at Appendix VI.

It is clear that all forms of environmental pollution exist in Trinidad (not Tobago) and have been brought to the attention of the policymakers. However, no concrete action appears to have been taken. No detailed information exists and the country is without modern anti-pollution legislation, standards and enforcement capability.

3.1.1 Air Pollution

Air pollution exists in Trinidad from the following:

- Smoke, gases and other atmospheric discharges from oil, petro-chemicals, cement, sugar, garment and other industrial establishments.

- Sugar-cane and refuse-dump burning.
- Gas and smoke exhausted from motor vehicles, especially in traffic jams at peak hours.

In general, the island's flushing atmosphere tends to reduce the effect of air pollution problems, some of which blow harmlessly out to sea. The largest area suffering from air pollution (oil refining) is the Marabella-Vistabella area.

3.1.2 Land Pollution

There is widespread littering in communities (e.g. streets, parks, drains, etc.) and along the nation's beaches. There is also considerable dumping of refuse off highways and in coastal waters. Dumping and abandoning of derelict motor vehicles is a special problem in rural areas.

A new Anti-Litter Act incorporates substantial penalties but it is difficult to enforce, requiring that the actual littering act be witnessed by more than one person.

The urban problem of stray and ownerless dogs is only now receiving effective attention (within recent months) by municipalities after years of complaints.

3.1.3 Water Pollution

Rivers: Most of the nation's rivers are polluted to one degree or another by industrial wastewater. This is most apparent in the dry season when river-flows are reduced to a minimum. In the wet season particularly, there is natural pollution by a heavy sediment load from soil erosion and silted run-offs. Pollution from the agricultural run-off of chemicals applied to crops and crop land (e.g. pesticides, fertilizers, etc.) is also suspect.

In the north, running east to west and receiving drainage and wastewaters from the most developed region in Trinidad is the Caroni River which is polluted in its upper stretches by a variety

of industries, in its middle area by sugar and rum refineries, and in its lower region by the tributaries of St. Joseph and San Juan rivers by milk, beer, soap and other industries. The lower Caroni River is the most polluted and it feeds the very important nature reserve called the Caroni Swamp. No measures to prevent and control this pollution have been taken. The proposed Caroni-Arena Water Treatment Plant has been sited as far upstream as Piarco Airport in order to escape the heavy pollution. This cost the country millions of dollars for increased water-transmission costs.

Other rivers are also polluted especially the two southern ones - the Cipero, with sugar refinery wastes and refuse dumping, and the Guaracara which is an open oil sewer.

Marine: The pollution of coastal waters and beaches is caused by:

- Oil from marine oil exploration, ships and natural seepages.
- Refuse and sewage from ships and coastal communities.
- Discharges of polluted rivers.
- Dumping and littering of beaches by fishermen and the public.

A new major threat of marine pollution is the growing practice of ship-to-ship transfer of oil in the Gulf of Paria from super tankers. Although preventive measures are taken, there is no local capability to control a major oil spill if it occurs.

## 3.2 Food Sanitation

Following typhoid, polio and gastro-enteritis epidemics in recent years, some attention is being given to food sanitation in the more urban areas. Food handlers must be medically certified, and some inspection of the sanitary conditions in eating places and food processing plants is taking place.

Two weak areas remain:

(a) the public's complacency and lack of knowledge of proper food sanitation, and

(b) the inadequacy of inspection staff in the local government councils.

3.3 Environmental Education

The Health Education Units in the Ministry of Health and in the City Council of Port of Spain are both functioning, although with limited budgets; and therefore, on a campaign basis rather than routinely. Because of the local indifference and complacency towards the environment, considerable public education is needed to get the public to participate.

At a meeting earlier this year on the subject of Environmental Education held by the Anti-Pollution Council, it was unanimously agreed that the environmental portion of the Social Studies curriculum in primary and secondary schools should be developed. To this end there is a growing demand for teaching material on the subject.

3.4 Health Situation and Statistics

Attached at Appendices VII and VIII are some basic health statistics. Some conclusions can be drawn, such as:

(a) Cancer and heart diseases are the two leading health problems.

(b) While environmental diseases are generally decreasing, sudden epidemics are possible -

Typhoid in 1969, 1971 and 1972
Diphtheria in 1969
Poliomyelitis in 1971/72
Hookworm in 1970

(c) The two mosquito-borne diseases of malaria and yellow fever are no longer the threat they were, while cholera is still non-existent.

The possibility of a sudden epidemic of one environmental disease or another is proof that environmental control measures are not fully successful, and therefore cannot be relaxed.

A high motor vehicle population on the country's roads, which have not enjoyed a parallel increase in width or number, continues to lead to annual increases in traffic accidents with accompanying deaths and injuries.(See Appendix IX).

## 3.5 Deficiencies in Government Services

Two deficiencies in government services appear to be the main constraints to the establishment of an all-embracing environmental agency in government.

The first is that there is a general feeling that too many government organizations already exist and that the government pay-roll is already too high. There is therefore an agreed reluctance among policymakers to form a new environmental agency with the trained personnel necessary to implement a national environmental programme.

Secondly, despite the preparation of a national health plan in recent years with PAHO/WHO assistance, there has been no serious progress in the development of the environmental health arm of the Ministry of Health. If such an arm had been fully developed in the past, it would have inevitably become the nucleus for an overall environmental agency, as has happened in a number of countries.

It is a fact that without such an agency to spearhead government's initiative in this area, no serious national environmental programme can be expected.

## 3.6 Other Problems

Noise Pollution: Noise pollution is developing in the Port-of-Spain area (e.g. motor vehicles, juke-boxes, etc.) but is still far from crisis levels.

Working Environment: The Factory Inspectorate in the Ministry of Labour is responsible for control of the working environment, especially the possibility of industrial accidents (See Appendix X for a recent record). However, it is the routine efforts of the labour unions that have improved working conditions over the years. New legislation is now being considered.

## 4. ENVIRONMENTAL RESOURCES

### 4.1 Soil Resources

Appendix XI gives the utilization of the surface areas by Principal Uses of Land (1946-59). About $\frac{1}{3}$ of the entire area of Trinidad & Tobago is classified as Agricultural Areas, and more than $\frac{1}{2}$ is State Forests. In recent years a Land Capability Survey was carried out to determine the agricultural potential of the soils of the country. There appears to be no large scale soil losses, although constant flooding by brackish water (e.g. lower Caroni in the El Socorro area) and poor drainage has ruined small areas here and there. Soil erosion on the hills results from uncontrolled bulldozing by land developers. Beach erosion on the east and north-east coast, open to the North-East Trade winds from across the Atlantic Ocean, requires more attention than has been given so far.

### 4.2 Water Resources

A Trinidad Water Resources Survey was carried out with bilateral assistance (Canada) during the period July 1966 to December 1969. Among other things the Survey:

- established a hydro-meteorological network,
- collected, analyzed and published hydro-meteorological data,
- established a preliminary assessment of the total exploitable water in Trinidad as 60 mgd groundwater and 240 mgd surface water,
- established that water requirements for Trinidad would approximate 200 mgd in year 2000.

For the time being there appears to be enough water in the country to meet its needs. The major threat to surface water sources is industrial pollution, while salt water infiltration into some wells (e.g. El Socorro) is cause for some concern. A Water Resources Department exists and reports to the Board of the Water and Sewerage Authority.

## 4.3 Forestry

An old and active Forestry Department controls the orderly removal of timber from the forests in accordance with a planned programme or when clearance for a water reservoir (e.g. Navet Dam) or agriculture is needed. The Department also carries out a successful Reafforestation Programme. At Appendix XII some forestry information is given. Two FAO experts are assisting the department which has posts for 8 professionals. A forestry school trains sub-professional staff members.

## 4.4 Parks and Beaches

Improved economic conditions in recent years have meant a greater number of citizens looking for recreational outlets and for areas for environmental appreciation. There is a growing demand for national parks, hiking trails, etc. and potential areas do exist. The Caroni Swamp, although not declared a national park, is used by tourists and locals alike; the main attraction being the beautiful red Scarlet Ibis bird which nests there. Meanwhile, despite the lack of facilities public beaches (and all are public) are widely used.

In 1973 a National Environment and Conservation Council was formed to advise the Minister of Planning and Development on the question of parks and beaches. This advisory council has no budget and it lacks the supporting staff for real effectiveness.

Beach erosion and pollution by oil are problems also deserving attention.

## 4.5 Fisheries and Marine Pollution

Oil is the most important pollutant in the coastal waters, and on beaches on the west, south and east coasts. It is feared that the sediment in Trinidadian waters from the Orinoco River in Venezuela, when mixed with oil (from natural seepages or oil spills) coagulates and settles to the bottom. As a result, over a period of time such a "paving" exercise will lead to the destruction of micro-plankton and the whole aquatic food chain. Bottom grabs by a U.S. Coast Guard

survey ship (1972) showed oil in every sample of seabed collected off the south coast. Meanwhile, the feeling is that the Gulf of Paria has been out-fished. Fish delivered to principal markets runs around 8 to 10 million lbs. annually.

### 4.6 Other Problems

Flooding: Almost every year the Caroni River floods to the south at Kelly Village in its mid-section. Much of the area is in sugar-cane and the flooding is a temporary inconvenience for households and transportation. Some relief is expected when the Caroni-Arena water supply project starts storing Caroni water in a reservoir on its Arena tributary.

## 5. NATIONAL POLICIES AFFECTING ENVIRONMENT

### 5.1 Local Institutions and Legislation

There is no statutory environmental agency responsible for all environmental matters, but the two advisory bodies mentioned previously are worthy of repeating. They are:

| | | |
|---|---|---|
| (a) | Anti-Pollution Council | - All matters relating to the human environment |
| (b) | National Environment and Conservation Council | - Parks and beaches |

Executive agencies and their supporting legislation in the environmental field are:

| | | |
|---|---|---|
| (a) | Local Health Authority (municipalities) | - Public Health Ordinance 1917 |
| (b) | Factories Division, Ministry of Labour | - Factories Ordinance 1948 |
| (c) | Harbour Master, Customs, Marine Police | - Oil in the Waters of the Colony Ordinance |
| (d) | Town and Country Planning Division, Ministry of Planning and Development | - Town and Country Planning Ordinance 1960 |

| | |
|---|---|
| (e) Water and Sewerage Authority | - Water and Sewerage Authority Act, 1965 |
| (f) Ministry of Petroleum and Mines | - Petroleum Regulations, 1970 |
| (g) Harbour Master, Customs, Marine Police | - Marine Areas (Preservation and Enhancement) Act, 1970 |

## 5.2 Industry and the Environment

There are many direct and indirect features in the relationship between industry and the environment. The most worrisome is environmental pollution - air and water.

### 5.2.1 Existing Industries

There is a fair amount of pollution from existing industry, especially from wastewater discharge into rivers. The old industries show no interest in the environment, and they are inclined to admit that in the absence of a strong anti-pollution programme by government, they plan to take no corrective action whatsoever. If this inactivity continues any future industrial development will have some serious and harmful environmental side effects.

### 5.2.2 Industrial Development

The government is currently engaged in a programme of industrial development and diversification with particular emphasis on the development and use of the petroleum resources of the Nation. A recent announcement referred to "the nationalization of Trinidad & Tobago's internal energy policy, the promotion and development of energy-based or energy-intensive industries and the development of infrastructure facilities to serve these industries. Some of the industries planned include petroleum production and refining, iron and steel, aluminium smelting, fertilizer manufacture, shipping and petro-chemicals".

The result of this will be a sharp rise in the water supply demands for the area, as well as the need to carefully assess waste disposal and other inevitable demands on the environment.

A special comment might be made with respect to the tourist industry and Tobago. There is a need for a much greater appreciation in local circles for the importance of the environment in tourism development, bearing in mind that a tourist to a tropical island is more interested in the environment of the sun and the sea than anything else.

## 5.3 Agriculture

The major environmental problems in agriculture are:

(a) Sugar-cane burning, before canes are reaped, causing air pollution over large areas in the early months of the year; and

(b) aerial spraying of insecticide over the sugar-cane crop to destroy the froghopper insect also destroys bees and other useful insects.

## 5.4 Public and Political Attitudes

As far as social and civic affairs are concerned, Trinidadians have a reputation for complacency and disinterest. This has probably been inherited from the past when Trinidad experienced years of strong colonial rule and citizens viewed the community as belonging to someone else. As it stands now the average citizen keeps his home clean (though not his backyard) but is prepared to tolerate an unsanitary street or public place; and indeed, he may litter at will.

The result is that there is little public pressure on government to give priority of attention to community sanitation, national parks and other features of the nation's environment. The policymaker therefore continues to be devoted to the energy crisis, industrial development and jobs.

However, an environmental group was formed (by the Consultant) in 1972 called Society for the Conservation, Appreciation and Promotion of the Environment (SCAPE). The Society meets irregularly and lobbies routinely for one environmental cause or another.

## 5.5 External Assistance

Trinidad & Tobago enjoys a fair measure of assistance from abroad. On a bilateral basis Canada and the U.S.A. are major donors. Otherwise the UNDP and the other UN Agencies assist in various projects from time to time. Many major projects such as water supply, sewerage, housing, etc. are possibly funded by one of the members of the World Bank group. Trinidad's economy is good enough to permit most of the funding to come from government sources.

# 6. CONCLUSIONS

Trinidad & Tobago, with its colonial background and oil economy seems to be at an intermediate stage in its development. As such she experiences environmental inadequacies like undeveloped governmental services (e.g. poor community maintenance) and a lack of environmental consciousness among members of the public. To these developing country problems however, may be added industrial pollution which is really a problem of development.

There is no doubt that the country badly needs to up-grade its present efforts and establish a modern environmental programme for the nation as a whole. A Resume of the Environmental Situation is given at Appendix XIII.

Appendix I

## List of Persons in Contact with Consultant in Trinidad

(1) Anti-Pollution Council members.

(2) National Environment and Conservation members.

(3) SCAPE members (Society for the Conservation, Appreciation and Promotion of the Environment).

(4) Ministry of Health: Minister, Permanent Secretary, Medical Officers, Director of Public Health Engineering Division.

(5) Water and Sewerage Authority: Executive Director, Deputy Executive Director, Technical Director, Projects Manager, etc.

(6) Ministry of Planning & Development: Minister, Director of Town and Country Planning, etc.

(7) Ministry of Agriculture, Lands and Fisheries: Conservator of Forests, Senior Fisheries Officer.

(8) Ministry of Petroleum & Mines: Minister, Permanent Secretary, Special Adviser to Minister, Chief Petroleum Engineer.

(9) Ministry of Local Government: Minister.

(10) Industrial Development Corporation: Deputy Chairman, General Manager, Projects Manager.

(11) Ministry of Works: Chief Technical Officer, Director of Drainage.

(12) Association of Professional Engineers of Trinidad & Tobago.

Appendix II

## List of Reference Documents for Trinidad & Tobago

(1) Annual Statistical Digest - Central Statistical Office 1971/72.

(2) Interim Report of the Anti-Pollution Council (September 1973).

(3) Trinidad & Tobago Water Study (September 1970).

(4) Land Capability Survey.

(5) Trinidad Water Resources Survey (1966-69).

(6) Trinidad Rainfall, 1933-52 - L. Wehekind.

(7) Report on Sewerage Facilities (September 1968).

(8) Final Report of the Committee appointed by the Prime Minister to consider the problems posed by Industrial Wastes in Trinidad & Tobago (March 1972).

(9) Report of the Committee appointed by Cabinet to consider the question of Pollution (September 1971).

*(10) SCAPE pamphlet on "aims and objects, methods, interest and fees".

*(11) Trinidad & Tobago: Thoughts on our Environment.

(12) Report of the Water Pollution Committee (1960).

*(13) Miscellaneous papers and extracts.

Note: * means document submitted.

## AREA, LOCATION AND CLIMATE

### TABLE 1

Area and Location

The Island of Trinidad is situated about 10 degrees North of the Equator, between 61 and 62 degrees West Longtitude in the Southern part of the Caribbean Sea. It is seven miles from the Venezuelan Coast from which it is separated by the Gulf of Paria and the narrow channels of the Bocas. It is the second largest of the group formerly comprising the British West Indian islands and is about 65 miles long and 48 miles broad with an area of 1,863 square miles. This island is mostly flat, with its highest peaks in the North; Aripo the highest, is 3,085 feet.

The Island of Tobago is situated about 11 degrees 9 minutes North of the Equator, 60 degrees 43 minutes West Longtitude. It lies north-east of Trinidad from which it is separated by a channel about 19 miles wide. It is about 32 miles long and 11 miles broad with an area of 116 square miles. The topography is broken with a central chain of peaks, the main ridge reaching a height of 1,800 feet.

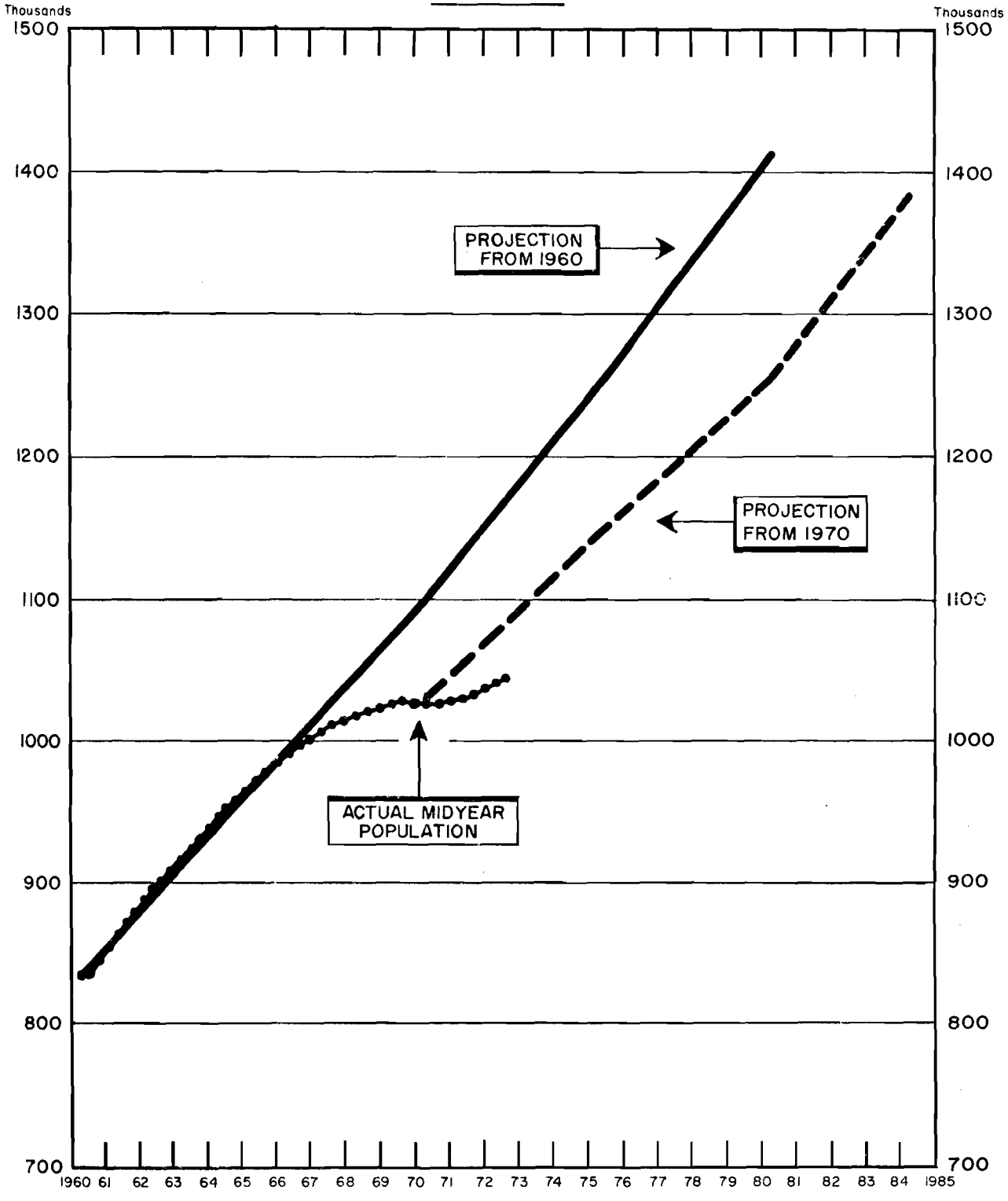
| Administrative Divisions | Area | | 1960 POP. CENSUS |
|---|---|---|---|
| | Acres | Square Miles | |
| | (1) | (2) | (3) |
| Trinidad and Tobago | 1,267,236 | 1,980.0 | 827,957 |
| Port of Spain | 2,368 | 3.7 | 93,954 |
| San Fernando | 1,600 | 2.5 | 39,830 |
| Arima | 582 | 0.9 | 10,982 |
| St. George[1] | 226,659 | 354.2 | 256,478 |
| St. Andrew | 180,954 | 282.7 | 32,590 |
| Caroni | 136,951 | 214.0 | 90,513 |
| Victoria[2] | 201,011 | 314.1 | 132,721 |
| St. Patrick | 166,912 | 260.8 | 108,218 |
| St. David | 50,530 | 79.0 | 6,032 |
| Nariva | 132,033 | 206.3 | 17,226 |
| Mayaro | 93,244 | 145.7 | 6,080 |
| Tobago | 74,392 | 116.2 | 33,333 |
| Waters of the Territory | ... | ... | ... |

[1]Excludes Port of Spain and Arima.
[2]Excludes San Fernando.

Source: 1

Chart 3

## POPULATION PROJECTIONS AND ACTUAL POPULATION GROWTH 1960—1985




*See table 21*

TABLE 205. ANALYSIS OF SUPPLY AND DISTRIBUTION OF WATER, 1960 – 1965

000 gals

| Year | Supply | | Distribution | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Works and Hydraulics Department | Arima Borough Council | To Consumers in distribution area | | To Municipalities | | | To consumers outside distribution areas | Other[1] |
| | | | Metered | Unmetered | Port of Spain City Council | San Fernando Borough Council | Arima Borough Council | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| 1960 ... ... ... | 7,706,503 | 532 | 764,598 | 5,356,805 | 507,666 | 672,391 | 148,065 | 257,510 | |
| 1961 ... ... ... | 8,751,800 | 447 | 703,558 | 6,228,676 | 742,693 | 595,796 | 176,495 | 305,259 | |
| 1962[2] ... ... ... | 10,565,455 | 739 | 792,935 | 7,636,280 | 843,461 | 781,628 | 239,614 | 272,276 | |
| 1963 ... ... ... | 12,103,708 | 776 | 812,275 | 8,909,142 | 809,161 | 938,339 | 256,827 | 278,740 | |
| 1964 ... ... ... | 13,230,644 | 813 | 831,615 | 9,793,401 | 1,084,715 | 938,083 | 278,482 | 305,161 | |
| 1965 ... ... ... | ... | ... | 852,405 | 10,772,741[3] | 1,878,544 | 703,798 | 245,700 | 346,495 | |

[1]Includes bulk supplies to shipping, to Wardens, for distribution by Lorries, to Trinidad Leaseholds Ltd., to Trinidad Cement Ltd., and to Federation Chemicals Ltd.

[2]Since 1961 there has been a rapid expansion in C.W.D.A. activity. In addition certain revisions were made in the accounting basis; hence data for 1961 onwards may not be strictly comparable with those for previous years.

[3]The Municipalities of San Fernando and Arima were billed only up to September, 1965.

Source: 83

TABLE 206. ESTIMATE OF WATER PRODUCTION OF THE WATER AND SEWERAGE AUTHORITY, 1965–1972

million galls.

| Year | Total Production | Average Daily Production |
|---|---|---|
| | (1) | (2) |
| 1965 ... ... ... ... ... ... ... | ... | ... |
| 1966 ... ... ... ... ... ... ... | 17,556.5 | 48.1 |
| 1967 ... ... ... ... ... ... ... | 17,998.5 | 50.7 |
| 1968 ... ... ... ... ... ... ... | 19,800.6 | 54.1 |
| 1969 ... ... ... ... ... ... ... | 20,483.5 | 57.7 |
| 1970 ... ... ... ... ... ... ... | 20,838.5 | 58.7 |
| 1971 ... ... ... ... ... ... ... | 21,158.0 | 59.6 |
| 1972 ... ... ... ... ... ... ... | 22,801.8 | 62.3 |

Source: 94

## ANTI-POLLUTION COUNCIL

The Terms of Reference of the Anti-Pollution Council are:

i) to advise the Minister of Health on all matters relating to the Human Environment;

ii) to identify, investigate and make recommendations for the improvement and maintenance of a healthy environment;

iii) to make recommendations with a view to ensuring that, as far as possible pollution controls are designed and implemented simultaneously with industrial development; and that rivers, watercourses and beaches are kept unpolluted and their full recreational and aesthetic value is preserved at all times;

iv) to recommend such legislation as will prevent further deterioration on the environment with the consequent debasement of the quality of life of the people of Trinidad and Tobago;

v) to study and make recommendations as to the possible effects of environmental influences, such as accelerated transportation and communication, and the stress and pressures of modern life on mental health and cultural and social patterns in the country;

vi) to appoint committees chaired by one of its members and comprised of members and/or non-members who may be drawn from the general public or from any Ministry of Government as may be appropriate.

Membership of the Council is as follows:

Mr. Ronald Williams — CHAIRMAN
Chief Engineer
Trintoplan

| | | |
|---|---|---|
| Mr. Ken Snaggs<br>Director<br>Town & Country Planning | - | MEMBER |
| Mr. Dudley Isac<br>Public Health Engineer<br>Ministry of Health | - | do. |
| Mr. Hugh Hinds<br>Chief Petroleum Engineer<br>Ministry of Petroleum<br>and Mines | - | do. |
| Dr. Alejandro Santiago<br>Public Health Medical Officer<br>Ministry of Health | - | do. |
| Dr. Michael Lines<br>Deputy Chief Chemist/<br>Assistant Food & Drugs Director<br>Ministry of Health | - | do. |
| Dr. John Spence<br>Biologist<br>University of the West Indies | - | do. |
| Dr. Edmund Jones<br>Technical Officer (Extension)<br>Ministry of Agriculture,<br>Lands and Fisheries | - | do. |
| Mr. Clem Razack<br>Lawyer | - | do. |
| Mr. Colin Taylor<br>Director of Drainage<br>Ministry of Works | - | do. |
| Mrs. Hazel Mutunhu<br>MSc. (Marine Biology) | - | do. |

TABLE 26. DEATHS AND DEATH RATES BY 50 CAUSE – GROUPS, 1969–1971
(RATES PER 100,000 ESTIMATED MID-YEAR POPULATION)

| Abbreviated List No.[1] | Cause of Death | Deaths | | | Rates | | |
|---|---|---|---|---|---|---|---|
| | | 1969 | 1970 | 1971 | 1969 | 1970 | 1971 |
| | Total (all causes) | 7.068 | 6,956 | 7,044 | 687.68 | 677.48 | 682.25 |
| B 1 | Cholera | – | – | – | – | – | – |
| B 2 | Typhoid fever | 3 | 4 | – | 0.29 | 0.39 | – |
| B 3 | Biscillary Dysentry and Amoebiasis | 5 | 4 | 2 | 0.49 | 0.39 | 0.19 |
| B 4 | Enteritis and other Diarrhoel diseases | 257 | 236 | 274 | 25.00 | 22.98 | 26.54 |
| B 5 | Tuberculosis of respiratory system | 40 | 42 | 53 | 3.89 | 4.09 | 5.13 |
| B 6 | Other Tuberculosis including late effects | 1 | 2 | 3 | 0.10 | 0.19 | 0.29 |
| B 7 | Plague | – | – | – | – | – | – |
| B 8 | Diptheria | 3 | 3 | 1 | 0.29 | 0.29 | 0.10 |
| B 9 | Whooping cough | – | – | – | – | – | – |
| B 10 | Streptococcal sore throat and Scarlet fever | – | – | – | – | – | – |
| B 11 | Meningococcal infections | – | 2 | 1 | – | 0.19 | 0.10 |
| B 12 | Acute Poliomyelitis | – | – | 2 | – | – | 0.19 |
| B 13 | Small pox | – | – | – | – | – | – |
| B 14 | Measles | – | 1 | 2 | – | 0.10 | 0.19 |
| B 15 | Typhus and other Rickettsioses | – | – | – | – | – | – |
| B 16 | Malaria | – | – | – | – | – | – |
| B 17 | Syphillis and its Sequelae | 3 | 1 | 2 | 0.29 | 0.10 | 0.19 |
| B 18 | All other infective and parastic diseases | 120 | 90 | 64 | 11.68 | 8.72 | 6.20 |
| B 19 | Malignant neoplasms, including neoplasms of lymphatic and haematopoietic tissues | 635 | 674 | 648 | 61.78 | 65.62 | 62.76 |
| B 20 | Benign Neoplasms of unspecified nature | 22 | 19 | 28 | 2.14 | 1.85 | 2.71 |
| B 21 | Diabetes mellitu | 197 | 279 | 390 | 19.17 | 27.17 | 37.77 |
| B 22 | Ayitaminosis and other Nutritional deficiency | 153 | 143 | 105 | 14.89 | 13.68 | 10.17 |
| B 23 | Anaemias | 58 | 67 | 77 | 5.64 | 6.52 | 7.46 |
| B 24 | Meningitis | 16 | 20 | 26 | 1.65 | 1.95 | 2.52 |
| B 25 | Active Pheumatic fever | 1 | 2 | 4 | 0.10 | 0.19 | 0.39 |
| B 26 | Chronic rheumatic heart disease | 71 | 70 | 73 | 6.91 | 6.82 | 7.07 |
| B 27 | Hypertensive Disease | 342 | 340 | 337 | 33.27 | 33.11 | 32.64 |
| B 28 | Ischaemic Heart Disease | 766 | 897 | 905 | 74.53 | 87.36 | 87.65 |
| B 29 | Other forms of heart disease | 550 | 544 | 466 | 53.57 | 52.98 | 45.13 |
| B 30 | Cerebrovascular Disease | 990 | 950 | 876 | 96.32 | 92.52 | 84.84 |
| B 31 | Influenza | 12 | 4 | 17 | 1.17 | 0.39 | 1.65 |
| B 32 | Pneumonia | 352 | 330 | 389 | 34.25 | 32.12 | 37.68 |
| B 33 | Bronchitis, Empysema and Asthma | 107 | 100 | 164 | 10.40 | 9.74 | 15.88 |
| B 34 | Peptic Ulcer | 36 | 49 | 37 | 3.50 | 4.77 | 3.58 |
| B 35 | Appendicitis | 3 | 6 | 9 | 0.29 | 0.58 | 0.87 |
| B 36 | Intestinal obstruction and hernia | 37 | 31 | 28 | 3.60 | 3.02 | 2.71 |

TABLE 26. DEATHS AND DEATH RATES BY 50 CAUSE - GROUPS, 1969–1971
(RATES PER 100,000 ESTIMATED MID-YEAR POPULATION) – Concluded

| Abbreviated List No.[1] | Cause of Death | Deaths | | | Rates | | |
|---|---|---|---|---|---|---|---|
| | | 1969 | 1970 | 1971 | 1969 | 1970 | 1971 |
| B 37 | Cirrhosis of liver | 115 | 125 | 139 | 11.19 | 12.17 | 13.46 |
| B 38 | Nephritis and nephrosis | 61 | 47 | 63 | 5.93 | 4.58 | 6.10 |
| B 39 | Hyperplasia of prostate | 22 | 13 | 17 | 2.14 | 1.27 | 1.65 |
| B 40 | Abortion | 23 | 17 | 18 | 92.07 | 68.05 | 69.46 |
| B 41 | Other Complications of pregnancy, childbirth and the puerpertium. Delivery without mention of complication | 26 | 17 | 20 | 108.13 | 68.05 | 77.18 |
| B 42 | Congenital Anomalies | 94 | 96 | 88 | 374.05 | 381.69 | 33.70 |
| B 43 | Birth Injury, Difficult Labour and other Ranoxic and Hypoxic conditions | 108 | 95 | 72 | 429.72 | 377.72 | 275.69 |
| B 44 | Other causes of Perinatal Mortality | 372 | 264 | 220 | 1,480.30 | 1,049.66 | 842.40 |
| B 45 | Symptoms and Ill-defined conditions | 404 | 304 | 327 | 39.31 | 29.60 | 31.67 |
| B 46 | All other diseases | 581 | 521 | 614 | 56.53 | 50.74 | 59.47 |
| B 47 | Motor vehicle accidents | 161 | 185 | 165 | 15.66 | 18.02 | 15.98 |
| B 48 | All other accidents | 187 | 217 | 212 | 18.19 | 21.13 | 20.53 |
| B 49 | Suicide and self-inflicted injury | 58 | 90 | 50 | 5.64 | 8.72 | 4.84 |
| B 50 | All other external causes | 76 | 55 | 55 | 7.40 | 5.35 | 5.33 |

[1]The Abbreviated Lists of 50 Causes for Tabulation of Mortality adopted by the World Health Organisation in 1965, Vide Eighth (1968), Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death - Volume 1 pages 445 – 446.

Source: 10

TABLE 94. MILEAGE AND EXPENDITURE OF PUBLIC ROADS IN TRINIDAD AND TOBAGO, 1961 – 1972

| Year | Existing Miles of Roads | | | Expenditure | | |
|---|---|---|---|---|---|---|
| | Main[1] roads | Local[2] roads | Total (all roads) | Maintenance (all roads) Total $ 000 | Maintenance (all roads) per mile $ | New Capital Works (all roads) $ 000 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 1961 | 1,428 | 1,099 | 2,527 | 6,344 | 2,510 | 4,789 |
| 1962 | 1,249 | 1,144 | 2,393 | 6,789 | 2,837 | 3,189 |
| 1963 | 1,249 | 1,128 | 2,377 | 6,040 | 2,541 | 2,923 |
| 1964 | 1,252 | 1,131 | 2,383 | 9,103 | 3,820 | 6,649 |
| 1965 | 1,252 | 1,240 | 2,492 | 9,126 | 3,662 | 4,308 |
| 1966 | 1,252 | 1,352 | 2,604 | 9,630 | 3,698 | 7,509 |
| 1967 | 1,252 | 1,289 | 2,541 | 9,040 | 3,558 | 3,770 |
| 1968 | 1,258 | 2,252 | 4,510 | 10,797 | 2,394 | 1,689 |
| 1969 | 1,258 | 2,565 | ... | 8,368 | ... | 1,058[3] |
| 1970 | 1,734 | 2,601 | ... | 8,598 | ... | 642[3] |
| 1971 | 1,754 | ... | ... | ... | ... | ... |
| 1972 | ... | ... | ... | ... | ... | ... |

[1]Maintained by Works Department.

[2]Maintained by Ministry of Local Government.

[3]Data received from Ministry of Local Government.

Source: 32

TABLE 95. PERSONS KILLED AND INJURED IN ROAD ACCIDENTS BY AGE GROUP 1962–1972

| Year | Under 5 years | | Between 5 and 14 years | | Between 15 and 50 years | | Over 50 years | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Killed | Injured | Killed | Injured | Killed | Injured | Killed | Injured | Killed | Injured | Killed and Injured |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| 1962 | 8 | 98 | 26 | 773 | 77 | 2,508 | 26 | 290 | 137 | 3,669 | 3,806 |
| 1963 | 6 | 114 | 30 | 750 | 64 | 2,547 | 39 | 294 | 139 | 3,705 | 3,844 |
| 1964 | 5 | 154 | 23 | 837 | 77 | 2,824 | 29 | 297 | 134 | 4,112 | 4,246 |
| 1965 | 9 | 152 | 22 | 941 | 77 | 2,921 | 37 | 341 | 145 | 4,355 | 4,500 |
| 1966 | 11 | 156 | 19 | 883 | 74 | 2,847 | 39 | 327 | 143 | 4,213 | 4,356 |
| 1967 | 3 | 156 | 23 | 982 | 88 | 2,859 | 35 | 364 | 149 | 4,361 | 4,510 |
| 1968 | 6 | 176 | 17 | 881 | 80 | 2,724 | 36 | 300 | 139 | 4,081 | 4,220 |
| 1969 | 6 | 157 | 35 | 980 | 96 | 3,132 | 48 | 325 | 185 | 4,594 | 4,779 |
| 1970 | 8 | 217 | 26 | 922 | 110 | 3,030 | 35 | 391 | 179 | 4,630 | 4,809 |
| 1971 | 8 | 164 | 19 | 819 | 105 | 3,341 | 56 | 409 | 188 | 4,728 | 4,916 |
| 1972 | 4 | 157 | 31 | 1,059 | 116 | 3,458 | 58 | 389 | 209 | 5,063 | 5,272 |

Source: 20

TABLE 53. INDUSTRIAL ACCIDENTS BY INDUSTRY 1962 – 1972

| Year | Clay concrete, limestone | Engineering | Wood working | Printing Book binding | Food, Drink, Tobacco | Sugar manufactures | Coconut oil, margarine and soap | Docks, wharves, warehouses | Petroleum refining | Building operations | Wearing apparel, textiles, leather goods, laundries | Miscellaneous | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| 1962 Fatal | – | – | – | – | 1 | – | – | – | 1 | 3 | – | 1 | 6 |
| Non-fatal | 127 | 213 | 3 | 13 | 47 | 208 | 29 | 440 | 298 | 209 | 15 | 74 | 1,676 |
| 1963 Fatal | – | 2 | – | – | – | 4 | – | – | 2 | 4 | – | 2 | 14 |
| Non-fatal | 119 | 222 | 7 | 13 | 47 | 218 | 25 | 432 | 273 | 272 | 12 | 82 | 1,722 |
| 1964 Fatal | – | 1 | – | – | – | 1 | – | 1 | – | 1 | – | 1 | 5 |
| Non-fatal | 172 | 207 | 7 | 10 | 35 | 162 | 44 | 294 | 291 | 404 | 16 | 71 | 1,713 |
| 1965 Fatal | 1 | – | – | – | 1 | – | – | – | 2 | – | – | 2 | 6 |
| Non-fatal | 140 | 214 | 9 | 16 | 79 | 177 | 37 | 352 | 325 | 40 | 5 | 373 | 1,767 |
| 1966 Fatal | – | 1 | – | – | 1 | – | – | – | 1 | 1 | – | 3 | 7 |
| Non-fatal | 142 | 269 | 8 | 25 | 64 | 122 | 23 | 310 | 186 | 29 | 7 | 293 | 1,478 |
| 1967 Fatal | – | 1 | – | – | 1 | 1 | – | – | 2 | – | – | 4 | 9 |
| Non-fatal | 127 | 321 | 4 | 26 | 71 | 75 | 20 | 304 | 247 | 37 | 13 | 146 | 1,391 |
| 1968 Fatal | 1 | – | – | – | – | – | – | 2 | 2 | 1 | – | – | 6 |
| Non-fatal | 110 | 279 | 9 | 38 | 88 | 148 | 13 | 329 | 239 | 194 | 19 | 51 | 1,517 |
| 1969 Fatal | – | – | – | – | – | – | – | – | 2 | 3 | – | 1 | 6 |
| Non-fatal | 104 | 288 | 3 | 58 | 62 | 157 | 11 | 379 | 209 | 231 | 14 | 78 | 1,594 |
| 1970 Fatal | 1 | – | – | 1 | – | 1 | – | 2 | 1 | – | – | – | 6 |
| Non-fatal | 142 | 274 | 3 | 22 | 60 | 248 | 17 | 140 | 275 | 282 | 25 | 72 | 1,560 |
| 1971 Fatal | 1 | 1 | – | – | – | – | – | 1 | 1 | – | – | – | 4 |
| Non-fatal | 128 | 442 | – | 11 | 68 | 187 | 21 | 178 | 232 | 240 | 9 | 104 | 1,620 |
| 1972 Fatal | | | | | | | | | | | | | |
| Non-fatal | | | | | | | | | | | | | |

[1]Accidents which occur on premises covered by the Factories Ordinance, Ch. 30. No. 2 and which are fatal or disable the worker for more than three days from earning full wages at which he was employed.

Source: 19

TABLE 125. UTILIZATION OF THE SURFACE AREAS[1] BY PRINCIPAL USES OF LAND, 1946 – 1959

| | 1946 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959[4] |
|---|---|---|---|---|---|---|---|---|---|
| | Acres | | | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Non-Agricultural Areas | | | | | | | | | |
| Residential and Industrial ... | 25,000 | 28,000 | | | | | | | |
| Roads, Traces and Railways ... | 19,050 | 19,150 | | | | | | | |
| Public buildings, Parks, Cemeteries, Schools, etc. (including non-forest areas of the U.S. Bases) ... ... | 48,200 | 48,550 | 97,250 | 97,250 | 97,250 | 97,250 | 97,250 | 97,250 | 97,250 |
| Swamps (not included in forest areas) and Inland water ... ... ... | 26,300 | 26,300 | 26,300 | 26,300 | 26,300 | 26,300 | 26,300 | 26,300 | 26,300 |
| State Forests: Production Reserves ... | 43,250 | 43,200 | 49,700 | | | | | | |
| Protection Reserves ... ... | 165,450 | 164,950 | 164,950 | 284,850 | 285,800 | 285,800 | 285,800 | 318,525 | 328,000 |
| Other State Forests ... ... | 342,750 | 344,100 | 337,400 | 267,200 | 266,300 | 266,300 | 263,200 | 230,475 | 216,000 |
| Private Forests ... ... | 25,800 | 26,000 | 26,000 | 26,000 | 26,000 | 26,000 | 26,000 | 26,000 | 26,000 |
| Abandoned tree crops, bush and secondary growth | 135,100 | 127,000 | 126,650 | 124,650 | 124,650 | 124,650 | 124,650 | 124,650 | 124,650 |
| Total Non-Agricultural Areas ... ... ... | 830,900 | 827,250 | 827,250 | 826,250 | 826,250 | 826,250 | 823,200 | 823,200 | 818,200 |
| Agricultural Areas | | | | | | | | | |
| Area in cultivation ... | 288,600 | 310,000 | 310,000 | 310,500 | 310,500 | 327,200 | 330,200 | 330,200 | 330,200 |
| Pastures ... ... ... | 13,600 | 15,000 | 15,000 | 15,000 | 15,000 | 14,400 | 14,400 | 14,400 | 14,400 |
| Semi-derelict crops and shifting cultivation ... | 134,150 | 115,000 | 115,000 | 115,000 | 115,000 | 80,550 | 99,450 | 99,450 | 99,450 |
| Total Agricultural Areas | 436,350 | 440,000 | 440,000 | 441,000 | 441,000 | 422,150 | 444,050 | 444,050 | 444,050 |
| Total Area of Trinidad and Tobago ... ... ... | 1,267,250 | 1,267,250 | 1,267,250 | 1,267,250 | 1,267,250 | 1,267,250 | 1,267,250 | 1,267,250 | 1,267,250 |
| *Of which* leased for: | | | | | | | | | |
| Oil Mining | | | | | | | | | |
| Crown lands (including forests) ... ... | 155,161 | 160,873 | 261,506 | 315,627 | 327,813 | 407,336 | 421,599 | 362,128 | 326,669 |
| Alienated Lands[2] ... ... | 56,180 | 75,184 | 93,782 | 100,538 | 124,777 | 113,107 | 116,910 | 116,036 | 98,730 |
| Oil exploration[3] – Crown lands (including forests) ... ... ... | 137,896 | 839 | 25,578 | 89,232 | 81,564 | 17,137 | 4,014 | – | – |

[1]Tentative estimates based on an assessment of information derived from a number of different sources.

[2]Crown lands which have been sold to the public. The oil rights of these lands are, however, retained by the Crown.

[3]Oil exploration leases are issued only in respect of Crown lands.

[4]The latest available information is in respect of 1959. Data for subsequent years are not available.

Source: 46

TABLE 147. FOREST OUT-TURN BY TYPE OF TIMBER 1962 – 1971

000 True Cubic Feet.

| Year | Saw Logs | | | | Fuel Natural Forest | Poles Plantations (Teak) | F.R. and C.L Total | Grand Total |
|---|---|---|---|---|---|---|---|---|
| | Natural Forest | Plantation (Teak) | Private Class 1 | Total | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 1962 ... ... ... | 2,866 | 56 | 430 | 3,352 | 715 | 78 | 3,715 | 4,145 |
| 1963 ... ... ... | 2,394 | 53 | 405 | 2,852 | 716 | 53 | 3,216 | 3,621 |
| 1964 ... ... ... | 2,624 | 53 | 430 | 3,107 | 560 | 53 | 3,290 | 3,720 |
| 1965 ... ... ... | 2,845 | 72 | 254 | 3,171 | 594 | 61 | 3,572 | 3,826 |
| 1966 ... ... ... | 2,565 | 49 | 380 | 2,994 | 481 | 51 | 3,146 | 3,526 |
| 1967 ... ... ... | 2,512 | 79 | 350 | 2,941 | 560 | 57 | 3,208 | 3,558 |
| 1968 ... ... ... | 2,236 | 94 | 365 | 2,695 | 402 | 124 | 2,856 | 3,221 |
| 1969 ... ... ... | 2,000 | 109 | 300 | 2,409 | ... | 88 | – | ... |
| 1970 ... ... ... | 2,106 | 81 | 250 | 2,437 | ... | 130 | – | ... |
| 1971 ... ... ... | 1,778 | 83 | 283[1] | 2,144 | 54 | 85 | 2,000 | 2,283 |

Source: 52

TABLE 148. MANAGEMENT AND FINANCIAL STATUS OF NATIONAL FORESTS, 1962 – 1971

| Year | Production Reserve | Protection Reserve | Unreserved | Administered Government | Leased to U.S. | Management Status | | | Total Sales of Forest Produce from National Forests | Total Expenditure on National Forests |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Managed by Working Plans | Controlled Exploitation | Other Forest | | |
| | 000 Acres | | | | | | | | $ | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1961 ..... | 332.2 | –[1] | 211.9 | 544.1 | 11.5 | 199.6 | –[1] | 344.5 | 427,252 | 1,024,740 |
| 1962[2] ..... | 334.1 | 20 | 200.0 | 554.1 | 11.5 | 199.6 | 308 | 46.5 | 351,528 | 786,894 |
| 1963 ..... | 334.1 | 20 | 200.0 | 554.1 | 11.5 | 199.6 | 308 | 46.5 | 386,876 | 773,791 |
| 1964 ..... | 334.1 | 20 | 200.0 | 554.1 | 11.5 | 199.6 | 307 | 46.5 | 422,124 | 1,219,493 |
| 1965 ..... | 334.1 | 20 | 200.0 | 554.1 | 11.5 | 199.6 | 306 | 46.5 | 402,285 | 1,143,405 |
| 1966 ..... | 334.1 | 20 | 200.0 | 554.1 | 1.0 | 199.6 | 305 | 46.5 | 424,110 | 1,105,298 |
| 1967 ..... | 334.1 | 20 | 200.0 | 554.1 | 1.0 | 199.6 | 304 | 46.5 | 641,936 | 1,549,588 |
| 1968 ..... | 334.1 | 20 | 200.0 | 554.1 | 1.0 | 199.6 | 304 | 46.5 | 572,761 | 1,820,210 |
| 1969 ..... | 332.4 | 20 | 194.8 | 547.2 | 1.0 | 197.9 | 303 | 46.5 | 612,067 | 1,911,829 |
| 1970 ..... | 296.2 | 36 | 226.6 | 558.8 | 1.0 | 197.6 | 303 | 46.5 | 632.039 | 1,141,610 |
| 1971 ..... | 288.7 | 36 | 226.6 | 551.3 | – | 197.6 | 307 | 46.5 | 356,322 | 2,232,754 |

[1]Figures for these years were undertermined.

[2]From 1962 figures for columns 2, 7 and 8 were estimated.

Source: 52

TABLE 149. AREA OF NATIONAL FOREST REGENERATED 1962 – 1971

Acres

| Year | Plantation | | Regeneration | | | Total |
|---|---|---|---|---|---|---|
| | Teak | Pine | Intensive | | Extensive | |
| | | | Natural | Mixed | Natural | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 1962 ... ... ... | 670 | 430 | 460 | 200 | 660 | 2,420 |
| 1963 ... ... ... | 680 | 370 | 380 | 70 | 660 | 2,160 |
| 1964 ... ... ... | 680 | 760 | 200 | 80 | 660 | 2,390 |
| 1965 ... ... ... | 700 | 910 | 200 | 80 | 660 | 2,550 |
| 1966 ... ... ... | 700 | 1,040 | 200 | 40 | 200 | 2,180 |
| 1967 ... ... ... | 680 | 390 | – | 60 | 200 | 1,330 |
| 1968 ... ... ... | 710 | 970 | – | 50 | 200 | 1,930 |
| 1969 ... ... ... | 660 | 590 | – | 30 | 200 | 1,480 |
| 1970 ... ... ... | 660 | 1,080 | – | 40 | 200 | 1,980 |
| 1971 ... ... ... | 580 | 72 | – | 30 | 200 | 1,530 |

Source 52

Appendix XIII

## Resume of Environmental Situation - TRINIDAD & TOBAGO

| Capacity of Response / Major Problems | Perception | Analysis | Power of Decision | Instruments of Action | | |
|---|---|---|---|---|---|---|
| | | | | Legislation | Executive Organization | Human Resources |
| (1) HUMAN SETTLEMENTS | | | | | | |
| (a) Water Supply Quantity | Yes | Yes | Yes | Water & Sewerage Authority Act, 1965 | Water & Sewerage Authority | Adequate |
| (b) Refuse Disposal | No | No | Yes | Public Health Ordinance, 1917 | Municipalities and Refuse Disposal Authority | No Professionals |
| (c) Slums and squatting areas | Yes | No | Yes | Town and Country Planning Ordinances, 1960 | Town and Country Planning Department and Urban Redevelopment Council | Limited |
| (2) ENVIRONMENTAL HEALTH | | | | | | |
| (a) River Pollution | Yes | No | Yes | Public Health, WASA and other ordinances | Ministry of Health, Water & Sewerage Authority | Limited |
| (b) Refuse dumping and littering | Yes | No | Yes | Public Health Ordinance 1917 | Municipalities | Limited |
| (c) Marine pollution | No | No | Yes | Oil in the Waters of the Colony Ordinance | Harbour Master's Office Marine Police | Very Limited |
| (d) Food Sanitation | Yes | Yes | Yes | Public Health Ordinance, 1917 | Municipalities | Limited |

| Capacity of Response / Major Problems | Perception | Analysis | Power of Decision |
|---|---|---|---|
| (e) Environmental education | No | No | Yes |
| (f) Traffic accidents | Yes | Yes | Yes |
| (3) NATURAL RESOURCES | | | |
| (a) Soil and Beach erosion | Yes | No | Yes |
| (b) Fishing depredation | Yes | No | No |

| | Instruments of Action | | |
|---|---|---|---|
| | Legislation | Executive Organization | Human Resources |
| | Public Health Ordinance, 1917 | Health Education Unit<br>Ministry of Health | Limited |
| | | Ministry of Works | Adequate |
| | Town and Country Planning Ordinance, 1960 | Ministry of Planning & Development | Limited |
| | Nil | Ministry of Agriculture, Lands & Fisheries | Nil |

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