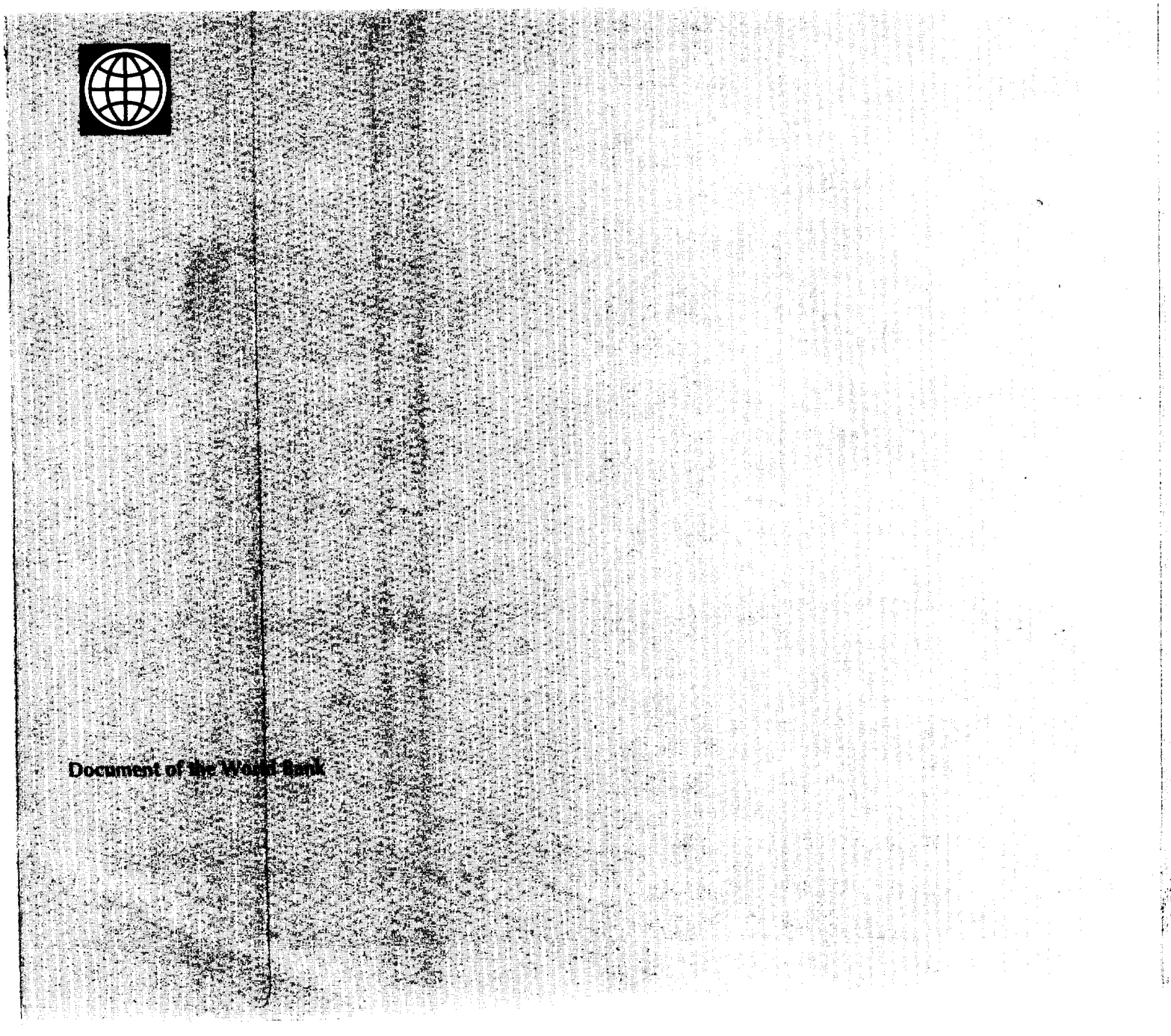
Public Disclosure Authorized

Report No. 15543-BEL

Belize
Environmental Report

May 30, 1996

Caribbean Division
Country Department III
Latin America and the Caribbean Region



Document of the World Bank

FISCAL YEAR

April 1 - March 31

CURRENCY EQUIVALENTS

Since 1976 the Belize dollar has been aligned with the US dollar at the rate of US$1.00 = BZ$2.00.

TABLES

Totals in tables do not always equal the sum of their components due to rounding.

Preface

The primary purpose of this report was to assist the Government of Belize in the preparation of a National Environmental Action Plan. The report focuses on key environmental problems and identifies policies and programs, including required investments and financing mechanisms, to enable the Government to develop and implement an environmental strategy. The report is accompanied by technical annexes which detail the sectoral and institutional issues for the benefit of the Government. The report identifies "win-win" policies and suggests the need for improving institutional capacity and community participation in the management of natural resources. More generally, the report illustrates environmental problems commonly encountered not only in Belize but in many other countries, and identifies approaches to deal with them.

This report is based on a draft environmental report of December 1993 on Belize and on the findings of a multidisciplinary mission which visited the country in March 1996. The coreteam responsible for preparing the report comprised: Carmen Scoseria (task manager, LA3C2), Ramon Lopez (environmental economist/coordinator), David Gray (land use and land allocation), Kristin McLaughlin-Elliott (forests and protected areas), Doreen Crompton (coastal zone management and tourism), Claudia Binder (water resource and waste management), and David Colbert (legal and institutional framework). Other contributors include Eugen Finkel (rural poverty), Veronica Vargas (health), Gillian Cambers (coastal zone management), Jim Arthur (waste management), and Bjorn Larsen (land allocation). Raj Nallari, Eliza Winters and Pilar Maisterra (LA3C2) provided useful comments and were responsible for revising the final draft. Ken Chomitz (PRDEI) provided valuable suggestions as a peer reviewer. Hazel Vargas, assisted by Krystyn Kohler and Pedro Carriço, was responsible for managing the complete processing of this report and the annexes. Paul Isenman is the Director of LA3 Department, Philippe Nouvel is the Division Chief of LA3C2, and Norman Hicks is the Lead Economist of LA3. The team benefited from an extensive exchange of ideas with public officials, local NGOs and aid agencies representatives. The report was discussed with a delegation from the Government of Belize that visited Washington during May 13-15, 1996 and its comments were incorporated.

The preparation of this report was financially supported by the British Development Division in the Caribbean (BDDC), the Canadian International Development Agency (CIDA) and the Switzerland Trust Fund.

Contents

Abbreviations

BAS	Belize Audubon Society
BDDC	British Development Division in the Caribbean
CARICOM	Caribbean Community
CDB	Caribbean Development Bank
CIDA	Canadian International Development Agency
CZMTC	Coastal Zone Management Technical Committee
CZMU	Coastal Zone Management Unit
DOE	Department of the Environment
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GIS	Geographic Information System
IDB	Inter American Development Bank
LOP	Land Ownership Program
MARPOL	International Convention for the Prevention of Pollution from Ships
MOF	Ministry of Finance
MOH	Ministry of Health
NARMAP	Natural Resources Management and Protection Project
NGO	Non-Governmental Organization
NPASP	National Protected Areas System Plan
ODA	Overseas Development Agency
PACT	Protected Areas Conservation Trust
PAHO	Pan American Health Organization
QR	Quantitative Restriction
SDA	Special Development Areas
SIF	Social Investment Fund
SWMA	Solid Waste Management Authority
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WASA	Water and Sewerage Authority
WRI	World Resources Institute
WWF	World Wildlife Fund

Executive Summary

Overview of existing environmental problems

i. The Belizean economy is highly dependent on activities based on natural resources: agriculture, fisheries and tourism. These constitute the backbone of the Belizean economy, and their rapid expansion explains in part the high economic growth of 6% per year achieved by Belize during 1985-95. To continue this rapid expansion, Belize must maintain its environmental resources at a healthy level.

ii. So far, Belize has been able to preserve its environmental capital to a much greater extent than other Central American and Caribbean countries. Approximately 60% of Belize's territory (about 23,000 km) is still under closed cover forest and most water resources remain in a relatively good condition. Also, coral reefs, a vital tourist attraction, are almost pristine. The relatively good state of natural resources can be largely explained by the low population density, but also by an increasing environmental awareness both by the Government and the public at large. However, population, albeit from a small base, has been growing rapidly over the last decade, at an annual rate of about 2.6% and at a much higher rate in rural areas.

iii. The rapid rate of population growth, especially in rural areas, is leading to increasing pressures on tropical forest areas and to unsustainable agricultural practices at least in certain areas. Also, due to the lack of concentration of the population, the provision of adequate services, including potable water and sanitation is more expensive, and is reflected in low availability of such services in rural areas. This in turn has contributed to a large incidence of environment-related diseases, such as gastrointestinal disease and malaria. Additionally, inadequate sanitation and waste management infrastructure, and control of agro-industrial effluents and fertilizer use, are having adverse effects on the coastal zone.

iv. Thus, the most serious environment problems facing Belize are: (i) deforestation, largely linked to inappropriate land management; (ii) inadequate sanitation and waste disposal facilities; and (iii) contamination and degradation of water resources. Many forest areas and the coral reefs are at risk of irreversible degradation. The incidence of environment-related diseases, such as malaria and gastrointestinal diseases, is high and compares unfavorably with most countries in the region. Therefore, the challenge for Belize is to improve policies linked to the protection of forest resources—in particular, land management—to maintain the health of the coral reefs and coastal ecosystems and to prevent environment-related diseases.

v. Belize is a unique case of a very small country with a rich endowment of natural resources of global importance: its large and still relatively intact tropical forest, and its almost pristine coral reef. The task of conserving the forests and reefs from development impacts, national and transboundary pollution, and natural causes of erosion, considerably exceeds the Belize Government technical and budgetary resources; thus, a cooperative international effort is needed to attain global and national objectives. While protection of

forests resources has been receiving large amounts of assistance from international sources both public and private for some time, the externalities provided by marine resources are only recently being recognized.

vi. Although Belize faces complex environmental challenges, the country is in a good position to successfully address them because (i) there is a large scope for "win-win" policies that are not costly and will both improve the efficiency of the economy and contribute to environmental protection (in some cases, removal of these distortions will also have favorable effects on equity); (ii) the Government and the public at large are becoming increasingly aware of the need to improve environmental management; (iii) the international importance of its forest and water resources has enabled Belize to attract substantial amounts of technical and financial assistance and can continue to do so (albeit at a more moderate pace); (iv) the framework for domestic financing of environmental conservation has improved much in recent years; and (v) there are already many successful examples of collaboration of the government and the private sector, and of local community involvement towards sustainable environmental management. However, as is often the case in other countries, many policies are difficult to implement due to political constraints and lack of complete information about the effects of these policies. Some initiatives are not implemented due to lack of resources.

Causes of the Environmental Problems

vii. The key environmental issues are related to agricultural expansion and agroprocessing activities. The main cause of forest degradation is the rapid expansion of agriculture (commercial and small farming) that is leading to a conversion of forest lands that in many cases are not apt for cultivation. The chief threats to the reefs are effluents from sugar and citrus processing, run-off of fertilizers and pesticides and, to a lesser extent, untreated sewage from urban centers.

viii. The negative environmental effects of agriculture and agroprocessing activities are exacerbated by certain government policies, in particular land policies, the inadequate enforcement and, in some instances, lack of environmental regulations; and by the prevalence of poverty among a significant segment of the rural population. A key issue is how to ensure the best use of land given the increasing demand for land.

ix. The system of privatization of public lands tends to increase the incentives for deforestation and there is an apparent lack of planning in selecting the lands to be privatized. Also, there is a high degree of subsidization, particularly to individuals who can afford large purchases of public lands. Because leased land can be returned at any time, and rental rates are very low, the system constitutes an incentive to deforestation and unsustainable agricultural practices. The system stimulates delaying the conversion of leaseholds into freeholds with the consequent reduction in incentives to invest in land improvement and in sustainable forestry.

x. Development pressures and rapid population growth are key factors which reinforce the need for appropriate land utilization. Land management in Belize is still at an early stage. A detailed map of land use capabilities exists. However, a national land zoning

system that provides a set of broad guidelines (which are consistent with the Government's enforcement capacity) is needed to ensure that land is allocated for its "best use."

xi. A large proportion of the private land does not have clearly specified and legal property rights. This problem affects more intensively the Mayan communities as well as poor farmers. International studies have shown the importance of land tenure security as a means to promote long term investment attached to the land, including investment in conservation. Elsewhere, investments in land titling have been shown to have a very high rate of return. The recognition of property rights should allow for both private ownership and communal ownership depending on the farmers' preferences.

xii. The current structure of trade protection significantly biases the domestic relative prices in favor of land-intensive agricultural commodities, mainly livestock, soybeans, rice and corn. Trade liberalization is necessary to improve economic efficiency. Liberalization of trade will also impact the environment in a number of ways. The reduction of tariffs and QRs will improve incentives towards producers of exportable commodities. However, the medium- and large-size commercial farmers that mostly produce export crops (such as bananas, sugar and citrus) use chemical inputs very intensively, and thus expansion of these crops could also result in higher levels of run-offs to rivers and the coral reefs, and of effluents from agroprocessors.

xiii. There is still a deficiency of environmental fees affecting many resources, and often, the collection is poorly enforced. The Government has recently expanded the coverage of fees for use of protected areas, increased fishing license fees and introduced a conservation tax (payable by tourists at the time of their departure), and the principle of "polluters pay" is now accepted by the Government. However much remains to be done: (i) the current use of fees for national parks is still restricted to the main sites; as such, there is further scope to increase environmental charges and to earmark funds, beginning with the establishment of an endowment for protected areas to support sustainable development; (ii) royalties and stumpage fees are also only partially collected. The insufficient royalty collection causes excess demand for public forest, thus exacerbating deforestation; (iii) while there are some pollution taxes in existence such as the effluent licenses, it is important to expand the system into other pollutants such as waste disposal, and to charge according to the amount of pollution produced rather than fixed payments; and (iv) improvement in collections of the land tax, if fully enforced could more than double current revenues and would induce more efficient use of private lands.

xiv. There is a cycle of poverty and deforestation particularly among the small farmers of Mayan and Central American origin in certain rural areas (Cayo and Southern districts). Lack of secure land rights for small farmers is an important factor leading to land degradation and deforestation. Additionally, about 68% of non-Mayan small farmers hold long and short-term leases of public lands and another 10% are squatting on public and private lands. It is estimated that more than 70% of the land cultivated by small or subsistence farmers is ecologically fragile lying in a hilly topography. "Slash-and-burn" or shifting cultivation (also called milpa) is widespread among small farmers. Fast population growth and the rapid degradation of the fragile lands cultivated by the small farmers lead to intense land clearing into closed cover forest areas. Also, small farmers lack resources and

knowledge to implement the considerable amount of conservation practices that the land requires to remain productive.

xv. Inadequate supply of potable water and sanitation especially to the rural population is a primary factor that explains the high incidence of gastrointestinal and other diseases which involve significant social costs and could pose a threat to the tourism industry. Sanitation in rural areas is highly deficient, with less than 30% of the population having access to adequate sanitation facilities. Also, there is not an adequate system of health education and extension that reaches the low income segments of the population. The incidence of malaria is extremely high and it has more then quadrupled since 1986 to about 10,000 cases in 1995. The main cause of this dramatic rise in malaria cases is the reduction of spraying. Poor disposal of both industrial and municipal solid waste in the cayes and other coastal zones may also become a serious problem to the health of the population and affect the tourism. No solid waste management authority exists in Belize despite that the Solid Waste Management Act of 1991 has called for its establishment.

xvi. The inadequate sanitation in coastal areas is beginning to cause the enrichment of the ocean with nutrients that are beginning to threaten the coral reefs; which are crucial to the fishing and tourism industries. Mangroves play an important role in retaining and filtering run-off and other pollutants thus preventing them to reach the coral reefs. Although mangroves have been so far preserved in most places, in areas immediate to the coast, particularly near the main cities and near rivers in main agricultural areas, mangroves destruction constitutes a serious problem. To a large extent this is due to lack of enforcement of regulations that protect mangroves within 66 feet from the coast line and rivers.

xvii. The lack of environmental regulations for agriculture production and the limited regulations affecting the effluents of agroprocessing industries are the most important factors that could further deteriorate the coral reefs due to the nutrient enrichment of the coastal waters. The most serious problem is associated with point pollution sources, mainly the effluents of the sugar processing plants and the by-products of the two citrus processing plants. The run-offs of fertilizers and other chemicals from non-point sources including banana, citrus, and mechanized crops represent a smaller fraction of the nutrient load affecting the coastal areas. However, as commercial agriculture continues to expand, this problem is likely to worsen.

xviii. Overfishing of certain important species, such as lobster and conch is occurring. Increase in the overall number of fishermen, and in the south, in particular, unauthorized trawling from neighboring countries, as well as illegal practices by local fishermen, are believed to have depleted stocks. Weaknesses in the regulatory framework, and lack of adequate enforcement have contributed to this result. Fishing license fees for both fishermen and boats were recently raised. However, these licenses are still cheap and play a small role in restricting the level of capture to permit the maintenance of adequate stock levels. The Belize Fisheries Department, with responsibility for a sea area that extends 200 miles out from a long coastline and comprises one thousand cayes, can barely monitor the seashore area between the mainland coastline and the barrier reef.

xix. There are serious weaknesses in the institutions that are in charge of the environment. Ministries and Departments with environmental responsibilities have been allocated resources that are not consistent with the roles assigned to them. There is also a lack of clarity in roles and responsibilities among institutions that causes confusion and wasteful duplication of efforts. In particular, the inadequate enforcement of existing environmental regulations is related to: (i) inadequate technical and financial resources of the central government and other entities to monitor resources and to collect fees and taxes; and (ii) the need to improve participation of the private sector, local communities and local governments in the design and implementation of environmental programs.

Recommendations

xx. To address these problems it is necessary to use instruments that could achieve several above mentioned problems simultaneously as well as other instruments that are goal specific. The raising of adequate levels of financial resources from environment-related activities earmarked to protect and improve the environmental resources can be regarded as a necessary condition to achieve this objective. Decentralization and the involvement of local communities and non-governmental organizations (NGOs) in the design, implementation and monitoring of regulations and collection of environmental fees is another essential component of a sound environmental policy. Additionally, the use of market based instruments in directing the allocation of natural resources should in most cases be preferred to direct government interventions. The recommendations are directed to reducing the effects of the factors underlying the emerging environmental problems of Belize:

(1) Land management needs to be improved through: (i) an overhaul of the land privatization system, including a more transparent process (perhaps an auction system); and (ii) the introduction of a system of land zoning based on broad guidelines for land use. Selling prices should correspond to those that clear the market. In addition to improving economic efficiency, this could lead to significant savings in terms of personnel and financial outlays required for land allocation. The existing leaseholds should be rapidly converted into freeholds. The Government should set clear quantitative goals regarding lands to be privatized by specific areas according to the land use potential. The Geographic Information System (GIS) data now available could be used to determine the land areas that are ideal for privatization.

(2) It is necessary to expand the scope of user charges on natural resources, carefully determine the optimal rates for the various charges and implement measures to enforce their collection. The potential for additional revenues is conservatively estimated at BZ$5-8 million, which would double current receipts. Further, the Government should increasingly earmark funds as part of the revenues for sustainable development and, at the same time, increase the participation of local communities, local governments and NGOs in the monitoring and enforcement of the collection of the various fees. In this connection, the Government should establish a Barrier Reef Foundation managed by the Coastal Zone Management Unit (CZMU) and to be financed by external and domestic sources.

(3) Improved forest management could be achieved by: (i) ensuring that the land-use planning takes into account the full range (and limitations) of goods and services provided by forest lands and products; (ii) increased management and revenue generation capacity of the forest through conventional and alternative means (including the private sector, community and NGO involvement); and (iii) targeted technical assistance to ensure implementation of critical actions to sustain agriculture and forest production.

(4) Effluent regulations and taxes based on the level of emissions should be further developed for the agroprocessing industries. The Government should continue its efforts to fully incorporate the industry into the process of devising pollution mitigating measures. To deal with non-point water pollution sources, it will be important to incorporate farmers' organizations to increase their awareness of the problem and to prepare guidelines and monitoring systems to reduce run-offs.

(5) Belize needs to access the services of regional and international agricultural research agencies, so that the country engages only in adaptive (not basic) research to improve the yields of its major crops. The Government should increase the provision of technical assistance and extension services to the small farmers to promote soil conservation linked practices and facilitate diversification; provide permanent and secure land property rights to small farmers and Mayan communities; and finally, relocate certain Mayan communities on a volunteer basis to nearby areas that are less environmentally fragile and more fertile.

(6) The economic feasibility of investments to expand the availability of potable water and sanitation to the rural areas should be explored. Additionally, an effective public health extension and education campaign should be implemented to improve the hygiene habits of the population, including awareness regarding reproductive health and family planning. Also, expanding and improving the malaria control program should have a very high economic payoff. Given the high cost-effectiveness of house spraying against the mosquito that transmits the disease, an expansion of the spraying program into high risk areas such as refugees' and laborers' camps is vital.

(7) While cost recovery should be a guiding principle of public investments in sanitation, water supply and solid waste facilities, the tariff structure should have enough flexibility to allow the poor households to be linked to the systems, so that a higher proportion of the population receive these services.

(8) For health reasons, to protect marine resources and to support the rapid expansion of tourism, it is imperative that the Government rapidly address the issue of waste management. In this connection, there is a need for key actions in waste management, including the operationalization of waste collection and sewage treatment facilities, and the establishment of a waste management authority. The Government needs to work with the private sector, including the NGOs and the grass root organizations in monitoring the state of environment and the management of natural resources.

(9) The Government should implement the actions identified in recent "Cayes Development Policy," continue the preparation of development guidelines for specific

areas, such as the recent Turneffe Islands guidelines, and continue to designate marine reserves and draw up management plans for these. The prices of fishing licenses should be reviewed regularly and fixed at levels that permit sustainable fishing. Further, fishermen organizations should be given greater powers to enforce the existing regulations. An effective system of monitoring of the quality of the reef and of the surface water needs to be established. The regulatory framework protecting mangroves needs to be better enforced.

(10) Tourism has grown rapidly in recent years, and currently contributes 15% of GDP. Further expansion is feasible, as Belize has unique natural attractions which have made it a special destination among nature lovers, mainly its tropical forest abundant in exotic species; the coral reef and remains of its Mayan heritage. However, further expansion would require a tourism development strategy that emphasizes the protection of these assets through the policies above, and that identifies additional infrastructure requirements.

(11) The Government should appoint a high level independent commission to propose a restructuring and reallocation of financial and personnel resources across ministries and departments with environmental responsibilities. There is an urgent need to review the role and responsibilities of the Department of Environment (DOE) and the Department of Lands and Surveys, among others, and match their functions with appropriate technical and financial resources, so as to make these and other departments more effective. In order to ensure more effective inter-sectoral coordination within the Government, the Government should establish a high-level, inter-ministerial Coordination Committee on Environment.

1 Overview

A. Introduction

1. The remarkable economic growth of Belize over the last decade has been largely based on activities heavily dependent on environmental resources. The environmental situation in Belize is not critical as existing resources can be more effectively used within a sustainable pattern. However, some recent trends indicate a rapid environmental deterioration in certain areas. Unless the Government acts promptly with carefully designed policies and management programs, Belize is at risk of environmental deterioration similar to the situation in its Central American neighbors. Severe environmental degradation would not only deteriorate the quality of life of the population; but, given the great dependence on environmental resources of several key sectors in the economy, would also jeopardize the country's economic future.

2. Over the last few years, the Government has shown increasing commitment to a comprehensive environmental management, beginning with the creation of a Department of the Environment (DOE) in 1989 and the enactment of Environmental Protection Act (EPA). The Government has: (i) imposed limited cost recovery in use of reserves and national parks, and raised certain charges, such as fishing license fees; (ii) supported the integrated management of coastal zone; (iii) declared a number of protected areas on land an in the marine environment and has enacted the Protected Areas Conservation Trust Act that established financial mechanisms to fund the management of reserves; (iv) strengthened the regulations, such as the requirement for Eras for new projects, and effluent and pollution controls; and (v) strengthened the enforcement capacity of the DOE. The Government has signed a broad range of international environmental conventions and most recently has signed off on all five MARPOL annexes.

3. The Government has been supported in the development of environmental management strategies by a number of external agencies: the World Bank through support to the Government in the preparation of a National Environmental Action Plan and the preparation of a report linking rural poverty with natural resource management; the IDB in land-use planning; the ODA in forest management and land use; the USAID in monitoring and protecting the natural resources the EU in mitigating the adverse impacts of banana production; the CIDA in strengthening the NGOs and the UNDP-GEF in integrating coastal zone management. International NGOs, such as the Nature Conservancy and the World Wildlife Fund are also active in Belize. The Government has delegated the maintenance of a number of protected areas to the local NGOs. The Environmental Profiles, the National Environmental Action Plan and the EIAs are being done in consultations with the private sector and the NGOs. Additionally, Belize has received a large amount of concessional and non-concessional funding from international sources for environmental investments.

4. As opposed to many other countries, Belize is in a relatively better position to appropriately address its key environmental problems. The situation is not critical; and while population has been increasing rapidly, especially in rural areas, population density is still very low. The country has therefore not suffered the extreme population pressures that have

contributed to quick depletion of resources in many countries. Also, as discussed above, there is an increasing awareness in the country of the need to strengthen environmental management, and Belize has access to substantial amounts of technical and financial assistance from various international sources to support both the development of appropriate strategies and of related investments. The framework for domestic financing of environmental protection has also recently been enhanced, and Belize developed successful examples of collaboration with the private sector and NGOs, and local community involvement towards sustainable environmental management.

5. Additionally, in Belize there is large scope for implementing "win-win" policies that can both improve economic efficiency and the use of environmental resources, and that are not costly. In some cases, such as land pricing policy, removal of distortions would also improve equity. Belize, however, shares with many countries the difficulties in implementing many reforms due to political constraints and lack of awareness of the consequences of these policies. Also, some initiatives are not implemented due to lack of financial or technical resources.

B. Objectives of the report

6. This report aims primarily to assist the Government of Belize in the preparation of a National Environmental Action Plan. The report focuses on key environmental problems and identifies policies and programs, including required investments and financing mechanisms, to enable the Government to develop and implement an environmental strategy. The report is accompanied by technical annexes which detail the sectoral and institutional issues for the benefit of the Government. It is hoped that the report would guide external financing agencies in supporting the Government's implementation of the proposed strategy. More generally, the report illustrates environmental problems commonly encountered not only in Belize but in many other countries, and identifies approaches to deal with them.

7. Rather than providing an all-inclusive diagnostic of the environment in Belize, this report focuses on three priority problems: deforestation and unsustainable agricultural practices, linked largely to inappropriate land management; inadequate sanitation and waste disposal facilities; and contamination and degradation of water resources. Many forest areas and the coral reefs are at risk of irreversible degradation. The incidence of environment-related diseases such as malaria and gastrointestinal diseases is high, and compares unfavorably with most countries in the region. Therefore, the challenge for Belize is to reduce the depletion of forest resources and improve land management, to maintain the health of the coral reefs and coastal ecosystems, and to prevent the environment-related diseases.

C. Structure of the report

8. The report is organized as follows: Chapter I provides an introduction to place Belize and the report in context, and provides an overview of the physical setting of the country. Chapter II reviews the most important environmental problems and policy issues. This chapter develops a conceptual framework integrating the economic growth, population growth and macroeconomic policies with the environmental issues and provides an analysis of the main environmental issues facing the country: (i) the environmental implications of land use and allocation; (ii) forest resources degradation and management of protected areas;

(iii) management of the coastal zone and the tourism industry; (iv) water resource and waste management; (v) environmental health problems; (vi) links between poverty and environmental changes; and (vii) institutional shortcomings. Chapter III deals with the policy recommendations which could reduce economic distortions that contribute to environmental degradation, strengthen the institutional capacity to monitor standards and enforce regulations and to plan and effectively implement programs, increase financial resources to support natural resource management, enhance community participation in environmental management, prevent deterioration of coastal zones, control environment-related diseases, and improve water resource and waste management.

D. Physical setting

9. Belize is located in the northeast of Central America with a land area covering approximately 22,963 km^2 or 5.4 million acres. Belize is the second smallest country in Central America, next to El Salvador. Its eastern coast lies entirely on the Caribbean and it boasts the largest barrier reef in the Western Hemisphere (the second largest in the world). Its neighbors are Mexico to the north and Guatemala to the west.

10. Belize has a subtropical climate with temperatures ranging from 16°C to 38°C but remaining fairly constant at a mean annual temperature of 25°C. Annual rainfall varies from 1,500 mm in the North to 4,000 mm in the South. A dry season extends from January/February to May, followed by a rainy season which peaks in July. Winds from the east and southeast prevail from February to September, while winds from the north and northeast dominate in the winter.

11. The total area under closed forest is estimated to be about 3.5 million acres or roughly 60% of the territory. Species diversity is rich with about 4,000 native flowering plant species, 121 mammal species, 504 species of birds, 107 species of reptiles and 26 species of amphibians. Endemism is limited due to the absence of natural barriers in the region. The barrier reef boasts hundreds of species of fish, corals and other aquatic life. Coastal and marine ecosystems include extensive mangroves, coastal lagoons and seagrass beds.

12. Belize has a diverse population. More than a quarter of the population is considered foreign and the very mixed ethnic community of Belize includes: Creole (predominant), Carib, East Indian, Kekchi, Ladino, Mennonite, Yucatec and Mopan peoples. In 1931, the reported population of Belize was 51,347. Today, total population stands at approximately 236,000 persons, including about 27-30,000 Central American immigrants. Despite this growth rate, its current population is considered small for a Central American nation of its size, with a low population density of approximately 10 persons per km^2 (e.g., El Salvador, a country similar in size, supports a population of over 5 million). Belize's annual population growth is about 2.6%. Rural population grows at a faster rate, estimated at about 3% per annum.

2 Existing situation and major issues

A. Basic framework

13. *Economic development and the environment.* Belize's economic development strategy emphasizes rapid expansion in export agriculture, fisheries, and tourism (mostly eco-tourism) as the main sources of growth. Together these sectors contributed 34% of GDP and 66% of total exports (GNFS) in 1995. These sectors are heavily dependent on the environment. Belize will be able to maintain fast economic growth and a higher quality of life over the medium to longer term only if the land is appropriately used, if the forests are protected, if the physical and chemical properties of agricultural soils are adequately maintained, if the fish stocks do not get depleted, and if the country is able to maintain its many tourist attractions in coastal areas as well as inland. These attractions largely correspond to the country's unique natural environment, including relatively pristine beaches, coral reefs, natural tropical parks, biodiversity and the historical architecture of the Mayan ruins.

14. Belize has been able to preserve its environmental resources to a much greater extent than have other Central American and Caribbean countries. The relatively low population density is one of the main factors explaining this, although in recent years efforts to improve environmental management have been strengthened. However, there are some indications suggesting that, unless more adequate measures are taken now, the natural capital of the country is likely to deteriorate as in other countries of the region. Population has been growing rapidly despite a significant out-migration of Belizeans and a moderate fertility rate. The main contributor to population growth has been a large inflow of immigrants and refugees from neighboring countries.

15. An unusual feature of the recent Belizean experience is the fact that the rural population has been growing not only in absolute numbers but also in its share of total population. The urban/rural balance has shifted over the years, from 46% rural in 1970 to 49% in 1980 and 51% in 1994.[1] This feature is explained by the tendency of immigrants to settle in rural areas, by the higher fertility rates in the rural areas, and by the fact that most out-migration occurs from the urban areas. Both population growth and its high concentration in rural areas is increasing pressures on tropical forest and leading to unsustainable agricultural practices. Also, the provision of adequate services including potable water and sanitation is much more expensive due to the scattered population.

16. Pressures on the natural environment are also increasing because of the rapid expansion of natural resource-based activities, which as indicated above, are the backbone of the Belizean economy. In the absence of proper policies and programs, the growth of these industries can cause sharp deterioration of the environmental resources, in turn compromising their own growth potential in the future.

[1] This rate of urbanization is much lower than in most countries at similar stages of development.

17. *Agriculture.* Agriculture continues to make up a large part of Belize's output and consists mainly of three export crops: sugarcane, citrus and bananas. These agricultural products are the basic input required by agro-based industries which produce most of the manufacturing output in Belize. In addition, import substitutes consisting mainly of corn, beans and rice are produced by small farmers. Largely as a result of Belize's preferential trade arrangements with Europe and the United States, the production of sugar, citrus and bananas has grown rapidly since the mid-1980s. By 1995, these agricultural products constituted 17% of GDP and 35% of the country's total exports (GNFS). Sugarcane is the most important crop in Belize, and sugar accounted for 8% of GDP and 16% of exports in 1995. Sugar processing in Belize takes place in two refineries and produces polluting effluents that contaminate surface- and ground-water sources. Oranges and grapefruits are produced mainly for juice concentrates which represent 5% of GDP and 10% of total exports (1995). However, the improper disposal of citrus rinds and subsequent leaching has led to water contamination. The production of bananas accounted for 4% of GDP and 8% of total exports in 1995. Bananas are transported in plastic bags which are then dumped or burned; the lack of a recycling program for these bags has created a waste disposal problem. While agricultural production is essential to the Belizean economy, it is important that expansion of this sector be undertaken in a manner that does not lead to excessive environmental degradation. Firstly, the expansion of farming land is cutting into forested areas. Secondly, agricultural production creates pollution in the form of fertilizer and pesticide runoff, effluents, and other byproducts. Therefore, expansion of the agriculture sector must go hand-in-hand with the development of proper land and waste management policies.

18. *Tourism.* The sector directly contributes about 15% of GDP and 26% of total exports in addition to unquantified indirect contributions. Tourism receipts were estimated at BZ$155 million in 1995, about twice the 1988 level. Some 133,000 tourists visited Belize in 1995. The coastal zone contains 80% of tourist accommodation; protected areas and national parks attracted some 17,000 visitors in 1995, while archaeological sites, mainly important Mayan ruins that form part of the multi-country "Mundo Maya" tour, recorded 43,000 visitors. Belize is competitive in price with the rest of the Caribbean and has superior marine and natural assets. Given its small share of all three segments of tourism demand (resort, nature and archaeological)—less than 1% of tourists to CARICOM countries—considerable expansion of the tourism sector is feasible. But a rapid increase in number of tourists would have environmental consequences.

19. *Fishing.* The value of seafood products exports was estimated at BZ$31 million in 1995: this represents 2.6% of GDP and 5.3% of total exports. The Fishing industry is characterized by small- scale commercial interests. Most fishermen are members of one of five Fishermen's Cooperatives. Concerns about overfishing of lobster and conch are expressed frequently, but the official statistics do not show a clear pattern. The acknowledged decrease in individual catches and in the average size of lobsters are attributed to the increase in the number of fishermen, which indicates that overfishing is occurring. In the south, in particular, unauthorized trawling from neighboring countries, as well as illegal practices by local fishermen, are believed to have seriously depleted wild stocks. In order to protect lobster and conch, they are regulated by a closed season and size and weight restrictions. Licenses are also used as regulatory mechanisms: that for fishermen was raised recently to BZ$25 per year and for boats ranges from BZ$25-5,000. The Government has also encouraged diversification of exploitation

of marine resources. Efforts to interest investors in deep sea fishing operations have so far not met with success. Several marine resources that could be developed commercially have been identified: sea-weed, shark fishery, and mullet, octopus, squid and oyster fisheries.

20. The fishing industry is regulated through the Fisheries Act and managed by the Fisheries Department, the staff of which are funded from various sources other than the Government budget. While better staffed and equipped than many in CARICOM, the Belize Fisheries Department, with responsibility for a sea area that extends 200 miles out from a long coastline and covers one thousand cayes, can barely monitor the nearshore area between the mainland coastline and the barrier reef.

21. *Aquaculture.* After an initial pioneering phase, the contribution of aquaculture to fisheries exports in 1994 was 51% in tonnage and 33% in earnings of the industry. The six farms cover more than 1200 acres of ponds, and are located along the mainland coast. Aquaculture is believed to have considerable potential for economic growth. Although potential negative impacts are not yet evident at the industry's current level of development, there are concerns at its rapid expansion and over the introduction of non-native species. Aquaculture producers, in turn, are concerned by the impact of intensive agricultural production in citrus and bananas on mariculture activities. Aquaculture activities will require close surveillance and regulation to ensure that they are neither the recipients of agricultural pollution nor the cause of coastal zone degradation.

22. *Key environmental problems.* Although Belize has been able to preserve a large proportion of its environmental capital at adequate levels, there are several worrisome developments that require attention. While there is considerable arable land still unused in agriculture, most of it is located in areas of difficult access and is far from markets and adequate infrastructure. At the same time, in many accessible areas there are clear indications of agriculture expansion into unsustainable lands. Although no firm data exists yet, there are indicators that the rate of deforestation is significant and has accelerated in the last few years. Estimates by the World Resources Institute (WRI) indicate that deforestation in Belize over the 1980s was about 0.7% per year. This is quite high and comparable to the average deforestation rates observed in the Central America and Caribbean region, where population pressure are higher.

23. There are certain indications that the Belizean barrier reef—the second largest in the world after the Australian Great Barrier Reef—is beginning an incipient process of deterioration. The barrier reef is clearly a main tourist attraction for Belize and, at the same time, is also a global asset. The barrier reef supports many species of significant commercial value to fisheries and other interests, and provides habitat for many endangered species.

24. While the overall level of contamination of rivers, streams and underground water sources is still low, there are certain rural areas where there is evidence of serious water-related diseases. The economic costs of environment-related diseases for Belize appear to be quite significant in terms of direct health costs and workday losses.

25. The key environmental issues are related mostly to agriculture and agroprocessing activities. The main direct cause of forest degradation is conversion to agriculture of forest lands

that in many cases are not apt for cultivation. The main threats to the reefs are effluents from the sugar and citrus processing, run-off of fertilizers and pesticides and, to a lesser extent, untreated sewage from urban centers.

26. *The Government and the environment.* Deforestation in lands of little agricultural value has been largely associated with policy-induced distortions, institutional weaknesses that affect the monitoring and enforcement of forest regulations and the persistence of rural poverty. Threats to the barrier reefs and other coastal ecosystems are mostly associated with inadequate enforcement and, in some instances, lack of regulations. The system of public land allocation and privatization is contributing to deforestation. Examples of institutional insufficiencies are the lack of specification of legal land rights, the inadequate participation of the private sector in the design, monitoring and enforcement of regulations and the poor record of collection of environmental fees, royalties and taxes. In addition to the removal of distortions and improvements in the regulatory framework and its enforcement, targeted investments to address key environmental issues (i.e., effects of shortcomings in sanitation and water management) are needed.

27. *Mechanisms to mitigate environmental degradation.* Overall, environmental degradation can be mitigated using a combination of market mechanisms with limited but effective Government intervention. Among the market mechanisms, the most important are appropriate pricing policies: such as valuation of assets (such as land); removal of trade distortions; removal of subsidies for energy use, use of pesticides, fertilizers, etc.; and the implementation of user fees and green taxes based on the polluters-pay principle. The role of the Government is most effective when it is limited to facilitating sustainable economic development through the enforcement of appropriate regulations (e.g., land management to prevent unsustainable uses of land or uses that negatively impinge upon environmental resources, and emission standards to control pollution), collection of appropriate fees from users and penalties from violators, through public-private investments in essential infrastructure and through greater collaboration with the private sector, the NGOs and the local communities in managing the resources.

28. The most important pricing issue in Belize relates to the under pricing of land which is discussed in the next section (Land Management). In contrast with many developing countries, public services are not subsidized. Electric tariffs are sufficient to cover average production costs, and the potable water charges permit full cost recovery at the national level. While current trade policies exacerbate certain environmental problems, trade liberalization is currently underway.[2]

29. The current system of trade protection favors the most land-intensive agricultural commodities and implicitly taxes labor-intensive commodities (vegetables and tubers) and capital-intensive commodities. This magnifies the demand for land and contributes to deforestation. The main beneficiaries of this policy are the medium-and large-size commercial farmers practicing mostly mechanized agriculture. In fact, most of this forest conversion has

[2] Within the agricultural sector, import subsitutes are still protected by both tariffs and quantitative restrictions. However, as of April 1996, most tariffs were reduced to 30-40% in line with the CARICOM agreement, and the phasing out of QRs is under consideration.

been for mechanized crop production and livestock pastures. Further trade liberalization will increase incentives for the agricultural export sector which will increase incentives for the agricultural export sector which produces a great deal of effluents. However, because export crop production tends to be localized, it is possible that effluents could be controlled more easily than deforestation. Nevertheless, given the complexity of the trade-offs involved, it is difficult to evaluate the impact of further trade liberalization on the environment.

B. Land management

30. About 60% of the land surface is under closed cover forest. Public lands constitute about 58% of the total land area, including approximately 600,000 acres of land under lease to the private sector (Table 1). Inappropriate land use practices exist mostly because of the existing system of lease-to-purchase of public lands at below market rates which is the underlying factor in land speculation, lack of land zoning framework, inadequate land title security and low land taxation rates.

Table 1. Public vs. private land ownership (1991)

	Area (thousand acres)	*% of Total*
1. Public Land	3,277	58
Forest reserves	(1,043)	(18)
Other reserves and protected areas	(0,658)	(12)
Leased land	(0,630)	(11)
Other	(0,944)	(17)
2. Private Land	2,398	42
Private reserves	(0,279)	(5)
Private parcels (>100 acres)	(1,825)	(32)
Small parcels (<100 acres)	(290)	(5)
TOTAL AREA	5,672	100

Source: Mission estimates, Barnes ,1995.

31. *Privatization of public lands.* There has been a rapid process of privatization of public forest lands. In 1992, almost 34,000 acres of new public lands were leased to the private sector and 13,000 acres were sold. The total stock of public land under lease arrangements is now estimated at more than 0.6 million acres or 10% of the total land area in Belize. Additionally, a new land grant scheme, the Roots Belizean Grant Scheme, has been developed for use of land as a social safety net system (see Box 1).

32. Lease-to-purchase is the main vehicle for privatizing public lands. The current lease rate is extremely low (about BZ$2-3 per acre/year) and the purchase price itself is determined by a formula that leads to higher prices per acre for small parcels than large parcels. These prices, particularly those for large parcels, are lower than market prices. The low land selling prices induce an excess demand for land that contributes to deforestation. Lower than market prices fosters lack of transparency in the land allocation process.

33. There are serious weaknesses in the procedures used to allocate public lands and in the institutions which subsequently administer it. First, there is a large number of unregistered leases, estimated at about 21,000. A new applicant may, through no fault of his/her own,

request an area which has already been leased, or which lies within a forest reserve or protected area. Unfortunately, it is currently practically impossible for the Lands and Survey Department (at any level) to check this out. The land is allocated with little reference as to its suitability for the intended purpose. As land is becoming scarce in certain areas, this is leading to the increasing use of marginal land for agricultural purposes. The amount of land issued often far exceeds that which can be reasonably developed and this is leading to further pressure on land resources. Second, there is a lack of demarcation of the parcels to be leased. As such, the parcels boundaries are undetermined. Third, there are serious discrepancies between land records and the actual field situation. For example, a recent study by NARMAP in Stann Creek and Toledo districts found that only 63% of leasehold parcels were in fact occupied by the registered lessee and only 29% of the parcels have been actually surveyed. Fourth, there is a lack of transparency in the procedures used to grant leases.

Box 1. The "Roots Belizean" land grant scheme

The Roots Belizean Land Ownership Program (LOP) is a major initiative of the current government. It is based on a Government policy of facilitating access for each Belizean to a piece of land. In practice it is a response to increasingly visible foreign ownership and immigration from neighboring countries and a realization of limited nature of land resources. It also acknowledges the frustration many feel towards the current land allocation system

Components of the policy include: any Belizean holding one lease can convert it to freehold title, immediately; no "development" clause; reduced purchase price (around 50%) of normal.

As originally implemented, the "Roots Belizean" scheme had a holding clause of 5 years, designed to minimize speculative sale of land, and subsequent application for a new parcel. This provision was rightly challenged on the basis that it is impossible to attach conditions to freehold title as situations may arise where an individual has to sell his or her land to obtain capital. The removal of this clause in effect means that land may be immediately sold following conversion to title. Realizing the potential this created for multiple applications-sales by an individual, the Ministry is maintaining a database of those obtaining title under the program. A further problem concerns the assessment of an individuals right to participate. This requires verification that the individual holds only one piece of land. This is largely impossible to determine prior to computerization of the land records and efforts to ensure the completeness of those records. In the meantime, a series of fines is in place to discourage multiple applications.

34. The aim of many of the lease-to-purchase policies is to stimulate commercial farming. However, the effective instrument to achieve this goal is to increase the availability of lands that can be exploited sustainably, rather than to subsidize land prices. Once the Government has set targets for land to be privatized, charging a price below the market rates will only induce land rents for the buyers and also result in land speculation, as currently observed, and revenues forgone for the Government. Since individuals can return the land leased with few restrictions, unsustainable practices on leased land are much more likely than in owned land. Thus, the elimination of the lease period would also contribute to reducing the risk of unsustainable exploitation of the land to be privatized. Low land swelling and rental prices for land have been seen by successive governments as a social-safety net, aimed at reducing land consolidation and landlessness. However, for social purposes, a much more effective system would be a transparent system of reduced prices for land to small land holders, linked to outright ownership of the land (the current selling price formula discriminates against small landholders). The "Roots Belizean" land grant scheme constitutes a step in this direction.

35. *Land security.* A variety of land tenure forms exist in Belize (Box 2). A large proportion of Belize lands do not have legal land titles. Additionally, there is a generalized problem associated with the lack of demarcation of the lands in Belize. This makes the allocation of legal land titles more difficult. The lack of land rights security decreases the incentives for investments that improve the productivity of the land and enhance sustainability. At the same time, lack of tenure security makes it harder for farmers to obtain credits, thus affecting the productive potential of the land. Additionally, a significant part of the land is under long-term lease contracts. It appears that there are little incentives to convert leaseholds into freeholds.

Box 2. Land tenure in Belize

Registered leases - a lease of 20 years registered with the Land Registry of the Lands and Surveys Department under the provisions of the Registered Land Act (1977) or with the General Registry under the common law deeds system.

Unregistered leases - where the lease has been applied for but no Certificate of Lease as been issued. Commonly this is delayed by the need for a survey (see below).

Irregular leases - expired leases and where the lessee has not complied with the terms and conditions of the lease

Possession - anecdotal evidence suggests that there are many people occupying land without any legal basis. The NARMAP project found that this ranged from 1% (Toledo), through 4% (Stann Creek) to 10% (Cayo). Under the laws governing adverse possession, the occupier may claim property rights after a 12-year period of occupation on private land and 30 years on national land.

Indigenous lands - Maya Indian reserves, established between 1920 and 1940. Land is held by the community, although increasingly the Mayas hold standard leases both within and outside the reserve.

Freehold land - Registered under a variety of mechanisms, i.e., (1) "Common law" deeds system; (2) Modified Torrens system; (3) Registration of Title. Today, most freehold rights are viewed as fee simple absolute tenures, documented through a recorded deed, certificate of title or land certificate.

36. *Land zoning.* Currently, the Government provides little guidance on the utilization of lands despite the existence of a detailed map of land capability for the country. The closest to a land management program is given by the Special Development Areas (SDA) program. The SDA intends to put in place, with Government and non-governmental agency participation, a preliminary set of sub-regional plans in certain areas designed by the Government. These are intended as a guide to land development for government units designed to authorize subdivisions of private lands (i.e., the Land Utilization Authority), other government departments and the private sector.

37. The Government is aware that the establishment of an enforceable national land planning system can be very expensive, requiring significant volumes of financial and human resources. Excessively detailed planning can restrict choice in the private sector beyond what is desirable, induce excessive legal litigation, and can also lead to inefficient land allocations causing significant economic losses. It appears, however, that there is some scope for land zoning system, at least in selected environmentally fragile areas where the potential for important externalities do exist.

38. *Land taxation.* A land tax of 1% over the unimproved value of the land is in effect. However, the collection of this tax is extremely low. It is estimated that the collection rate is

only about 30-40%, reaching to BZ$1.2 million in 1993, and the arrears in 1994 were estimated at about BZ$9 million. The low effective taxation of the land is encouraging its under-utilization. In fact, a large proportion of the good agricultural land in private hands is not cultivated. Although lack of infrastructure is one reason for this, in some cases, it appears that the problem also affects areas that are not too isolated.

39. *Southern Highway.* The upgrading of the Southern Highway will accelerate the pace of development in southern Belize and integrate it more closely with national and regional socio-economic advancement. The project feasibility study indicated a 20% rate of return on investment for the road, and envisaged additional economic growth, especially in the agro-industrial and tourism sectors. Benefits, however, may be distributed unevenly, and are expected to accrue mainly to large enterprises, rather than to small farmers, entrepreneurs or labor. It has been noted that this increased competition for natural resources could adversely affect some groups and communities and increase the environmental vulnerability of some areas.

C. Forest resources

40. At present the forest cover in Belize is fairly extensive (57%) and, due to selective logging practices, relatively intact. However, the human and financial resources needed to manage this ecological wealth are inadequate, and anthropongenic pressures which impact directly on the well-being of forest resources and protected areas continue to grow unchecked.

41. Threats to forest resources and protected areas are compounded by the inadequacy of resources to effectively manage and protect them. While the contribution of traditional forest products to the economy has decreased over the last thirty years and leveled off, demand for land, together with population pressures in key forested areas, is increasing. Expansion in smallholder agriculture, milpa farming and commercial agriculture is intensifying, sometimes resulting in inappropriate deforestation. A direct result of these pressures, combined with inadequate land use planning and management, and agricultural emphasis on extensification rather than intensification, has resulted, not only in deforestation, but also increasing encroachment and excisions within Forest Reserves and Protected Areas.

42. Apart from the expansion of agriculture, there are other important sources of deforestation which are more difficult to quantify. Logging, both legal and illegal, fuelwood collection for cooking and other uses and land clearing for the exclusive objective of establishing property rights appear to be important sources for forest losses. Mission estimates suggest that the sustainable annual allowable cut has been surpassed by more than 35% in recent years just considering timber extraction. There are indications that illegal logging is substantial. For example in 1992 exports of mahogany exceeded the official Forest Department figure of mahogany fellings by 74%.

43. Estimates of deforestation rates for Belize vary widely. According to WRI (1992), the rate of deforestation for Belize from 1981-1985 was 0.7%, whereas WRI (1994) estimated deforestation from 1985-1990 to be 0.2%. Estimated areas of current annual land conversion due to agriculture (see Annex I) imply that the deforestation rate is still closer to 0.7%-1% mark, a rate which is relatively high considering the low population density of Belize. Very rough "back-of-the-envelope" estimates indicate that milpa farmers are converting up to 7,100 acres

of forest per year, smallholder agriculturists up to 5,000 acres of forest per year and commercial agriculture is responsible for up to 5,000 acres of cleared forest lands per year—implying a deforestation rate of 0.5-0.6% attributable to agricultural expansion alone. These calculations assume that agricultural expansion results in the likely conversion of forest lands rather than other land types.

44. Considering that less than 50% of the land area suitable for sustainable agriculture is in fact being used, a rate of annual deforestation below 1% may not seem excessive.[3] However, a very large proportion of the land considered apt for agriculture is located in remote areas of difficult access. Thus, much land clearing has concentrated in accessible areas which are not necessarily suitable for sustainable agriculture. There are numerous reports indicating that deforestation is taking place in several places on lands that are not apt for agricultural uses. Important factors that tend to accelerate the process of deforestation are poverty of milpa farmers, lack of access to other sources of income, inadequate land management, weak tenure rights, lack of access to technologies that are appropriate for cultivation under fragile ecological conditions, and the biased price incentive structure that promote land-intensive crops such as maize.

45. On the positive side, the importance of the forest sector has been recognized as vital for protective purposes (watershed, slope stabilization, carbon sequestration, biodiversity and critical habitats) and for its contribution to the tourism sector (second highest hard currency revenue earner for Belize). Increasingly, as tourism revenues climb, the value of forest conservation, intact ecosystems and protected areas are recognized. The area of forests under protective status has increased over time. However forest lands, including Forest Reserves and Protected Areas, adjacent to areas of agricultural expansion are under increasing pressure and are particularly vulnerable to encroachment, inappropriate conversion and sometimes formal excisions.

D. Protected areas

46. About 14% of the total area of Belize—approximately 700,000 acres—has been designated into some category of protective status, including both private and public areas. The present management arrangement of protected areas is still weak. The management for six of the 26 protected areas is in the hands of the Belize Audubon Society (BAS). The BAS has been informally involved in park management since 1982. In 1995, their role in protected areas management was formally established. While the BAS provides adequate management for six major protected areas, sixteen of the 26 protected areas are still without any formal management due to the lack of financial and human resources. The insufficient financial resources has led to lack of park protection, of potential illegal activities, lack of research and to absence of quantitative data regarding biodiversity protection in parks that do not yet have formal park management. Also, training and community level education efforts to promote public awareness of the importance of national parks is rather limited.

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[3] Land use estimates indicate that there are approximately 850,000 acres of arable land in Belize and that about 460,000 acres are now in use for agriculture.

47. Recently, a National Protected Areas System Plan (NPASP)—in charge of a committee that includes representatives of non-governmental organizations (NGOs) and various governmental departments with financial support from USAID and technical assistance from the World Wildlife Fund (WWF) and Winrock Foundation—has been established. The NPASP's objectives are to guide policy for the establishment of protected areas; recommend protected area coverage and management objectives; suggest an enabling administrative and managerial structure; identify resource requirements and support mechanisms; and to integrate the Protected Areas System within national land use and economic development planning, as a component of national policy. Additionally, NPASP attempts to make recommendations which support institutional reform and coordination, identification and implementation of revenue generation and management of critical sites. Nonetheless, often important sites such as wetlands have not been incorporated into the NPASP.

48. One of the main reasons for the insufficient financial resources for conservation of national parks has been the limited revenue and the lack of earmarking of the revenues for conservation purposes. While several national parks including Cockscomb, Hol Chan and other national parks do charge an entrance fee, these fees are too low and inadequate to cover the operational costs. Estimates indicate that Cockscomb and Hol Chan would require doubling their current fees to cover their operational costs. Recently, progress has been made in expanding the national parks that are allowed to charge entrance fees (in November 1995 five parks were allowed to charge entrance fees for the first time). Another recent positive step is the fact that park management is now allowed to retain part of the fees (70%) to cover their costs. This increases the incentives for collection and facilitates the financing of the protected areas. An additional positive development has been the recent creation of the PACT (Box 3).

Box 3. Protected Areas Conservation Trust (PACT)

The Protected Areas Conservation Trust Act was passed in 1995. The PACT was created to provide a long term financial mechanism to ensure the protection and enhancement of natural and cultural resources of Belize. The PACT is financed by a BZ$7.50 conservation fee imposed on foreign tourists through purchase of airline and cruise ship tickets. In addition, 20% of entry fees to protected areas will also be contributed to the PACT. The PACT would be augmented by bi- and multi-lateral funds. Those eligible to apply for funds under the PACT include government agencies, NGOs, private businesses and individuals. PACT funds are not intended to replace standard environmental protection responsibilities of ministries and departments. Likely use of funds includes strengthening protection and management of Protected Areas (including buffer zones), infrastructure needs, education, training and public awareness programs. On a more limited basis, development of appropriate eco-tourism will also be supported.

Source: W. McCalla, et al. (1996).

49. There have been several recent initiatives towards increase the self-financing of national parks and towards improving their management. However, there are two remaining problems: (i) the determination of the specific fees which in some cases are too low and (ii) the lack of formal management for at least 16 protected areas.

E. Coastal zone

50. The coastal zone comprises a 220 km barrier reef, three offshore atolls, many patch reefs, extensive seagrass beds, hundreds of cayes of sand and mangrove, dense mangrove forests, and lagoons and estuaries. The Belizean barrier reef is the second longest in the world, after the Australian Great Barrier Reef. The component ecosystems are closely interlinked and support many species of significant commercial value to fisheries and to other interests, such as the pharmaceutical trade, and provide a habitat for endangered species. The reef, mangroves and seagrasses, play a critical role in stabilizing and protecting the coastline against erosion and storms. The wetlands, and particularly mangroves, of the coastal zone act as a natural sink for terrestrial run-off and pollutants, particularly from the sixteen major watersheds that drain into the numerous lagoons throughout the coast.

51. Some 40% of the population lives in the coastal zone. Most of the commercial, residential and tourism-related building permits issued in Belize in recent years have been for construction in coastal areas. Principally, the coastal zone supports tourism and fisheries. Fisheries account for 3.5% and tourism 15% of GDP. Currently some 80% of all tourist accommodation in the country is located on the coast and cayes. Belize's pristine reef ecosystem and its biodiversity has global value, as recognized by UNDP/GEF funding for the Coastal Zone Management Unit (CZMU) and the reef's designation as one of the "Seven Underwater Wonders of the World."

52. *The reef.* The ecological health of the reef is largely unknown because of the absence of long-term monitoring and the technical difficulties related to measuring change in a marine environment. The development activities and pressures that have provoked coral reef degradation elsewhere are now occurring in Belize. The main threats to the reef are from: (i) algal growth—which destroys live coral and is stimulated by the nutrient enrichment of rivers and coastal and marine waters from heavy fertilizer use, principally on bananas, domestic sewage pollution and agro-industrial effluents; (ii) sediment in marine waters—which prevents the sun and light from reaching the reef and which occurs because of soil erosion from agricultural practices, clearcutting and deforestation, marine dredging and sand mining, and destruction of seagrass beds and mangroves, which destroys their function as filters; (iii) declining water quality from agrochemicals, industrial wastes, and plastics. The ecological balance of the reef is disrupted by overfishing of certain species; hurricanes can cause serious damage to the coastal zone; and uncontrolled diving, commercial and sports fishing can cause localized damage. Periodic threats arise from oil-drilling and movement of rigs in coastal areas, and the potential for an oil spill is constant. Efforts by Belize to control pollution of its coastal waters will be ineffective without the cooperation of its two neighbors—Mexico and Guatemala. Mechanisms are in place for a dialogue with Mexico but need to be created with Guatemala.

53. *Mangroves.* The approximately 190,000 acres of mangroves are legally required to be retained as buffers along all watercourses, including the coast. The rapid growth of coastal settlements in Ambergris Caye and San Pedro and in Belize City and surroundings (where about half the mangroves have been cleared) has led to localized clearing of mangroves, almost all without a permit. The consultation between the Lands and Survey Department, which issues development permits, and the Forestry Department, remains poor, but forms for new leaseholders and related maps now identify mangrove areas and the need for a permit for

mangrove clearance. A Mangrove Manager was appointed in 1993 in the Forestry Department charged with enforcement of permit regulations and designation of protected areas that include mangrove areas.

54. As of July 1993, the overall area of mangroves in a reserve, including Forest Reserves and Private Nature Reserves, totaled 26,358 acres or 13.7% of the total mangrove area. Manpower and funding constraints prevent management plans from being drawn up and the designation of more mangrove sites as protected reserves from the already identified priority list. Draft legislation was drawn up in 1993 for "Forest (Protection of Mangroves) Regulations" that would increase the fees for permit applications to cut mangroves and specify in greater detail the criteria for granting permits. This legislation should be enacted. An EIA is required for mangrove clearance.

55. *Administration of the coastal zone.* A CZMU was established in 1990 within the Fisheries Department, with responsibility for coordinated management of the coastal zone, and in 1993 received UNDP/GEF funding. The overall objective of the five-year project is to preserve the high biodiversity of the coastal zone by ensuring the sustainable management of its resources and to assist in the development of an integrated coastal zone management program for Belize. Cabinet authorized the establishment of the CZM Technical Committee (CZMTC) to facilitate working relations between all the agencies involved in coastal zone management, to encourage information sharing, and to help formulate government policies, plans and programs.

56. The CZMU has already completed significant work on monitoring and management of the coastal zone. Specifically, the CZMU has identified a number of priority marine reserves and has prepared management plans for several. Six existing and proposed areas have been nominated as part of a multi-cluster World Heritage site. Some 67% of the cayes are currently under lease or ownership by Belizeans and, to address the consequent development pressures, the CZMU recently published a "Cayes Development Policy," followed by guidelines for the Turneffe Islands.

57. The Belize Barrier Reef is a marine resource of global significance that is currently being managed by the Government of Belize (CZMU), with limited external assistance. The preservation of the reef is of global importance, but its sustainable use is essential to the Belizean economy, especially to the fisheries and tourism sectors. The task of conserving the reef's assets from national and transboundary pollution, development impacts and natural causes of erosion exceeds the Government's technical and financial resources. The Government has just deferred a decision on a proposal to convert the CZMU into a statutory body.

F. Water resource and waste management

58. *Water supply and sanitation coverage.* Access to safe[4] water in Belize has improved significantly in the 1991-95 period. In urban areas the coverage increased from 95% to about 100%; in rural areas from 51% to about 73%. In contrast, the situation with respect to sanitation has remained constant. Only 75% of the urban population and less than 30% of the rural population is served with adequate sanitation or waste collection and disposal facilities.

[4] "Safe" is understood as access to a protected well with a handpump or piped system, WASA, 1995.

Mostly in the rural areas of Cayo, Stann Creek and Toledo sanitation coverage still remains very low.

59. In comparison with other countries in the region, Belize has similar urban coverage rates for water supply services and sanitation (Table 2). In rural areas, however, Belize fares much worse than even considerably poorer countries in the region. This is particularly true in the case of sanitation facilities where the coverage is worse in Belize than practically any other country in the region. To a large extent, this is due to the fact that the rural population in Belize is spread over a much larger geographic area than in most other countries in the region. This makes the provision of rural water/sanitation services per household in Belize much more costly than in other more densely populated countries of the region. There are reports that indicate that polluted surface water sources are frequently used for drinking in rural areas and that open and unprotected wells are located too close to pit latrines causing contamination of the wells.

Table 2. Access to water and sanitation (1993) comparing Belize and other countries in the region

(percentage of population with access to services)

	POTABLE WATER		*SANITATION*	
	Urban	*Rural*	*Urban*	*Rural*
Belize (1995)	100	75	59	35
Costa Rica	100	84	100	93
Guatemala	98	42	72	48
Honduras	89	60	88	44
Trinidad & Tobago	100	87	88	44

Source: World Bank statistics and mission estimates for Belize.

60. The fees, terms and conditions for the supply of water and for sewerage disposal are determined by the Government. The current fees are enough to meet the recurrent expenditures of WASA, however, they are not sufficient for expanding and upgrading the water and sewer system without government or external subsidy. Since 1986, urban households pay BZ$50 for the connection of water and another BZ$50 to be connected to the sewer. There is a minimum charge of BZ$9.90 for a consumption of less than 1000 gallons per month. For consumption above 1,000 gallons the marginal rate gradually increases from 13.2 cents per gallon to 17.2 cents per gallon for consumption above 10,000 gallons.

61. Sewer fees are currently billed at 20% of the water rate in Belize City and Belmopan. The Water and Sewerage Act has been recently amended for sewer rates to be increased to 30%. It appears that the fees for both water and sanitation are quite steep for the poor urban household and no allowances are made for special rates for them.

62. Most industries obtain their water from rivers and groundwater sources without paying any fees for the use of these resources. Although the Water and Sewerage Act allows WASA to issue licenses for industrial and irrigation water uses, no such licenses have been granted yet. The issuing of licenses, however, could provide part of the financing for future investments in the sector, considering that industrial water consumption is about 80% of the total water consumption and that water needs for irrigation are likely to increase.

63. Public recurrent expenditures on water and sanitation have decreased substantially over the last five years from BZ$13.3 million in 1989 to BZ$2.9 million in 1994. Given that the urban sector is now largely self-financed in terms of recurrent expenditures, the largest potential negative effect of this dramatic reduction in public expenditures is likely to be felt in the rural

services, where the operation and maintenance of the system still depends on government expenditures. In terms of capital investment there are two large ongoing urban projects, namely, the San Pedro Water Supply and Sewerage Project and the Belize City Infrastructure Project. The latter will have an indirect positive effect on the overall water and sewer services to the city. Due to the high and rigid tariff structure, the San Pedro project is not scheduled to hook about 40% of the households to the system. This will mostly affect the poor households and subtract considerably from the effectiveness of the project in improving the quality of the discharge into the ocean.

64. Despite the serious deficiencies of water supply and sanitation systems in the rural areas discussed above, there are no new ongoing investments in the rural sector. Currently, as a result of the Belize Water and Sanitation Sector Analysis, some preliminary proposals to analyze the feasibility of various rural projects are being considered with the support of UNICEF, PAHO and Ruta Social. The Social Investment Fund (SIF) is likely to fund some of the rural infrastructure investments. The SIF is likely to provide support to the involvement of local communities in the operation and management of rural water supply and sanitation systems. This could increase the efficiency of the investment in water and sanitation in the rural areas. Rural communities are currently operating and managing rural systems, but should be involved in both larger rural water and sanitation projects.

65. *Surface water contamination.* Surface water contamination with nutrients and pesticides which could cause further degradation of the reefs is perceived to be an increasing problem. The main sources of contamination are agricultural run off (including fertilizers and pesticides), untreated or insufficiently treated urban and industrial waste water). The source of contamination varies for the different catchment areas and districts. While in the district of Corozal and Orange Walk the main pollution is caused by the sugar industry, in the district of Belize (Belize River), the main polluters are cities and agriculture and in the district of Stann Creek, the largest pollution is caused by agriculture. So far in the Toledo District there is no significant pollution source.

66. The largest source of increased surface water pollution will probably be agricultural run off. The increase will be due to (i) agricultural expansion and (ii) increasing use of chemical inputs. According to land allocation studies, agricultural expansion will be localized in the south, where due to the construction of the Southern Highway, new areas, mainly in the catchment area of the Deep River, will probably be used for citrus production. As the discharge of the Deep River is very close to the coral reefs, the risk that the reefs will be affected by the agricultural development is larger than in the agricultural areas further north. In the Stann Creek Valley, agricultural expansion is likely to take further place on steep hills which are very sensitive to soil erosion. Thus, run off of sediments and nutrients will increase more rapidly. Additionally, during the last few years imports of fertilizers have increased significantly from 6,000 tons in 1985 to 32,000 tons in 1994. The total amount of fertilizer used per acre has increased from 170kg/acre in 1987 to 270 kg/acre in 1994. According to NARMAP, it is probable that small farmers will increasingly use more chemical inputs whereby the nutrients flux would increase further.

67. Given urban population growth of 2% per annum, a doubling of the urban population within the next 30 to 40 years is expected. Consequently, the flux of nutrients from the urban areas to the ocean may double if no measures are taken. According to the plans of WASA, the

sanitation and sewage treatment facilities, mainly in Belize City and San Pedro, will be improved. Although no specific data of the capacity of nutrients retention of the present and planned sewage treatment facilities are available, it can be assumed, that even with these improved facilities, the nutrients flux of urban centers will at best stay constant. One major reason for this is that most of the poor residents are not being hooked onto the sewerage system and they will continue to dispose their sewage directly into the ocean (e.g., San Pedro). The main reason for insufficiently covering the poor with an adequate sanitation system, is their lack of resources for paying the marginal costs for the service.

68. The problem of industrial and commercial effluents is being addressed by the Government. According to the effluent regulation which was implemented in the beginning of 1996, each industry and commercial institution (i) has to pay a license for the discharge of its effluent, (ii) has to monitor its effluent, and (iii) has to establish together with the DOE yearly improvement goals. As the effluent regulations were prepared in a consultative process with the industries, they are widely supported by the private sector. Since January 1996 about 33 licenses at a cost of BZ$300 each were issued, including the largest and most polluting industries. However, participation of the commercial sector and small companies has not yet been very high. Nevertheless, the involvement of the private sector by giving them the responsibility of their own environmental improvement seems a very promising approach. One remaining problem, however, is the fact that the fees are not yet linked to the amount of pollution produced by each industry.

69. *Solid waste management.* Solid waste is perceived as an increasing problem in Belize. Improper solid waste disposal affects the tourist industry, contaminates surface and groundwater and creates health problems. The main problem areas are industries, urban centers and the cayes. No authority for the coordination of solid waste management at a national level exists

70. About 63% of the waste is produced by industries while municipal solid waste has a share of about 36%. Citrus and sugar industries are the most important industries with respect to waste production. The waste of citrus industries are orange rinds which are not disposed in a landfill. The improper disposal causes leaching products which have severely contaminated the Stann Creek River. The sugar industry produces bagasse and filter mud as waste products. Bagasse is partly used for energy production, the rest is dumped and burned. About 70% of the total urban population, is served by some kind of regular municipal solid waste collection service. The collection systems are generally operated by the respective local governments, and in some cases has been contracted out to private operators. In rural areas and in some parts urban areas, householders are themselves left to dispose of their own solid waste as they see fit.

71. Only Belize City, Belmopan and San Pedro charge specific fees for waste collection. Charges range from BZ$5 and BZ$8 per month. The other municipalities receive most of their financial resources for solid waste collection and disposal as grants from the government, small amounts of funds are also collected through local taxes (property and fire taxes). The funds available are often not sufficient for providing an adequate disposal of solid waste. Estimates made in feasibility studies show that to achieve cost recovery the fees must at least be double the current fees.

G. Health

72. The main environment-related diseases in Belize are gastrointestinal, other water/sanitation-related diseases and vector-transmitted diseases, mainly malaria. The inadequate supply of safe water and sanitation services especially to the rural areas has made Belize susceptible to outbreaks of gastrointestinal and other water/sanitation-related diseases. Gastroenteritis and hepatitis A have become widespread, particularly in rural areas. Cholera was a problem in 1992/93 with more than 700 cases in 1992, however, was reduced to 18 cases in 1995 due to the rapid intervention of the Government and different donor agencies. Gastroenteritis remains high particularly in the rural areas of the Toledo and Stann Creek districts, where water and sanitary services are least developed and the incidence of hepatitis A in certain rural areas near banana plantations is extremely high. Almost 98% of the population in these areas have been exposed to hepatitis A.

73. Apart from the inadequate supply of potable water and sanitary services in rural areas, certain behavioral practices among the Belizean people have contributed to the rapid spread of gastrointestinal diseases. A common practice is rainfall collection for drinking purposes in both urban and rural areas. In part this practice is related to the poor quality of drinking water. The problem with rainfall collection is that collection areas are not clean in many cases and storage containers are not properly protected. There are several other household practices that contribute to the spreading of the disease (see Annex V on Health and the Environment for a detailed discussion).

74. Diseases transmitted by insect vectors[5] such as malaria are increasing dramatically. The number of malaria cases increased from an average of 2,800 cases during 1986-88 to 9,400 malaria cases in 1995. Dengue reappeared in 1994 with 14 cases increasing to 107 suspected cases in 1995 after being controlled between 1991 and 1993, and the incidence of other vector-borne diseases, such as filariasis and leptospirosis, is believed to be increasing, though not well documented. In comparison with other countries in the region, Belize appears to have a much greater incidence of malaria (Table 3). The cases of malaria have occurred mainly in the western district, Cayo and in both southern districts, Stann Creek and Toledo. In 1995, Cayo district reported the most cases at 40%, followed by Stann Creek (18%) and Toledo (23%). One main cause for the increase in malaria is the reduction of the spraying of houses. Spraying of houses has been reduced from 23,500 in 1992 to 6,000 in 1994 and no spraying at all was made in 1995. Expansion of the agricultural frontier into jungle areas may also have played a role. Additionally, the transmission of malaria is increased by crowded and poor housing. Also, malaria can spread to other regions by migration of infected people from endemic to non-endemic regions

Table 3. International comparison of malaria incidence, 1994

	# of Cases per 10,000
Belize	474
Mexico	1
El Salvador	5
Guatemala	21
Nicaragua	97
Honduras	95
Haiti	33
Costa Rica	14

Source: PAHO and mission estimates.

[5] A vehicle of transmission of a disease which is an integral part of the life-cycle of the diseases, e.g., the mosquito is a vector for malaria.

75. Preliminary estimates of the direct and indirect costs of environment-related diseases are about BZ$1.7 million in 1995. The main source of this is associated with malaria, which in 1995 is estimated to have amounted to BZ$1.57 million including direct health costs and days of work lost. The cost of water-sanitation-related diseases are estimated at about BZ$0.26 million per year. This is a very significant loss for the Belizean economy equivalent to about 0.15% of GDP. It is estimated that the costs of preventing one case of malaria is about half the indirect and direct costs resulting from a case of malaria.

H. Poverty and the environment

76. The 1995 Poverty Assessment prepared by the Caribbean Development Bank (CDB) estimates that 34.6% of Belize's population live in poverty. About 40% of the poor live in rural areas compared to 26% who live in urban areas. Poverty is mostly prevalent in the South, especially in the district of Toledo, and in the Cayo district.[6] Ethnically, poverty is most prevalent among the Mayan and Central American immigrants. Most of the poor depend on the agriculture and fishing for their livelihood, except in Belize District, where the poor depend on construction and trading activities. For the lowest expenditure quintile for the country as a whole about 49% of employment was provided by the agriculture and fishing sectors.

77. Poverty is prevalent among three clearly identifiable economic groups: (i) about 8,000 milpa farmers with a high predominance of Mayan Indians; (ii) the sedentary small farmers with a significant component of relatively recent immigrants mostly from El Salvador; and (iii) the legal and illegal immigrants from Central America working as farm workers in the banana, citrus and other agricultural industries. The last two groups, consisting of sedentary farmers and farm workers, amount to a labor force of approximately 6,000 workers. The sugar, citrus and banana industries are the major employers among those groups. In the banana industry, for example, 81% of a total labor force of 1,790 workers are Central American immigrants.

78. To a large extent, the Central American immigrants and the Mayans have not been able to take full advantage of the benefit from the past economic growth experienced by Belize since the mid 1980s. It is estimated that a high percentage of the land cultivated by small or subsistence farmers is ecologically fragile lying in a hilly topography. Most of the land is characterized by low levels of fertility requiring a considerable amount of conservation practices to keep it productive. About 71% of the land used by milpa farmers lies in traditional Maya reservations. Among the non-milpa small farmers, recent surveys suggest that a significant proportion of them did not have secure land tenure rights.

79. There are many factors among the milpa farmers that cause greater environmental degradation, excessive deforestation and increased poverty. These factors include fragile lands, lack of utilization of conservation practices, specialization on land-intensive crops, the poor quality of soils, insecure land titles and the prevalence of leasing arrangements. By and large, the most important crops among both milpa and non-milpa small farmers are corn and beans. Some of them also produce vegetables which are much more labor-intensive. Vegetables are also more profitable than corn and beans, but the lack of technical assistance, the scarcity of good land and

[6] The Bank's 1995 September Report on Belize: Rural Poverty and Natural Resource Management provides an analysis of the rural poverty and its impact on environment.

marketing problems prevent small farmers from expanding vegetable production. The expanded vegetable and other labor-intensive crops could potentially replace part of the traditional crops as a source of cash income.

80. The poor were more likely to be afflicted with ailments, especially the poor in the South, because they depend on untreated water supply from rivers and streams. The poor live in dwellings with wooden walls, and in the South, with thatched roofing and earthen floors. They are dependent on wood as a fuel for cooking. Most immigrant farm workers earn substantially lower wages than non-immigrant workers and live in much worse conditions from the viewpoint of social services, education and housing. The effects of inadequate water and sanitation services that affect the rural sector tend to fall disproportionately among immigrant workers. It is among them that malaria, cholera and other gastrointestinal diseases are most prevalent. Further, there are reports that a significant number of farm workers are being exposed to various degrees of environmental contamination. Banana workers, for example, among which there is a large proportion of immigrant workers, are affected by continuous spraying of pesticides in their settlement areas. In addition, the issue of pesticide abuse and misuse is much more prevalent among these migrant workers/farmers.

81. There is also a connection between poverty and the environment in urban areas. Because of inadequate sanitation facilities, the urban poor suffer from water-borne diseases such as gastroenteritis. Only 75% of the urban population is served with sanitation and waste collection facilities, and while this level of service is higher than that in the rural areas of Belize, it is lower than in other countries in the region. In addition to the health problems created by contaminated surface- and ground- water, insufficient sanitation and waste disposal services lead to the discharging of waste directly into drainage canals and creeks. This practice along with several non functioning sewage treatment plants threatens to degrade coastal waters and is detrimental to tourism.

I. Legal and institutional framework

82. A comprehensive Environmental Protection Act (EPA) went into effect at the beginning of 1993. The implementing regulations for certain provisions of the act have been developed and a number of the existing natural resource management laws and regulations are being reviewed and revised. These are aimed at modernizing the legal/regulatory framework for environmental management in Belize. The EPA provided for the establishment of the Department of Environment (DOE) and granted it broad regulatory and enforcement authority for prevention and control of environmental pollution, conservation and management of natural resources, and environmental impact assessment (EIA). Much remains to be done to ensure its effective implementation, including preparation of necessary environmental officers and inspectors, and establishment of essential administrative procedures. The first implementing regulations prepared under this Act by the DOE were the EIA guidelines. The Department has also promulgated legislation pertaining to the control of effluents and other pollution and to hazardous waste management.

83. In addition to the broad regulatory authority, the Act also provides the DOE with significant investigation, inspection, and enforcement authorities. In fact, the Act contains substantial penalties, e.g., up to BZ$25,000, two years imprisonment, or both, for violation of

pollution control and EIA requirements. Furthermore, the Act authorizes the court in any conviction for an offense under the act to order, among other things, the offender to take remedial action with respect to the harm caused to the environment, and allows any person who may suffer loss or damage as a result of an offense to bring a civil action against the offender. However, the act does not appear to provide authority for the imposition of penalties without going to court, i.e., administrative penalty procedures, nor does it provide authority for the use of economic incentives, e.g., pollution fees or taxes, to promote environmental protection.

84. *Environmental institutions.* Authority for environmental planning and management in Belize is shared by a number of ministries, departments, quasi-governmental authorities, and NGOs. The portfolio for environment now rests with the Ministry of Tourism and the Environment, but major environmental responsibilities are also held by the Ministries of Health, e.g., water quality monitoring, solid waste management, Agriculture and Fisheries, e.g., fisheries, coastal zone management, pesticides, and Natural Resources, e.g., forestry, national parks and protected areas, wildlife, water supply and sanitation, and land use planning. Two quasi-governmental authorities, the Water and Sewerage Authority (WASA) and the Solid Waste Management Authority (SWMA), were created to carry out specific environmental responsibilities. Finally, several NGOs have taken over natural resource management functions for the Government of Belize.

85. This proliferation of institutions with environmental responsibilities gives rise to a number of implementation problems. For example, the current lack of clear roles and responsibilities sometimes results in unnecessary confusion and wasteful duplication of effort. Inter-ministerial coordination on environmental matters has not been fully institutionalized. The current basis for resource allocation among institutions is not clear, and financial resources and technical capacity remain a problem.

86. The most serious institutional problems arise from the lack of consistency between resource allocation across ministries or departments and the responsibilities assigned to them. It appears that the resources allocated to the various public entities involved with the environment are more related to their respective political clout than to the responsibilities assigned. A dramatic case is the Department of the Environment, which faces the enormous task of implementing most of the provisions of the Environmental Protection Act including the issuance of the vital implementing regulations but with limited staff.

3 Policy recommendations

A. Financing mechanisms, enforcement and community participation

87. Belize has made progress in recent years in developing the framework for user fees, and charges based on the "polluters pay" principle. However, much needs to be done. The current use of fees for national parks is still restricted to a few sites and should be expanded into most marine, archaeological and forest protected areas. A thorough analysis to determine the optimal fees in the various protected areas should be implemented. Another problem is related to the collection of fees and taxes. Royalties and stumpage fees are currently partially collected. The insufficient royalty collection causes excess demand for public forest, thus exacerbating deforestation.. Some pollution taxes have already been introduced, such as the effluent licenses. It is important, however, to expand the system into other pollutants such as waste disposal and to charge according to the amount of pollution produced rather than fixed payments.

88. Improving collection of land taxes is of particular importance as a way to induce a more efficient use of the private lands, and increase government revenues. The current land tax should be fully enforced. It is estimated that the revenues from the land tax could be more than doubled in the short run from the current BZ$1.2 million. The appropriate rate should be carefully determined, but it is expected that such a tax could yield considerable revenues.

89. A greater effort should also be made in order to improve the design and collection rates of the various fees, royalties and taxes. In this respect, organized local communities, local governments and NGOs should play an important role not only in assuring collection, but also in monitoring the implementation of the regulations. Effective involvement of local entities would require (i) an increased participation of the local entities in the design of the various financing schemes and regulations; (ii) support to local governments to strengthen their capabilities; and (iii) allowing local communities and local governments to retain a share of the revenues to be collected as a way of providing incentives for monitoring.

90. Sustainable financing of environmental preservation will require maximizing both domestic and external sources. External sources have provided ample support to many environmental initiatives in Belize, and based largely on the externality it provides to the rest of the world, large amounts of financing has been directed to the protection of forest resources. However, the externalities provided by marine resources are only recently being recognized. In this respect, establishment of a Belizean Barrier Reef Foundation to channel domestic and external resources is proposed. Additionally, rationalization of initiatives and improvement in the effectiveness will be critical in the near future, as the overall availability of external resources is likely to be reduced.

B. Improving land management

91. Various policies currently in effect tend to artificially exacerbate the incentives for deforestation. Land pricing should be comprehensively revised to encourage the productive use

of the available land and to decrease speculative pressures. Upward revision of the land tax rates and lease rental rates should be done in the short term.

92. The system of public land privatization needs to be changed. Land selling prices should be set at market levels. This is the best way to eliminate the risk of land speculation and at the same time increase fiscal revenues. The existing leaseholds should be rapidly converted into freeholds. This would enable the use of land as collateral for credit and would also provide the necessary incentives for the sustainable management of the land.

93. The Government should set clear targets of land areas to be privatized each year by district. The land could be sold via an auction process. To minimize the administrative cost it may be necessary to standardize the size of the parcels to be sold into 3 or 4 categories, say 10, 50, 70 and 100 acre parcels, depending on the income potential and fertility of the land. The Geographic Information System (GIS) now available could be used in order to determine the land areas to be privatized.

94. As a first step, a national land zoning system would be useful to ensure the "best use" of the land. Detailed land zoning at the local level could be developed later in close collaboration with the community organizations. Potential funding and technical assistance sources for the preparation of a land zoning system are the Overseas Development Agency (ODA) and the IDB.

95. A large proportion of private land does not have clearly specified and legal property rights. These problems affects more intensively the Mayan communities as well as poor farmers. Several international studies have shown the importance of land tenure security as a means to promote long-term investment attached to the land, including investment in conservation. Elsewhere, investments in land titling have been shown to have a very high rate of return. Therefore, it is recommended that the Government increase its efforts in legalizing land titles. The recognition of property rights should allow for both private ownership and communal ownership, depending on the farmers' preferences.

96. Improved forest management could be achieved by: (i) ensuring that the land-use planning takes into account the full range (and limitations) of goods and services provided by forest lands and products; (ii) increased management and revenue generation capacity of the forest through conventional and alternative means (including the private sector, community and NGO involvement); and (iii) targeted technical assistance to ensure implementation of critical actions to sustain agriculture and forest production. Enforcement of regulations affecting the use of public lands, including national parks, is an essential condition to permit sustainable use of forest reserves and the conservation of protected areas. The increased revenues of royalties, fees and part of the land taxes should be allocated to step up the protection of the parks and enforcement of forest planning. As indicated above, local entities should play an important role in facilitating both collection of revenues and enforcement of regulations.

C. Preventing deterioration of coastal zone areas

97. A potentially serious issue is the apparent degradation of the coral reefs. Given the crucial importance of the reefs for tourism as well as fisheries, efforts should be made early on to prevent further deterioration of the reefs. It is important to establish an effective system of water

and reef monitoring to identify problems and their sources as early as possible. Furthermore, measures should be taken to reduce effluents from agro-processing industries, agricultural run-off and the discharge of untreated sewage into the ocean. The Government, in conjunction with the four major plants that generate most of the industrial effluents, should seek the most economically efficient systems to reduce their nutrient load in the effluents. Increased awareness of farmers of the run-off problem and the knowledge of measures to reduce it are very important to control the run-off. The Government should promote the integration of the main farmers organizations, banana, citrus, sugar and commercial grain growers into the process of devising measures to control the run-off in certain key areas.

98. In order to conserve the quality of the Belize Barrier Reef, it is proposed to establish a Belizean Barrier Reef Foundation that would be managed by the CZMU, which should continue to receive external assistance until it is strengthened and is self-financing. The long-term objective would be to raise funds from a variety of external and domestic sources to establish an endowment; the immediate objective would be to continue financing the work of monitoring the reef and identifying the causes of coastal zone degradation, mitigation of these impacts and management of sustainable uses of the coastal zone, through planning and zoning, economic incentives and regulations. The Foundation would mostly finance the work program of the CZMU, but other agencies such as the DOE should receive funding for specific studies such as its current water quality monitoring program, the Fisheries department for plans to diversify exploitation of marine resources, and tourism agencies for a development strategy for tourism.

99. The rigidity of the sewage collection fees has caused the exclusion of important segments of the urban population, particularly the poorest, from sewage collection and treatment. This is one of the factors that contributes to the deterioration of coral reefs. It is recommended that more flexibility be given to the fees structure so that a much greater proportion of the urban population is integrated in the system.

100. Mangroves play an important role in retaining and filtering run-off and other pollutants, thus preventing them from reaching the coral reefs. Although mangroves have been so far preserved in most places, in areas immediate to the coast, particularly near the main cities and near the rivers in main agricultural areas, mangrove destruction constitutes a serious problem. To a large extent, this is due to lack of enforcement of regulations that protect mangroves within 66 feet from the coast line and rivers. It is recommended that such regulation be strictly enforced without exceptions.

101. The Government needs to continue to work with the private sector, including the many NGOs involved in management of natural assets, to formulate a development strategy for the sustainable expansion of the tourism sector. Given current concerns about the health of the reef in areas where it is most under stress, the sector strategy should consist of mitigation measures for existing tourist areas, together with a diversion of new investments to other areas better able to absorb their development impacts. Current requirements for environmental impact assessments must be strictly applied to tourism projects, including enforcement of setback measures for tourism-related construction and prevention of pollution from sewage discharges and solid waste. More targeted measures will be required to ensure that the carrying capacity of existing tourist assets is not exceeded. Fiscal incentives, which are currently granted liberally, could be targeted only for the new areas to be developed. Infrastructure investments in existing

tourist areas should be limited to mitigation, e.g., solid waste management, sewerage systems where relevant, while infrastructure that would facilitate access should be for new tourism areas. Local residents in tourist areas should all be given access to such investments, even if this entails differential pricing of the service, to preserve acceptance of tourism by locals and to improve public health in tourist areas.

102. The strategy should also include measures to encourage community-based tourism where this involves the protection of an asset that generates revenues for the community, such as archaeological sites and nature reserves. Tourists give "souvenirs" in Belize the lowest ranking for "good value for money." Since an objective of tourism is to induce tourists to spend as much as possible during their stay, the development of a souvenir industry would meet this objective and generate income and employment.

103. Recent sample surveys indicate that tourists are (i) willing to pay for the use and conservation of the reef, provided that the ensuing revenues are earmarked for conservation of the coastal zone, and (ii) much more satisfied with Belize's natural assets than with its supporting hotels and service and transport facilities. The Government will need to ensure that the tourists' willingness to pay for use of the natural assets is maximized for conservation purposes, rather than by the private sector for inferior accommodation and services. Current measures, by the Belize Tourism Board and the Belize Tourism Industry Association, to classify tourist accommodation, license guides and encourage environmental consciousness among tourism entrepreneurs, will help to improve the quality and efficiency of the tourism product. The sustainable development of tourism will depend on the guidance and incentives provided by the Government to the private sector.

104. Efforts to involve the fishermen cooperatives in improving the management of the industry should continue. The fishermen as a group are the most direct beneficiaries of sustainable fishing practices. Their organizations can, therefore, become important organisms for management, monitoring and enforcement of agreed regulation. The advantage of involving fisheries organizations is that it could lead to a substantially decreased role for the Fisheries Department in the above endeavors. Given the limited availability of resources of the Fisheries Department, this should be an important consideration to fully incorporate fishermen organizations into the management of fish resources.

D. Improving water resource and waste management

105. Sanitation in the rural areas, particularly in the south, is highly deficient with less than 30% of the population having access to adequate sanitation facilities. This is a potential source of disease and water contamination involving significant social costs. Various potential projects for increasing rural sanitation have been developed by the Government of Belize in conjunction with international organizations. The Social Investment Fund is likely to fund some of the rural infrastructure investments. It is recommended that the feasibility and cost-benefit analyses of these projects be rapidly carried out so that implementation of those with the highest rate of return be initiated.

106. Poor disposal of both industrial and municipal solid waste has become a serious problem for Belize that could have negative consequences for the tourist industries and can affect the

health of the population. The major problem areas are agro-industrial waste and municipal waste in the cayes and other coastal zones. No solid waste management authority exists in Belize despite the Solid Waste Management Act of 1991 having called for its establishment. The creation of such an institution is one of the urgent measures that should be undertaken. This is particularly important given that feasibility studies for potential solid waste management projects with international financial support are under way. Regarding industrial effluents, to improve the effectiveness of recently approved regulations fees need to be linked to the amount of pollution produced.

E. Controlling environment-related diseases

107. The high direct and indirect costs for the Belizean economy of environment-related diseases suggest that measures or investment projects to reduce them may potentially have a high payoff. The fact that Belize is behind many countries in the region in terms of rural availability of potable water and sanitation would indicate that consideration should be given to studying the feasibility of expanding and improving the rural services.

108. As important as expanding the rural water/sanitation system is the need for an effective public health extension and education campaign. The experience in other countries suggests that health education can be cost effective in decreasing the incidence of environment-related diseases. Relatively inexpensive measures to decrease the risks of such diseases by using more hygienic practices should be adopted. Teaching simple precautions about food preparation such as hand-washing and boiling the water, quarantining sick family members, and disposing of waste hygienically has proven to be a very effective approach to significantly reduce gastrointestinal diseases, including cholera. Education on reproductive diseases and family planning should also be included.

109. Improving the malaria control system should be another important priority for the Government. Given the high cost-effectiveness of house spraying against the disease-transmitting mosquito, an expansion of the spraying program into high risk areas such as refugees' and laborers' camps is recommended. The targeting of the spraying program could be substantially increased by certain new technologies available such as the use of satellite data combined with field surveillance to obtain a more accurate map of high risk areas. Also, the public education campaign proposed above could include information about certain practices that could decrease the incidence of malaria such as using bed nets and other simple procedures to decrease exposure to the disease vector.

F. Breaking the poverty-environmental degradation cycle

110. The cycle of poverty-environmental degradation can only be broken by a combination of measures that attack the problem at its roots. The fact that there is a clear identification of the population living in poverty that have a high degree of economic dependence on environmental resources facilitates the targeting of the required policies and decreases their cost. The group consists of small farmers (both milpa and non-milpa) of Mayan origin and Central American Spanish-speaking immigrants. Most of them live in the Cayo and Toledo districts.

111.. Another measure should be to eliminate institutional conditions that tend to encourage unsustainable practices and further deforestation. In particular, it is recommended that definitive legal property rights be provided to small farmers and Mayan communities. This will provide farmers with greater incentives to protect their lands and to use more sustainable practices.

112. Additionally, voluntary relocation of certain Mayan communities to nearby agricultural areas that are less fragile is recommended. Several communities in Toledo would be willing to relocate to better public lands where continuous agriculture is feasible if they have government assistance. In various instances, the potential new agricultural areas are located in the proximity of the villages, and thus the reallocation would cause very little social disruption among the communities and the cost for the Government would be quite moderate. Most farmers would not need to resettle their homes because the new lands are at commuting distances from the villages.

113. Measures that improve the water and sanitary infrastructure and the health education campaign to improve environmental health should play an important role in improving the living conditions of poor farm workers and small producers. Also, there is a need for a thorough study of the potential health impact of various environmental risks facing farm workers, particularly in the banana, citrus and sugar industries. Recent efforts to resettle banana workers to safer areas should be promoted by the Government.

G. Strengthening the institutional capacity

114. The Government should appoint a high level independent commission to propose a restructuring and reallocation of financial and personnel resources across ministries and departments with environmental responsibilities. A timetable to implement the recommendations of such a commission should be developed. Also, there are major institutional changes that need to be implemented very soon. There is an urgent need to increase the capacity and resources of the DOE, including through its restructuring, so that it can develop the essential regulations to start implementing the EPA. Efforts should be made to reallocate resources from other departments. The restructuring of the Department of Lands and Surveys, currently charged with the land allocation process, should be considered to ensure transparency. One option is to consider a personnel rotation system so that each staff would not be involved in the process for, say, more than three years. Finally, in order to ensure more effective inter-sectoral coordination within the Government, the Government should establish a high-level, inter-ministerial Coordination Committee on Environment.

May 30, 1996/LA3C2

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Annex I

BELIZE

Land Use and Land Allocation

May 30, 1996

World Bank
Caribbean Division
Country Department III
Latin America and the Caribbean Region

Contents

Abbreviations

CARICOM	Caribbean Community
CEDS	Conservation and Environmental Data System
CSO	Central Statistics Office
ECU	European currency unit
FAO	Food and Agriculture Organization of the United Nations
FPMP	Forest Planning and Management Project
GIS	Geographic Information System
GRO	General Registry Ordinance
GPS	Global Positioning System
IDB	Inter-American Development Bank
IICA	Inter-American Institute for Cooperation on Agriculture
LIC	Land Information Center
LIS	Land Information System
LUA	Land Utilization Authority
MNR	Ministry of Natural Reosurces
MOA	Ministry of Agriculture
NAFTA	North American Free Trade Agreement
NARMAP	National Resources Management and Protection Project
NGO	Non-Governmental Organization
NPASP	National Protected Areas System Plan
NPV	Net present value
NRI	National Resource Institute
ODA	Overseas Development Agency
SDA	Special Development Area
UNHCR	United Nations High Commission for Refugees
USAID	United States Agency for International Development

Summary

With an estimated population in 1994 of 209,000 and a density of only 23.6 persons per square mile, it is not surprising that conventional wisdom suggests that Belize is unique among its neighbors in terms of available land resources. This widely held perception is reflected in attitudes towards land in Belize and the approach taken to land allocation. However, there is mounting evidence to suggest that land pressure[1] is increasing in certain areas (see Appendix Map 1), commonly reflecting competition for agricultural land, land suitable for housing and tourist-related development.

In light of this growing demand, Government needs to re-examine its policy towards land allocation, recognize that the land of Belize is a finite and fragile resource and take steps to ensure that it is utilized to its full potential in a sustainable manner. As well as improvements to farming systems, this will require a comprehensive revision of land allocation practices, the strengthening of physical planning capabilities and a shift from regulation to the use of economic incentives as the principal means of influencing land allocation and use.

This technical annex will examine the demand for land in Belize, concentrating on the main source of pressure—agricultural land use—and will focus on the land allocation process.

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[1] Land pressure being defined as land use conflict or high land demand, largely attributable to:

a) agricultural expansion - the growth of commercial and smallholder agricultural activities.
b) the limited availability of suitable agricultural land in areas of high demand.
c) the proximity of existing protected areas to areas of high land demand.
d) demand for land for urban/housing development (sub-division).
e) tourist-related development.

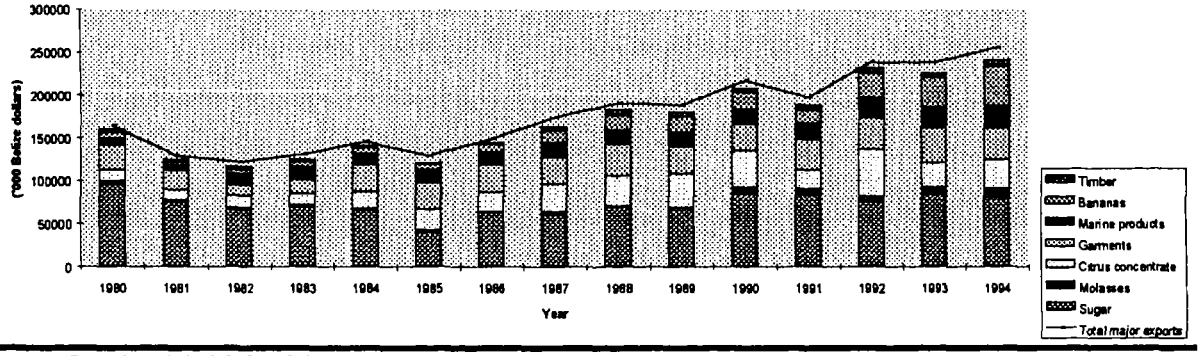
1 *Land use and agricultural expansion in Belize*

Agricultural expansion - overview

The economy of Belize is currently extremely dependent on its natural resource base. The agricultural sector remains very important to overall macroeconomic performance, both in terms of growth, employment and the current account balance (Figure 1.1). The sector is heavily dependent on external trade and is vulnerable to external shocks based on possible changes to the preferential arrangements for the three primary agricultural exports: sugar, citrus (orange and grapefruit) concentrate and bananas. These are exported under preferential trade agreements with the European Community, CARICOM and the United States. In 1994, total exports of these commodities accounted for approximately 82%. In the future, pressure on land resources from these activities will depend to a considerable extent on external forces.

The total land area of Belize is approximately 5,672 million acres (22,790 km^2). Of this, some 35% is set aside as national or private forest reserves, wildlife sanctuaries, national parks, marine reserves, nature reserves, archeological reserves, national monuments or private reserves (Barnes, 1995).

Figure I.1 - Major Domestic Exports 1980-1994



Source: Central Statistical Office, Belize.

Belize has a diverse and complex agricultural production system, ranging from semi-subsistence slash and burn (milpa) through to large commercial concerns. These farming systems and their associated crops owe their distribution (Appendix Map 2) to a number of factors, including climate, soil characteristics, access to processing facilities and cultural/historical factors. According to King, et al. (1993), only 16% of the land in Belize is suitable for sustained agricultural production without skilled management (see Table 1.1).[2]

Appendix Map 3 shows the distribution of agricultural potential in Belize. Most of the high potential agricultural land is either already under cultivation (approximately 33%), or held undeveloped as public or private land (include secondary growth and fallow; 67% combined). It is important to note that most of the latter lies north of the Western Highway, not in the

[2] This analysis is based on the results of a series of Land Resource Assessments carried out by NRI from 1986 - 1992. The same data are used in Appendix Map 3.

areas experiencing significant land pressure. Further, it is also clear that there is very little viable agricultural land (reportedly, only 7,000 acres) within the existing protected areas or forest reserves.

Table 1.1 Agricultural potential and the area under cultivation (1989/92)

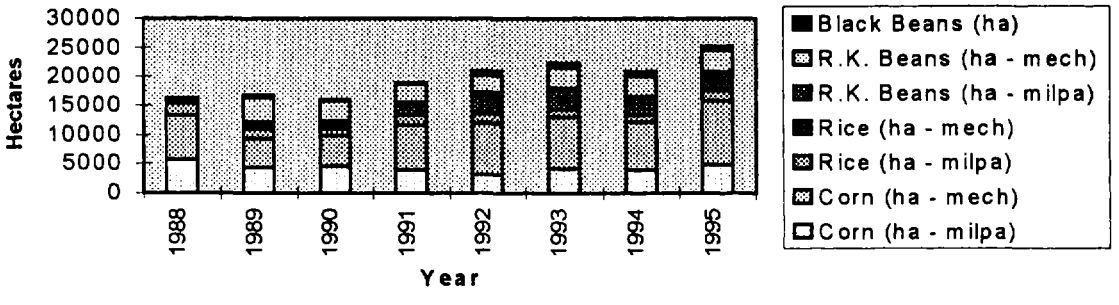
Class	*Agricultural Potential*	*Area (km2)*	*% of total land area*	*Area (km2) already in cultivation*[a]	*% Area already in cultivation*
1	High income potential	990	4	321.24	32
2	Good chance of financial success	2,790	12	949.44	34
3	Success subject to skilled management	4,480	20	327.52	7
4	Marginal, even with skilled management	4,670	20	323.15	7
5	Steep slopes	10,040	44	167.39	2
Total		**22,970**	**100**	**2088.74**	

a. Based on GIS analysis of Land Use 1989/92 and Agricultural value (from King, 1993).
Source: King, R.B., J.H. Pratt, M.P. Warner, and S.A. Zisman (1996). *Mission findings.*

Small farmer agriculture

Milpa farming. Milpa farming is an agricultural system in which forest land is cut and burned, cropped for one or more seasons and then left in fallow for a period. Milpa farming is usually carried out on hillsides and typically consists of corn, grown during the wet season and a variety of other crops (including beans, vegetables, root crops, squash and plantains) grown in the subsequent dry season. In the flat areas rice is commonly substituted for corn as the main wet season crop, with corn being grown in the dry season (Figure 1.2).

Figure 1.2 - Staples - Area Under Production 1988-1995



Source: Ministry of Agriculture, Central Statistical Office.

Milpa farming is found throughout Belize and is the basic system used to produce food for domestic consumption and to supplement income generating activities, which may include commercial production of citrus, sugar-cane, vegetables or other cash crops. In areas where land is plentiful, milpa farming is, for the most part, a thoroughly sustainable farming system (King, 1993). However, sustainability depends largely on sufficient land being available to allow for an extended fallow period. Pulver and Nolan (1994) note that in the Toledo Uplands ('A' on Appendix Map 1), the fallow has fallen from an average of 8 years to 5.2 years.

Over the last twenty years, several major agricultural projects have attempted to introduce commercially marketable alternative crops-both to raise living standards, and to decrease the dependence on subsistence cropping. These projects have largely failed to achieve their aims, primarily due to problems with marketing and failure to adequately reconcile the proposed alternatives with the existing farming systems and cultural characteristics (Richards, 1994, IICA, 1995).

More recently, the Sustainable Agriculture Programme of the NARMAP project has successfully introduced a revised milpa system based on the use of a managed fallow. The project has concentrated on three areas of high land conflict—the Toledo Uplands ('A' on Appendix Map 1), Cayo District ('B' and 'C'), and the Stann Creek Valley ('D'). Pulver and Nolan (1994) note that agriculture is having a negative impact in these areas, reflected in :

- encroachment into protected areas and forest reserves, notably Vaca forest reserve ('E' on Appendix Map 1), Mountain Pine Ridge ('F') and Columbia River ('G');
- hillside clearance for citrus in the Stann Creek Valley;
- deforestation and declining fallow period for slash/burn agriculture in Toledo.

The general conclusion of the NARMAP study was that milpa farmers primarily practice shifting cultivation due to lack of awareness regarding the use of inputs and management practices and, as land use intensity and productivity are both low, an average farming family needs access to a large area of land. The study concludes that if the trend in population growth continues, and there is no change in agricultural practices, the demand for land will continue to grow (in the areas studied), the rate of encroachment will increase and the fallow period will shorten.

The NARMAP study notes that a move from shifting cultivation to some form of sedentary agriculture is a necessity.[3] However, intensification must be carried out in the context of the fragile nature of the land in question and the potential impact of agro-chemical inputs on water bodies, drinking supply and the barrier reef. With regard to the application of the revised milpa system, Pulver and Nolan (1994) note, that even if the extremely appropriate use of technology (as developed under SAP) is completely successful, the resultant productivity increases can only satisfy land demand for about the next ten years.

King, et al. (1993), suggest that alternative crops attempted under various donor projects have been constrained by isolation from national markets, limited development of external markets and lack of awareness of market possibilities. In the context of the Toledo uplands—a key area of concern, they found that most cooperative groups tended to concentrate on a narrow range of specialized products, creating oversupply, a drop in farmgate prices, increased demand for land, landlessness and disillusionment.

King notes that there is considerable scope for alternative income based on eco-tourism and that, if this becomes more profitable that agriculture, "forest-need" might become more important than land need. However, ironically, the currently profitable community-based

[3] NARMAP estimate that without such improvements agriculture in Cayo will require an additional 18,000 acres by 2010 while, with improved practices this could be reduced to 4,251.

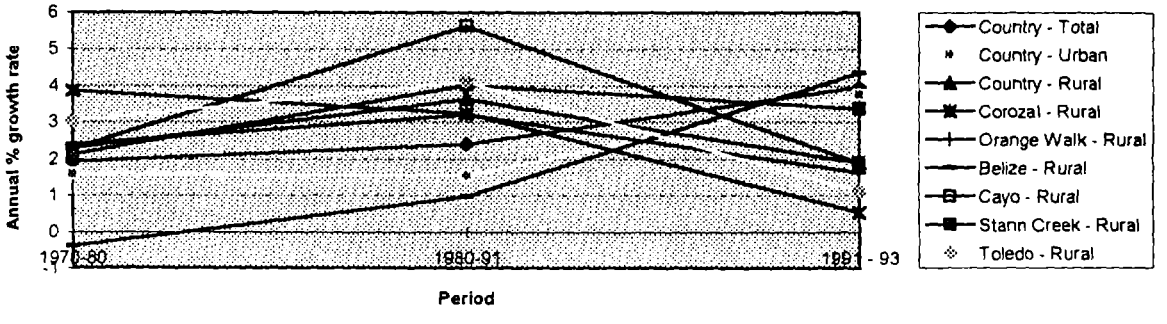
tourism projects are actually creating a demand for agricultural land due to the need to feed tourists.

A recent IICA Sector Study (1995) while agreeing with these assessments notes that, to be successful, strategies for increasing commercialization in these areas need to be approached in a comprehensive manner with consideration given to the characteristics of existing farming systems as possible, environmental and social consequences. They suggest that this has rarely been the case, with projects frequently being overly identified with particular agronomic innovations. They conclude that any significant improvement in small farmer agriculture will require the use of appropriate incentives and strong support services—to induce farmers to either shift into new activities and/or adopt improved technologies and practices. The government, IICA argue, must therefore agree on an agricultural policy framework and provide essential services including agricultural extension, affordable credit, marketing advice and plant and animal health services.

Population pressure and demand for land. Population is not normally conceived of as a problem in Belize. The country has one of the lowest population densities and growth rates (2.6% in the 1990s) in the region. However, Pulver and Nolan, (1994) note this growth is largely concentrated in rural areas[4] and, when combined with the extremely high fertility rates (4.9 live births per woman in 1992), suggest that Belize does indeed have a population growth rate problem.

However, there is tentative evidence (Figure 1.3) that the rate of growth has decreased significantly in some rural areas in the past three years. Much of this is probably due to a reduction in the level of immigration. The 1980s were a period of rapid immigration into Belize from Guatemala and El Salvador. UNHCR estimated in 1993 some 31,000 immigrants of varying status in Belize (Table 1.2). In comparison, UNHCR report only 12 new cases last year, and increasing interest in repatriation among established refugees. Further, officials from the Forest Department and NGO community report a decrease in cross-border incursion into the forested area.

Figure 1.3 - Population Growth Rates 1970 - 93



Note: Figures for 1992, 1993 are based on mid-year estimates.
Source: Central Statistical Office.

[4] Pulver and Nolan quote rates of 1.5% in urban areas and 3.4% in rural areas for 1980-91.

Table 1.2 - Immigrants and Refugees: 1993

District	*Belizean*	*Immigrants*	*% of total dist. pop*	*Undocumented*	*% of Undocumented*	*Refugees*	*% of total Refugees*
	No.	No.	%	No.	%	No.	%
Belize	79,743	6,950	8.7	1,155	18.9	1,080	16.8
Cayo	31,932	11,004	34.5	1,852	30.3	2,699	42.2
Corozal	27,400	2,445	8.2	730	11.9	454	7.1
Orange Walk	31,225	3,730	10.7	719	11.7	1,093	17.1
Stann Creek	18,151	4,174	18.7	1,418	23.2	626	9.8
Toledo	16,967	2,531	13.0	247	4.0	450	7.0
Total	**205,418**	**30,834**	**13.0**	**6,121**	**100**	**6,402**	**100**

Source: UNHCR (1993).

Perhaps of more concern, in the long term, is the fact that 44% of the population is under 14 years of age. Given that agriculture is likely to remain the principal source of economic activity and employment for the foreseeable future, the demand for land will likely continue to increase in the coming years.

Table 1.3 - Potential Agricultural Land by District (including protected areas and forest reserves)

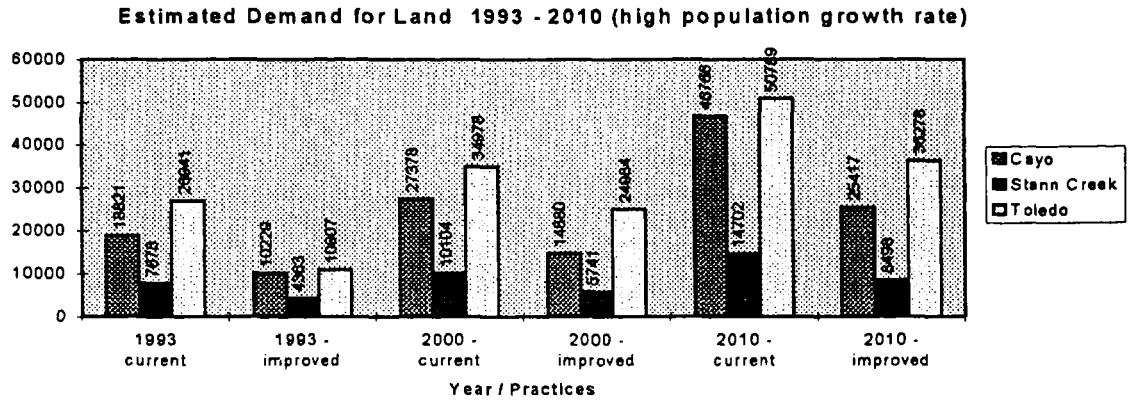
District	*Total Area (ha)*	*Grade 1 (ha)*	*% Grade 1*	*Grade 2 (ha)*	*% Grade 2*	*Grade 3 (ha)*	*% Grade 3*
Corozal	185,962	0	0	74560	40	25834	13
Orange Walk	463,610	641	<1	121782	26	155457	33
Belize	430,717	17355	4	26349	6	66923	15
Cayo	519,554	41564	8	26186	5	80008	15
Stann Creek	255,374	12768	5	18642	7	19265	7
Toledo	441,336	26599	6	11964	3	100699	23
Total	**2,296,553**	**98930**		**279484**		**448189**	

Source: Mission findings based on King et al, 1993.

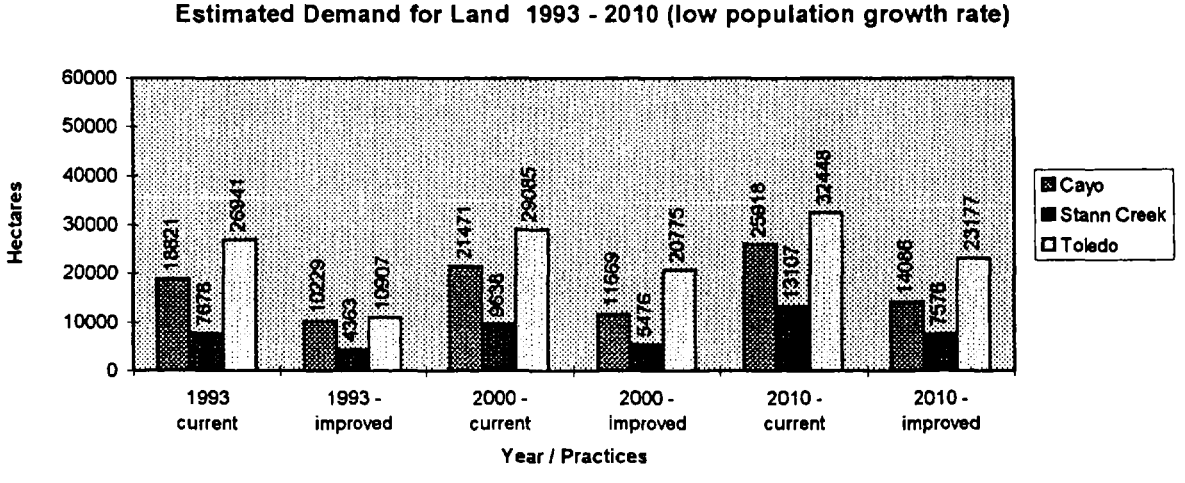
Table 1.3 shows potential agricultural land by district, according to the classification developed by King, et al. (1993) (see Table 1.1). If compared with estimated demand, calculated here only for the southern districts (Figure 1.4), it is clear that, even assuming uniform distribution of demand,[5] high population growth and existing agricultural practices will result in complete utilization of high potential (grade 1 and 2) land by the year 2010. Extensive commercial agriculture will likely increase pressure and competition for these resources. This has particular consequences in the context of the proposed upgrade of the Southern Highway, predicted to increase demand for land suitable for commercial agriculture in these areas.

[5] As King, et al. (1995) note, the distributional effects of land demand depends not only on population growth but include the size of the local market and the variable price of agricultural exports.

Figure 1.4 - Estimated Demand for Land - 1993 - 2010



Notes
1. High Growth rates: Cayo (5.5%), Stann Creek (4%), Toledo (3.8%).
2. District agricultural land calculated based on No. of Agric Families x Av. farm size.
3. Current land use intensity: Cayo (27.6ac), Stann Creek (17.3ac), Toledo (35ac).
4. Improved land use intensity: Cayo (15ac), Stann Creek (10ac), Toledo (25ac).
Source: Central Statistical Office, Pulver and Nolan, 1995.



Notes:
1. Low Growth rates: Cayo (1.9%), Stann Creek (3.3%), Toledo (1.1%) based on CSO mid-year population estimates 1991-1993.
2. District agricultural land calculated based on No. of Agric Families x Av. farm size.
3. Current land use intensity: Cayo (27.6ac), Stann Creek (17.3ac), Toledo (35ac).
4. Improved land use intensity: Cayo (15ac), Stann Creek (10ac), Toledo (25ac).
Source: Central Statistical Office, Pulver and Nolan, 1995.

Commercial agriculture

Export crops are produced by small-medium size farm units as well as large modern plantations. In total it is estimated there were about 135,000 acres under export crops[6] in 1994, up from the estimated 120,000 in 1991.

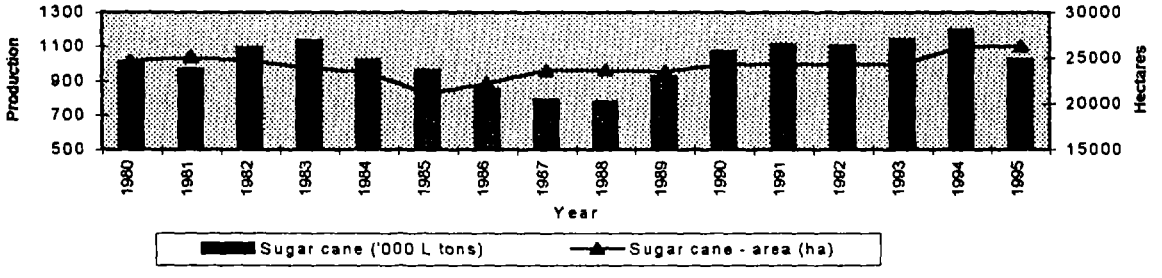
Sugar-cane. Sugar-cane is highly concentrated in the northern districts of Corozal and Orange Walk. Cane is cultivated by around 5,300 small farmers. Processing efficiency for

[6] Sugar-cane (60,000 ac), Cocoa (1,465 ac), Oranges (55,403 ac), Grapefruit (14,000 ac), Banana (4,353 ac).

sugar production is very high, although until recently yields were among the lowest in the region, ranging from 37 to 39 metric tones per hectare. Attempts to diversify agriculture in the region have largely failed due to marketing and production/quality problems.

After suffering a severe price collapse during the late 1980's, the sugar industry has now completely recovered (Figure 1.5). Recent expansion (from 24,000 up to 26,000 hectares) is reportedly occurring largely in the marginal land to the west of the existing cultivation (Appendix Map 3). However, no dramatic expansion of the area under cane is predicted, the productive area being closely related to the amount of sugar allowed under the preferential trade agreement.

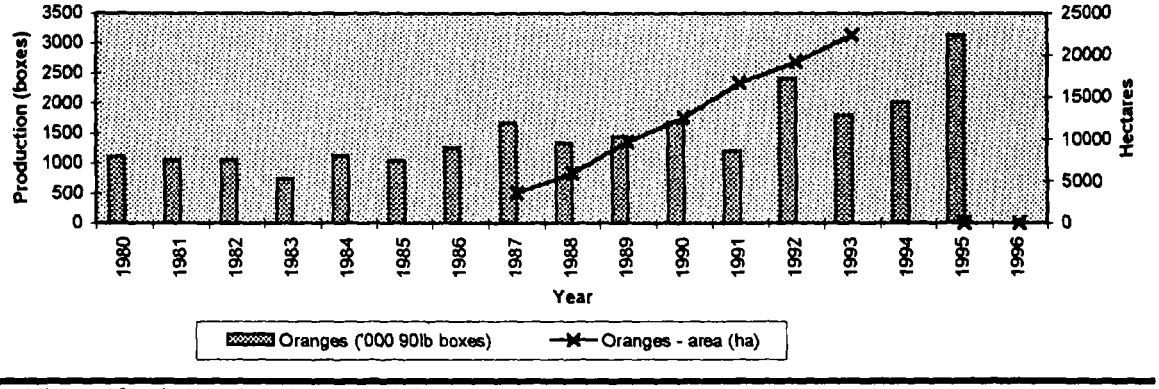
Figure 1.5 - Sugar-cane - Production and Area Under Cultivation 1980 - 94



Source: Ministry of Agriculture, Central Statistical Office.

Citrus. Citrus (orange and grapefruit) is cultivated primarily in the Stann Creek valley, in close proximity to the two processing facilities at Pomona and Alta Vista. Improvements to several major roads in recent years, coupled with favorable economic returns have resulted in expansion of the area under cultivation (Figure 1.6) into the Belize River valley and, increasingly down the Southern Highway, often on lands of only marginal suitability. The proposed expansion of the Southern Highway will likely lead to the expansion of citrus cultivation along the highway and into the highly suitable lands of the Toledo uplands.

Figure 1.6 - Oranges - Production and Area Under Cultivation 1980 - 1996



Source: Ministry Of Agriculture, Central Statistical Office.

Muraro and Rose (1994) note that the dramatic increase in the acreage under citrus acreage seen, in among others, Brazil, South Florida and Belize during the 1980's was a clear response to improved returns. As a result, world supply is projected to increase rapidly with the associated effect on prices. To survive in this environment, the citrus producers of Belize will need to be cost efficient while maintaining quality. It is likely that only producers with considerable management expertise, appropriate economies of scale and advantageous location can succeed. Interestingly, Muraro and Rose note that it is the medium sized growers (greater than 10 acres) who are most likely to experience difficulties, the small farmer being able to avoid labor costs and to continue using citrus as a source of supplementary income.

In their analysis, Muraro and Rose point out that there are several factors which combine to suggest that demand for the high quality concentrate produced in Belize should remain relatively stable. These include the gradual reduction of imports from Mexico to the US under NAFTA and the GATT trade agreement. They argue that these agreements may actually increase demand for citrus concentrate from Belize, as the variety and timing of harvest are extremely appropriate to the current system of blending of low (domestic) and high (imported) quality juices by Florida processors. This is supported by other NARMAP studies (1993, 1994) which conclude that, while the citrus price is liable to remain low (around BZ$6/box) until the end of the decade, Belize should have little difficulty in marketing it at this price.

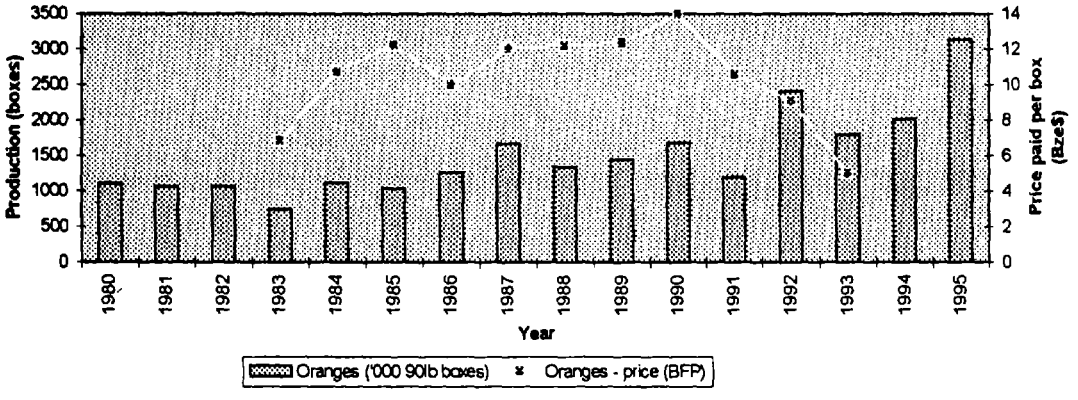
The expansion of citrus onto marginal lands. Until the 1980's, 90% of citrus production was concentrated in the Stann Creek Valley (King, et al., 1994) and was characterized by relatively low levels of chemical inputs due largely to the suitability of the flat valley lands and the low return available at the time. Increased prices (see Figure 1.7), experienced throughout the 1980's led to a dramatic increase in the area under cultivation, including the use of steep slopes and marginal soils in and around the core area (the Stann Creek valley). The latter are of variable quality but are generally well suited to citrus if high levels of management are applied (notably relating to drainage and fertilizer application). However, this marginal cultivation is likely to prove uneconomic if the price paid for citrus remains low for any protracted period.

Increased farming activity on the steep slopes both within and above the valley towards Belmopan is a cause of growing concern (King, et al., 1993). Many of the settlements in these areas have been established with the help of the UN High Commission for Refugees although some incomers have been drawn by employment prospects in the citrus industry. Many of these milperos maintain their farms as a source of food security while others are attracted by the ease of access accorded by the road. In general, clearance of the steep mid-slopes is in response to the shortage of other available land, most land being in private hands and/or involved in citrus production. Tenure in these areas is characterized by Government leases (of between 20-50 acres), leases of land from land-holding companies, sublets from individual Belizean leases and illegal squatting. Continued clearance of these steep slopes threatens protected areas (and forest reserves) and risks soil erosion.

A study undertaken by NARMAP (Pulver and Arya, 1993) found that farms in the Stann Creek Valley clear on average 5.4 acres/year, and favor continuous cultivation (82% of farmers) over shifting cultivation (18%). Most of the cleared land is either planted in citrus or

cropped for a year prior to planting, the most important grain crop being corn (72% of farmers). While being generally knowledgeable regarding conservation practices, only around 25% actually practiced them in any form. The study reported that the use of steep slopes not only reduces tree growth by 50% (possibly due to shallow soils), but also increases labor costs (again by 50%). The study recommended that land use conditions, if stipulated as a condition for a Government lease would have a positive impact on natural resource utilization. In the study area, this would affect 50% of those sampled and restrict their migration onto steeper slopes. As they conclude, 'more fragile lands will be cleared and exposed to rapid degradation if efforts are not directed to protect these marginal areas. Combining land-use requirements with tenure rights offers the opportunity for preserving these ecologies."

Figure 1.7 - Orange Production and Price per box 1980 - 1995



Source:: Ministry of Agriculture, Central Statistical Office.

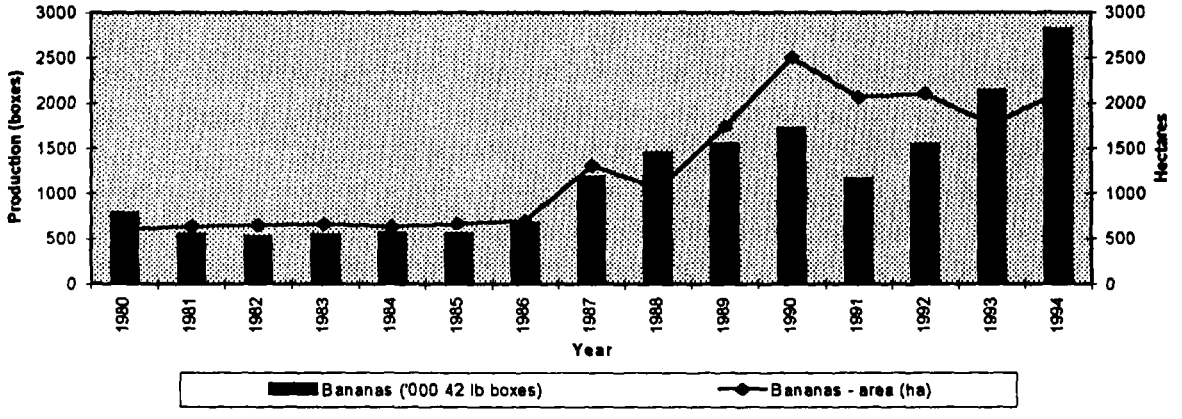
Banana. Banana production is concentrated in the Stann Creek and Toledo districts where the total area farmed is around 2,400 hectares (Figure 1.8). The principal period of growth in the industry occurred between 1985 and 1995. During this period, and in spite of a series of financial setbacks caused by the cumulative effect of disease and extreme weather, output increased significantly, from 0.6 million boxes (42 lb. each) to around 2.7 million boxes. The total area farmed expanded from around 360 ha to 2,400 ha in 1995. Much of this expansion can be attributed to the planting of disease resistant varieties in the 1970's, the opening of the deep water port facility at Big Creek and the guaranteed market resulting from a long-term commitment from Fyffes Group Ltd., and higher prices under the 40,000 (now 55,000) ton EU preferential quota.[7]

Banana production in Belize is not as competitive as that of other regional producers. Yields are generally lower (50-60% of that found elsewhere), production costs higher (by 30-40%). Production is affected by poor management practices, especially related to drainage and irrigation, and the constant threat of Black Sigatoga disease and cold weather. With the help of a 2.5 million ECU grant, significant improvements have been made in infrastructure, irrigation and quality control, which according to the Ministry of Agriculture, have in turn, contributed to increased yields. King, et al. (1993), estimate that, based on land already

[7] IICA Belize: Agricultural Sector Study, 1995.

acquired by farmers, the industry could expand to a productive area of around 4000 ha, yielding around 4 million boxes annually.

Figure 1.8 - Bananas - Production and Area Under Cultivation 1980-94



Source: Ministry of Agriculture, Central Statistical Office.

Mechanized arable. Corn (maize) is grown to meet domestic requirements both for human consumption and for blending in poultry and pig feed. Belize is self-sufficient in corn, largely due to the mechanized production of the Mennonites in the Orange Walk, Cayo and Corozal Districts. The Ministry of Agriculture estimate that around 11,000 hectares are under mechanized production (as compared with 5,000 under milpa corn). The area under production is increasing quite rapidly, particularly in the Orange Walk District.

Mechanized *rice* production is concentrated in the Toledo and Orange Walk Districts. Mechanized production (rainfed and lowland) brings about twice the yield of upland milpa rice production, although this has fluctuated in the past few years due to weather and other production difficulties. However, the area under mechanized production has grown to 3,000 hectares. Production is heavily subsidized and yields are generally low and of poor quality. Several studies suggest that these difficulties can be overcome but it remains to be seen whether this can be achieved prior to removal of the subsidy.

The area under *pasture* is not thought to have expanded significantly since the last major expansion in the early 1980's. Indeed, anecdotal evidence suggests that much of the unimproved grassland in the Cayo and Orange Walk districts has been converted to other commercial crops or reverted to secondary bush (King, et al., 1993). King reports that in 1985 the area under pasture was around 48,000 hectares, and that around a third of this could be regarded as improved.

King also notes that the stocking rate of cattle/acre had dropped significantly and that this offered scope for intensification. He suggested that any increase in the area under pasture should await identification of new markets for products and the establishment of appropriate processing facilities.

Sorghum production has remained constant at around 10-14 million lb. grown on around 1,800 hectares. Production is almost exclusively by Mennonites and used for pig and poultry feed.

Red kidney beans are grown primarily on large mechanized farms by the Mennonites. These are primarily exported to Jamaica. The area under production has remained relatively stable at around 3,800 hectares.

Agricultural production and the upgrading of the Southern Highway. The proposed upgrade of the Southern Highway from Dangriga to Punta Gorda is a central feature of the Government's strategy of encouraging economic development in the southern region (King, Harrison and Wright, 1995). This region, comprising the southern half of Stann Creek district and Toledo district is the poorest and least developed in the country. A recent poverty assessment[8] found that 40% of the South could be classified as "poor" (34.6% nationwide) with 23.6 classified as "indigent" (14.7% nationwide).

Having only rudimentary infrastructure, the region is isolated from the mainstream of national decision-making and development. Settlement is highly dispersed with much of the local population located in rural settlements.

This isolation is exacerbated by ethnic diversity. This includes the traditional social organization of the Maya; through the transient communities of migrant labor around agro-industrial plantations in the south of Stann Creek; to the mixed farming settlements, and more urban lifestyles of the Creole, Garifuna and people of East Indian descent.

The upgraded Southern Highway is likely to accelerate the pace of development in southern Belize and integrate it more closely with national and regional socio-economic advancement. The project feasibility study (DHV Consultants, 1994) indicated a 20% rate of return on investment for the road, and envisaged additional economic growth, especially in the agro-industrial and tourism sectors (Table 1.4). Benefits, however, may be distributed unevenly, and are expected to accrue mainly to large enterprises, rather than to small farmers, entrepreneurs or labor. King, et al., note that this increased competition for natural resources could adversely affect some groups and communities and increase the environmental vulnerability of some areas.

Table 1.4 - Distribution of highway rehabilitation benefits by sector
(BZ$ 1,000s)

Sector	*Year 2000*	*Year 2015*	*NPV at 12%*
BENEFITS:			
Agriculture	2,769	4,757	19,477
Estate Crops	1,958	3,259	13,498
Mechanized farming	204	309	1,276
Milpa	20	55	144
Subsistence farming	0	0	0
Forestry	0	0	0
Pisciculture	587	1,134	4,559
Tourism	84	169	619
ADDITIONAL COSTS:			
Feeder roads	177	177	1,006
Agricultural extension	764	764	4,486
Public services	660	712	3,909
TOTAL (net)	**1,253**	**3,273**	**10,695**

Source: DHV Consultants, October 1994.

[8] Kairi Consultants Ltd for the Caribbean Development Bank, Draft Report, December 1995.

Pressure on natural resources resulting from agro-industrial expansion, tourism development and population growth from migration are identified as the greatest potential sources of discord between existing patterns of life and projections of social transformation. In particular there are serious concerns regarding the potential for social disruption and environmental degradation if measures to mitigate the impact of the road are not instituted. The areas of gravest concern, according to King, Harrison and Wright (1995) are: (i) The impact of change on the traditional social organization of the Maya, especially in respect of security of land rights, livelihood and cultural identity; (ii) The impact of change on fragile environments and habitats resulting from natural resource exploitation and the development of tourism; (iii) The potential for loss of biodiversity; (iv) The cost implications of the provision of public services.

2. Land allocation

Overview

Land allocation in Belize is complicated by the number, and characteristics of, the legal and administrative systems used to manage it. These have traditionally been heavily dependent on government intervention and resources. Recently, constraints in the latter, and the increasing demand for land, have highlighted a number of bottlenecks in the system. As a result, the de facto process of land allocation has become increasingly ad hoc and discretionary, leading to environmental problems relating to the management of protected areas, soil conservation and the sustainability of agricultural production.

Table 2.1 - Land tenure in Belize

	Corozal	*Orange Walk*	*Belize*[f]	*Cayo*	*Stann Creek*	*Toledo*	*Total*	*Total (%)*
National Land								
Forest Reserves[a]	39,526	20,670	77,726	436,801	179,979	288,349	1,043,051	18.38
Other reserves/ protected areas[a]	0	016,305	36,255	300,326	100,238	204,898	658,022	11.59
Lease - urban	825	1,043	11,186	8,005	735	346	22,140	0.39
Lease - rural[b]	N/A	N/A	N/A	N/A	N/A	N/A	609,646	10.74
Other	25,836[c]	274,084[c]	491,850[c]	177,965[c]	193,097[c]	388,956[c]	944,142	16.64
	66,187	314,102	617,017	923,097	474,049	882,549	3,277,001	57.75
Private Land								
Reserves	18,840	245,823	14,454	0	0	0	279,117	4.92
Large parcels (>100ac)[d]	294,313	552,852	359,573	306,984	141,905	169,724	1,825,351	32.17
Small parcels (<100ac)	79,827	32,376	68,482	50,328	14,771	38,139	283,923	5.00
Urban	353	447	4,794	3,431	315	148	9,488	0.17
Total Priv.Land	**393,333**	**831,498**	**447,303**	**360,743**	**156,991**	**208,011**	**2,397,879**	**42.25**
TOTAL	**459,520**	**1,145,600**	**1,064,320**	**1,283,840**	**631,040**	**1,090,560**	**5,674,880**	**100.00**

a. Land Information Center, Department of Lands and Surveys.
b. National Estates Office, Department of Lands and Surveys - no data for individual districts.
c. Rural lease and other national land combined.
d. Extracted from tax rolls.
Source: Adapted from Barnes (1995).

Secure land title is widely acknowledged as a pre-requisite for increased investment in land, intensification of agricultural production and associated agricultural productivity. Unlike

most countries where land is already allocated and requires only administration, there is a commonly held belief in Belize that there is an abundance of good agricultural land available and that Belizeans have a constitutional right to ownership. This has led to a continued emphasis on land allocation despite the fact that there is now good evidence to suggest that Belize has in fact, extremely limited land suitable for agricultural production, and that efforts should shift towards careful stewardship of this resource in accordance with national priorities, namely maximizing economic and social benefits.

As Table 2.1 demonstrates, approximately 58% of the land area of Belize is in public hands. This National Land has been viewed by successive governments as a "land bank" for eventual distribution to the population. Of the total land area, Barnes (1995) estimates that around 26% lies outside existing reserves and protected areas with around 11% of this already allocated under government leases.

The basic framework of land allocation policy is outlined in six main statutory documents:

1. The terms and conditions of leases under the National Lands Act, 1992;
2. Control of the sub-division of private land under the Land Utilization Act, 1981;
3. Titling of land through the Land Registration Act, 1977 and the General Registry Ordinance, 1954;
4. Maintenance of Forest Reserves under the Forest Act, 1927;
5. Protection of land through the National Parks System Act, 1986;
6. Licensing of foreign land ownership through the Aliens Landholding Act, 1973.

The allocation of national land

National land is administered under the National Lands Act (1992). This applies to all lands (other than Reserved Forest) not already "located" or granted, including any lands ceded to the State. The Act is administered by the Commissioner of Lands and Survey through the National Estate Office on behalf of the Minister of Natural Resources.

The procedure used to allocate national land strongly reflects the perception that land resources are plentiful. The process generally begins at the district level with the applicant approaching the village land committee for a piece of land-defined in the most general terms, perhaps with reference to a locality. If approval is obtained, the applicant will go to the nearest District Lands and Surveys Office where (s)he is required to provide personal information relating to proof of residency, type of intended development and family income.

According to a recent study by Barnes (1995), the lease operates, in reality, as a lease-to-purchase system as rental paid is applied to the purchase price and most leaseholders moving to freehold after a period of approximately 15 years. Conditions for conversion to freehold include: (i) the "development" of land (in practice, 50% of the land should be cleared within a two year period) and (ii) the land should be surveyed. Given the weaknesses in the land administration system that have developed over time, many small-holders do not bother to convert to freehold, the system being ill-equipped to sanction them if their lease has

expired. However, obtaining a government lease is still commonly perceived by all concerned as an affordable first step towards eventual purchase.

Box 1. Land Tenure In Belize

Registered leases
- a lease of 20 years registered with the Land Registry of the Lands and Surveys Department under the provisions of the Registered Land Act (1977) or with the General Registry under the common law deeds system.

Unregistered leases
- where the lease has been applied for but no Certificate of Lease as been issued. Commonly this is delayed by the need for a survey (see below)

Irregular leases
- expired leases and where the lessee has not complied with the terms and conditions of the lease

Possession
- anecdotal evidence suggests that there are many people occupying land without any legal basis. The NARMAP project found that this ranged from 1% (Toledo), through 4% (Stann Creek) to 10% (Cayo). Under the laws governing adverse possession the occupier may claim property rights after a 12 year period of occupation on private land and 30 years on national land

Indigenous lands
- Maya Indian reserves, established between 1920 and 1940. Land is held by the community, although increasingly the Maya hold standard leases both within and outside the reserve.

Freehold land
- Registered under a variety of mechanisms.
1. "Common law" - deeds system
2. Modified Torrens system
3. Registration of Title

Today, most freehold rights are viewed as fee simple absolute tenures, documented through a recorded deed, certificate of title or land certificate.

A number of factors combine to complicate any attempt to obtain a clear picture of the extent and location of leased lands. Most of these relate to weaknesses in the procedures used to allocate land and in the institutions that subsequently administer it:

1. *Large number of unregistered leases.* Barnes estimates that in the five districts where data was available (this excludes Belize District) there are 21,270 leases at some stage of the application process.

2. *General location of unsurveyed leases.* Until surveyed, a leased parcel of land is only identified as an area of land in a general location. As such their boundaries are undetermined and cannot be related to other parcels or boundaries (e.g., forest reserves).

3. *Discrepancy between land records and field situation.* A recent study by NARMAP in the Stann Creek and Toledo districts found that only 63% of leasehold parcels were in fact occupied by the registered lessee. Of the total of 329 leases only 29% had been surveyed.

4. *Lack of transparency in the granting of leases.* While the procedures for obtaining a lease is well established it is often circumvented.

As such, it is largely impossible to determine the location, occupant or extent of leased land in Belize. This largely confounds efforts at incorporating them in the Land Information System (LIS) of the Lands and Surveys Department, to enforce planning or land use restrictions, to summarize the extent of land pressure or the level of encroachment into parks and reserves.

The present lease procedure is largely inappropriate to the management of land resources:

1. The applicant may, through no fault of his/her own, request an area that has already been leased, or which lies within a forest reserve or protected area. Unfortunately, it is currently practically impossible for the Lands and Survey Department (at any level) to check whether this is the case.

2. The existing process is largely impossible to administer. The issuance of new "general area" leases continues to compound the confusion in the Lands and Surveys office and in the rural areas. This will particularly frustrate any effort to computerize the records of the National Estate Office or improve levels of rental collection. It will also complicate efforts to bring leased parcels into the Land Register.

3. The existing method allocates land inefficiently and with little reference as to the suitability of land for the intended use. This is leading to increasing agricultural development of marginal land and large numbers of undeveloped leases. Further, land which could be effectively utilized is being allocated in unrealistically large leases. This adds pressure to an already limited resource.

4. The "development" clause, designed to reduce speculative use of land, leads to unnecessary levels of deforestation of leased land-often on land of only marginal agricultural value.

5. Bottlenecks in the provision of government authorized surveys is significantly delaying the conversion of land to freehold title and holding up efforts to improve land administration, increase revenue generated and ensure productive investment in agricultural land.

6. *Provision of services.* As leases are allocated in a largely ad hoc manner in a general location, little or no consideration is made of the costs or feasibility of providing services, such as roads or drainage. As such, the situation can arise where a road must be built to a single parcel or where many parcels have no access to a road.

However, while many of these widely acknowledged difficulties persist, the technical capabilities of the Department, relating to land information and Geographic Information System (GIS), already provide the basic tools to facilitate planning of areas to be leased. This

can range from the use of 'Special Attention Area" maps[9] by District Lands Officers, to the use of Special Development Area plans as a guide to suitable development (see below).

Current efforts to develop a medium-accuracy GPS survey methodology will soon provide a rapid and cost-effective method of pre-survey of land designated as suitable for leasing.[10] This could eventually lead to the adoption of a 'development scheme" approach, where land is rapidly surveyed and subsequently allocated as identifiable parcels. This would also facilitate the provision of necessary infrastructure and would, in practice, be similar to the existing Programme of government sub-division, commonly found around large towns.

What is clear, is that some form of planning is required if the problems relating to land allocation, outlined in this Annex are to be resolved.

Physical planning

Three main pieces of legislation have an impact on land allocation in Belize: the National Lands Act (1992), the Land Utilization Act (1981), and the Aliens Land Holding Act (1973). The first controls activities on public land, the second the sub-division of private land and the third, the extent and location of land holdings by non-Belizeans.

Land use policy

There is no effective national land use policy or development plan in place, beyond the Government policy that every Belizean is entitled to own a piece of land (Box 2). Land use planning is carried out through the Special Development Areas (SDA) Programme, discussed below. This approach is extremely appropriate for the type of problems being faced at a local level in Belize and is based on the principles of 'best use" of land and community participation. However, the SDA Programme is insufficient to deal with regional aspects of development, e.g., watershed protection or downstream issues (e.g., water supply contamination).

The SDA Programme is no substitute for a sound land use policy that addresses national level policy options and adequately coordinates the institutions that have an interest in them.[11] For example, there is a clear need for high-level technical coordination on matters such as solid waste management and agricultural development. While these types of issues are currently handled by bodies such as the Coastal Zone Management Technical Committee and the NARMAP Project Coordinating Committee-these tend to be focused on specific regions or problems and tend not to outlast the projects which establish them. While intersectoral coordination has been difficult to sustain, there is clearly the need for such activity. To

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[9] Responding to the concerns regarding the arbitrary nature of land allocation through government leasing (as discussed above), the LIC, in collaboration with the Physical Planning Section began (in 1993) producing a series of "Special Attention Area" maps. These maps, intended as a guide for District Lands Officers (who decide on the viability of lease applications), show the boundaries of reserves/protected areas, existing surveyed parcels, areas of steep land and areas of swamp (the latter two being basic indicators of poor agricultural value).

[10] By the Physical Planning Section.

[11] Failure to adequate plan development can also be extremely wasteful-the current GoB commitment for land acquisition for development is upwards of BZ$60 million. Much of this land had previously been allocated by Government for prices well below market value.

succeed however, there has to be clear interest on the part of the main line ministries, perceived ownership of the process and a tightly defined remit. In recent years, efforts to instigate intersectoral coordination have largely failed, these too often being seen as compromising ministerial power or duplicating existing sectoral committees.

Box 2. The "Roots Belizean" Land Grant Scheme

The Roots Belizean Land Ownership Programme (LOP) is a major initiative of the current Government. It is based on a policy of each Belizean having access to a piece of land. In practice it is a response to increasingly visible foreign ownership and immigration from neighboring countries and a realization of limited nature of land resources. It also acknowledges the frustration many feel towards the current land allocation system.

Components of the policy include:

- any Belizean holding one lease can convert it to freehold title, immediately.
- no "development" clause.
- reduced purchase price (around 50%) of normal.

As originally implemented, the "Roots Belizean" scheme had a holding clause of 5 years, designed to minimize speculative sale of land, and subsequent application for a new parcel. This provision was rightly challenged on the basis that it is impossible to attach conditions to freehold title as situations may arise where an individual has to sell his or her land to obtain capital. The removal of this clause in effect means that land may be immediately sold following conversion to title. Realizing the potential this created for multiple applications-sales by an individual, the Ministry is maintaining a database of those obtaining title under the Programme. A further problem concerns the assessment of an individuals right to participate. This requires verification that the individual holds only one piece of land. This is largely impossible to determine prior to computerization of the land records and efforts to ensure the completeness of those records. In the meantime, a series of fines is in place to discourage multiple applications.

The Land Utilization Authority

The Land Utilization Authority (LUA), established under the Land Utilization Act (1981), meets monthly to assess applications to sub-divide private lands. An application is assessed by the Authority and either recommended to the Minister for Provisional Approval with any necessary conditions attached, or deferred pending inspection or alteration (deferral can result in discontinuance of application). After having the land legally surveyed and complying with any attached conditions, the applicant can apply for Final Approval.

The workload of the LUA has increased significantly in recent years as the pressure to sub-divide has increased. McGill (1994) notes that in 1988 a meeting of the LUA might have to consider approximately eight applications whereas in 1993 it might have to consider 30 or more. Applications to sub-divide have largely been concentrated in several identifiable areas (see Appendix Map 1). Many of the most useful aspects of the functioning of the LUA are currently outside the terms and spirit of the Act and require urgent attention. These are described in the context of Special Development Area planning.

The Special Development Areas (SDA) Programme

The Special Development Areas (SDA) Programme was an attempt to put in place, with as much government and non-governmental participation as time and resources allowed, a preliminary set of sub-regional plans. These are intended to act as a guide to land development potential for the Land Utilization Authority (LUA), other government departments and the general public. McGill (1993) notes that this planning process was intended as a provisional measure based on existing legislation and resources.

The SDA Programme is administered under section 19(d) of the Land Utilization Act (No. 16 of 1981) which states that the Minister (responsible for land) may declare an area to be a Special Development Area and stipulate the types of development which can take place within it. McGill notes that this provision was not intended to provide the basis for a physical planning system and is not sufficiently robust to withstand legal challenge.

In order to ensure that SDA Development Plans are based on a sound assessment of the resources and potential of a declared area, the Minister appoints a local committee to oversee the planning process. The process itself revolves around reconciling the physical characteristics of the area with the views of the local committee. The resulting Development Plan primarily indicates recommended densities of use basically the maximum or minimum parcel size appropriate to the land in question. SDA plans also recognize the boundaries of Forest Reserves and Protected areas,[12] although management decisions within these areas are the responsibility of the Forest Department or the agency charged with managing the area (Belize Audubon Society, in most cases). Development Plans may also zone areas for specific uses, or list restrictions to apply in certain areas (e.g., turtle nesting areas). Preparation of the data required for production of the plan (e.g., agricultural suitability) and the final plan itself is carried out by the Physical Planner in conjunction with the Land Information Center (see Box 3).

Once approved by the local committee, the Development Plan is displayed in the district offices of the Lands and Surveys Department and subsequently, following any necessary alteration, presented to the Minister for his approval. According to the Statutory Instrument, the plan must be reviewed every five years.

To date, ten SDAs have been declared by the Minister or are proposed (see Appendix Map 1). These are primarily in areas of population or developmental pressure.

The existing SDA process suffers due to lack of awareness and consensus on the part of other government departments and the public regarding the purpose of the Act. This is evidenced by a number of occasions where development concessions have been distributed by the Ministry of Economic Development in contradiction of accepted SDA development plans. As predicted, this resulted in a legal challenge to the LUA in 1995. To deal with the legal problem the LUA reverted to its original position as required under the 1981 Act, that is, without formal input from the Department of the Environment, most government departments

[12] Consequently any excision or dereservation of these areas would contravene the established SDA Plan, if approved by the Minister.

and the physical planner. As a result, the use of zoning plans or environmental considerations in determining the suitability of a proposal to sub-divide has been greatly weakened.

Box 3. The Land Information Center (LIC)

The LIC was established within the Ministry of Natural Resources in 1991 with the assistance of ODA and USAID. The Center is intended to provide a focus for land-related information in Belize (Gray and Belisle, 1993) and to support land administration and the coordinated collection and dissemination of natural resource data. As such, the LIC is supporting land use planning activity, land revenue collection, and the management of protected areas. The LIC operates on a partial cost recovery basis.

The LIC has three components, which once fully operational, should help ensure that land allocation in Belize is carried out in a transparent and sustainable manner based on the most accurate data available.

1. LIS - A computer-based Land Information System - capable of storing and manipulating land records. Development of the LIS is focusing on land covered by the Registered Lands Act (1977), although this will eventually be expanded to cover leased land. Once complete, the LIS will consist of a distributed database management system serving the day-to-day needs of the Lands and Surveys Department and district offices and a spatial component handling the associated cadastral data (Registry Index Maps, control network, etc.).

2. GIS - The Geographic Information System component supports land use and forest planning. Belize has extremely detailed and accurate land resource and land use data thanks to a series of studies undertaken by the Natural Resources Institute (King ,et al., 1988, 89, 92) and FAO/L&S (LIC, 1994). The GIS allows combination and analysis of this data with other thematic layers (e.g., roads, land parcels, watersheds) to produce derivative maps of interest. These have included land suitable maps for a wide range of agricultural crops, Special Attention Areas (for use by District Lands Officers) and the zoning plans for the Special Development Areas.

3. CEDS - The Conservation and Environmental Data System is designed to formalize the relationship between the LIC and the other government departments and the NGO community (i.e. the principal sources of new data in Belize), both to ensure data sharing (reduced duplication and contention) and that the LIC bases its plans and analyses on the most accurate information available. CEDS is organized as a membership organization with a technical committee and Data Sharing Agreement.

A Technical Amendment to the Act is currently with the legal advisor to the Ministry. This increases fines and fees, sets out in greater detail the provisions required for provisional approval and formalizes wider participation on the LUA (including representation by the Department of the Environment). Other aspects of the Act being examined include a widening of its remit to focus on change of use rather than simple density-based zonation. However, the amendment does little to increase the power of the LUA or strengthen the legal basis for zoning or the Special Development Area.

As well as weaknesses in the legislative/participatory base of the process, the ability to establish viable Special Development Area plans is significantly reduced by the size of the Physical Planning Section. At present, this consists of one planner.

The success of any given SDA plan requires far more that the technical tasks associated with plan preparation. The process is rightly based firmly on consultation with the local committee and other community representative and specialists. To be sustainable, the SDA planning process must be ongoing with Ministerial acceptance of development plan representing an early, rather than final, stage in the process. Implementation requires ongoing input from the Physical Planning Section as well as sustained effort on the part of the local committee and affected communities. To date, the process of devolving these activities (of achieving local 'ownership') from the planner to local communities has largely failed—perhaps as a result of the low impact the plans are perceived as having on development in the area.

A series of SDA plans to complete coverage of the southern part of Belize is proposed under the IDB Southern Highway project. Unlike many technical tasks performed by the

Lands and Surveys Department, these should not be carried out as one of exercises in plan preparation, but in accordance with the highly interactive and ongoing approach used in the earlier SDAs. The use of external consultants, with limited term input, will do little to eliminate many of the problems discussed above, and to ensure the success of the resulting SDA development plans.

Box 4. LIC Data Holdings (useful as the basis for rational land use allocation)

1. **Land Resource Assessments** - Produced by NRI (ODA) by King et al., 1988, 1989, 1992), this series of studies used a land systems approach to maps land resources and land use in Belize. The data include physical descriptions of each land system, including soils characteristics (e.g., pH) and other land quality indicators (e.g., slope, wetness). These data have been entered in the GIS and subsequently interpreted to produce land suitability for a range of agricultural crops as well as more general agricultural value.

2. **Land Use** - Two studies provide data for land use in 1985-88 (King et al., 1988, 89,92) and 1989-92 (LIC, 1994). The latter provides the first detailed breakdown of land use. A further study (USAID) will soon provide updated coverage (1994-96). This will allow monitoring of deforestation and land use change over time.

3. **Protected Areas** - Maintained by the LIC through application of the Statutory Instruments to the existing GIS data, this date set provides up-to-date picture of forest reserves and protected areas in Belize.

4. **Natural Vegetation** - This data set is derived from the work of Charles Wright, et al. (1959) and provides an insight into the natural vegetation cover of Belize and its potential. This data provides insight into the biodiversity of Belize. A subsequent study (NARMAP, 1996) updates this data based on modern imagery and understanding.

5. **Roads** - Based on the roads/tracks shown on the 1:50,000 topographic map series, this coverage has been kept current by the Physical Planning Section and input from the Ministry of Works.

6. **Others** - A wide variety of supplementary data is available, including watersheds, production forest, mangroves, human impacts on the coastal zone, rivers and hydrology, surveyed parcels (medium accuracy).

A number of government ministries are taking an active interest in policy and planning relating to land use. Most significant is the current efforts of the Ministry of Agriculture (MOA). The MOA are receiving assistance from IICA and IDB to strengthen the Policy and Economic Analysis Unit. These efforts should be supported and their aims reconciled with the activities of the Lands and Surveys Department. In particular, MOA should be brought in to the SDA planning process and encouraged to make use of the facilities of the Land Information Center. Every effort should be made to avoid duplication of capabilities.

Aliens land holding

The Aliens Land Holding Act (No. 31 of 1973) was introduced to encourage the productive use of land purchased by non-nationals. It was in response to the "sub-division and sale" that became a problem following the introduction of the 1966 Land Tax (Rural Land Utilization) Ordinance. This was designed to curb land speculation and stimulate development of land resources by imposing fiscal penalties for not doing so (Belisle, 1988). Many of the

larger landowners subdivided their properties into sub-100 acre parcels and sold them to avoid the increased taxes. As the sub-divided lots were generally being bought by foreigners, the introduction of the Aliens Land Holding Ordinance was introduced to partly counter this tactic, to maintain control of land, once sub-divided, and as a means to continue the anti-speculation and pro-development policy.

Powers under the Act lie directly with the Minister of Natural Resources who 'may in his discretion grant an alien a license to acquire and hold estate in land subject to such terms and conditions in the license specified as he may deem fit for the development of said land." The ordinance may also specify terms and conditions under which aliens may, if at all, hold land.

The Ordinance covers interests greater than 10 acres in rural areas, half an acre in a town, or any parcel in a 'declared' area. Six areas have been declared to date covering the offshore cayes (99.5% of the total area declared) with the rest covering inland areas (0.1%) and the coastal mainland (0.4%). The Ordinance also covers the transfer of shares between foreign shareholders.

The general trend for license application has been up, although it is difficult to separate the effects of actual growth from those related to increases in the area declared under the Ordinance. While the nationality of applicants is not entirely clear, the available data suggests that the majority are from the United States (60%+) with the rest consisting principally of Taiwanese, British and Canadian. Interestingly, more than half the recorded sellers are also foreign—suggesting that there is a considerable resale by foreigners to foreigners. The main areas of concentration have been Ambergris Caye ('J' on Appendix Map 1), Caye Caulker ('K'), Belize City ('L'), Placentia ('M') and Society Hall ('N').

Zisman (1996) notes that, from its inception, the Ordinance has been poorly monitored, largely due to resource constraints. He notes that the licensing system has become an administrative formality rather than a means of promoting development and discouraging speculation.

In recent years the governments policy of selling passports has largely circumvented the provisions and spirit of the Ordinance—as these individuals are officially Belizean. Further, the clause allowing acquisition of land by foreigners if they have been domiciled in Belize for over 3 years, effectively exempts some of the main foreign interests operating in Belize. Zisman notes that 'the Departments (Lands and Surveys) confidence to impose the full powers of the Act, including the enforcement of conditions, appears to have been undermined at an early stage by opposition from legal professionals, those promoting an anti-intervention approach to development promotion, and those involved in the real estate business."

A proposed revision, currently with the legal advisor to the Ministry, would increase the domicile rule to 5 years, set a cap of foreign land holding to 500 acres, countrywide and increase the provisions relating to forfeiture and appeal.

Dereservation of forest reserves

Localized land demand has been increasingly threatening the integrity of Forest Reserves, particularly along the Southern Highway. Ad hoc dereservation of these lands brings significant environmental risks. The land within the reserves is commonly of poor agricultural value. A recent study examining the potential for a National Protected Areas System Plan (NPASP),[13] found that the existing parks and forest reserves contain only 7,000 acres of grade 1 and 2 agricultural land (i.e., that which can be considered suitable for agriculture) with the rest being constrained by steep karst topography and/or poor soils. However, the study goes on to concede that most protected areas do have pockets of land that could be put to agricultural use and that even grade 3 land, while demanding higher levels of management, are being used productively in areas of high demand.

The NPASP study identified a number of areas currently facing land pressure. These areas already contain incursions or leases/grants, largely due to confusion over the boundaries of the parks/reserves. In line with the practice of the FPMP,[14] the NPASP study recommends that these areas be excised from the reserves and new boundaries drawn to accommodate the on-ground situation. These boundaries should subsequently be demarcated on the ground. The NPASP acknowledges that, in areas of high land pressure, excisions of good agricultural land may be considered. They note however, that this should only apply to the periphery of the parks/reserves and not lead to the creation of internal "enclaves" which will, over time, compromise the integrity of the area.

In the past most dereservation of forest reserves has been carried out in an attempt to regularize an existing incursion, whether a legitimate lease or grant or squatter. Given that this is the case, improvement to the procedures used in the allocation of leases should act to decrease incursions. However, in areas of high land demand there will be continued pressure to dereserve land. McGill notes that while limited dereservation is inevitable on a local basis, this is commonly not carried out with reference to the suitability of land for agriculture. The result is that leases have been larger than necessary and many of these have not been developed.

Land administration

Efficient land administration is the essential foundation of policies aimed at ensuring the productive use of land, improved revenue generation and a functioning land market. Many of the problems outlined in this Annex relate directly to the lack of a single, comprehensive, legal cadastre in Belize and the relatively simple administrative structures which would accompany it (see Box 5). Ironically, the legal and institutional framework of such a system have existed in Belize since the late 1970's. Unfortunately, progress towards comprehensive registration stalled in the 1980's, largely due to resource constraints.

Around 20% of land parcels are already covered by the Registration of Title system (administered under the Registered Lands Act (1977) and the related Land Surveyors Act).

[13] NARMAP, 1996.

[14] ODA Forest Planning and Management Project.

Under this system, all lands existing inside a declared area are shown with respect to their rectangular coordinates on a Registry Index Map, and are given a unique reference number. These reference numbers are cross-referenced to parcel files which reflect ownership, encumbrances, etc. Subsequent subdivisions of any of these land parcels require a mutation to the Registry Index Map supported by a survey that reflects plottable accuracy only. Accordingly, and depending upon the existence of horizontal controls, a number of surveying techniques can be adopted, e.g., compass and tape survey, chain survey and medium accuracy GPS survey. All this, instead of the very accurate and expensive Theodolite surveys done to unnecessary accuracy of a mathematical closure of 1 in 5,000 to 1 in 7,000 as is the practice. Any legal estate in land, i.e. freehold or a lease for a term of years absolute, must be reflected and its boundaries shown on the Registered Index Map, and all legal interests, e.g., mortgage agreements for sale, etc., can be recorded on the encumbrance register attached to the parcel files. There is also a Proprietors Register so that information to lands can be obtained through a known proprietor or through a known parcel number.

While this system has certain shortcomings, the Government would like to see it extended to the whole country—as the basis of a single, legal computerized cadastre. In the Cayman Islands, where this system is fully operational, considerable amounts of revenue are now being earned from registry transactions.

The Registered Lands Act and its companion legislation, the Land Surveyors Act, were originally envisaged as two parts of a three-component package, the third being an act to cover land adjudication. This was subsequently enacted in 1992, although delays in the appointment of adjudicators has significantly hampered progress towards registration. The proposed IDB "Land Administration and Secured Transactions Project" should address this through the provision of adjudicators, a methodology for medium accuracy GPS-based[15] surveys and survey teams. The IDB proposes to survey approximately 8,000 parcels and, with the cooperation of affected communities, adjudicate associated land disputes. While this will clear the backlog and add significantly to the extent of lands covered under the RLO, it is unclear if the Department of Lands and Surveys has the resources to continue these activities once the project is complete.

Modernization of land records

While this system has certain shortcomings, the Government would eventually like to have all parcels registered under it (including leases). The Land Adjudication Act of 1992 provides the legal mechanism to bring more parcels onto the Land Register. However, the backlog of surveys and ongoing problem of appointing adjudicators has delayed progress. The proposed IDB "Land Administration and Secured Transactions Project" should address this through the provision of adjudicators, a methodology for medium accuracy GPS-based[15] surveys and survey teams. The IDB propose to survey approximately 8,000 parcels and, with the cooperation of affected communities, adjudicate associated land disputes. While this will clear the backlog and add significantly to the extent of lands covered under the RLO, it is

[15] Global Positioning System - a satellite based system to provide precise location (sub-meter accuracy is possible).

unclear if the Department of Lands and Surveys has the resource to continue these activities once the project is complete.

Box 5. Land Registration in Belize (adapted from Barnes (1995)

1. **Recordation of Deeds System (Common Law System)**

Administered by the General Registry Office in Belize City under the terms of the General Registry Ordinance (1954). Freehold title is conferred under a Crown grant (up until 1981) or a Minister's Fiat (post 1981). The deed is defined as any document that is used to create, transfer, charge or encumber land rights (Barnes, 1995). Title to land under this systems is proved by showing a valid root or chain of title for a minimum of 30 years. Approximately 75% of all documents registered in the GRO are under this system.

2. **Modified Torrens System**

Also administered by the GRO in Belize City, this system was first introduced under the General Registry Ordinance of 1954. Certificate of Title is issued upon first registration of freehold or lease land rights, as well as easements, rights or privileges. All subsequent transfers of a registered property are carried out by a Transfer Certificate of Title which also records any charges or encumbrances.

3. **Registration of Title**

Introduced under the Registered Land Ordinance of 1977, the Land Registry system only operates in declared "compulsory registration areas." At present this system covers around one sixth of Belize, or 31,000 parcels. There are 41 declared areas, although the registration of all parcels in these areas has been delayed by the backlog of surveys. As a result, landholders in these areas are only required to register their land in the Land Registry (in Belmopan) on transaction. Over time, and given adequate resources, registration areas will cover the entire land area of Belize. Once completed this will largely regularize the land tenure situation and facilitate computerized administration of records.

The Register is divided into three sections dealing with "Property" (description of the parcel and reference to Registry Index Map (RIM) and filed survey plans, "Proprietorship" (name, address and restrictions) and "Encumbrances" (leases, charges, etc.).

The Registry Index Map records the "general" boundaries of parcels unless these have been "fixed" by means of a precise survey. The landholder is issued a Land Certificate, in the case of freehold, or Certificate of Lease, in the case of leasehold. Absolute title is granted to those landholders who have "good documentary title to the parcel."

With the assistance of USAID and ODA, a computer-based Land Information System (LIS) has been established within the Land Information Center (LIC) of the Ministry of Natural Resources (see Box 3). While progress has been slow, due largely to resource constraints and problems with the existing manual system of records, the LIS is already operational for Corozal District. The Ministry have made the appropriate decision to only enter land covered under the Registration of Title system (see Box 5).

Land pricing

While Belize has an extremely limited amount of land with good agricultural potential, much of this (estimated at 67%) lies: (i) in private hands—often held for speculative purposes; (ii) undeveloped—often within an existing lease or freehold parcel; (iii) reverting to scrub or lying fallow as part of the shifting cultivation cycle.

Given the increase in land pressure being experienced throughout Belize, and the increasing trend towards the use of marginal land for agriculture, it is essential that Government adopt policies designed to bring these resource into productive use.

Much of the current under-utilization of land is due to the rates associated with government lease rental and land tax, which are set well below market value. This has induced

an excess demand for land and associated assets, requiring the state to intervene to ration out the resource (e.g., through the Aliens Land Holding Act). This policy has reduced the revenue accruing to government and removed incentives to land ownership and the productive use of land.

Land tax. Belize has a system of taxing land based on unimproved value. However, rates are extremely low and an increase in the land tax rate—to more closely match market value—would have several beneficial effects:

1. *Increase revenue to government*—allowing for improved land administration, infrastructure provision, etc.;

2. Act as a *disincentive to speculation* and improve the productive use of private and leased land;

3. Create an *incentive for development of land*—as the investor could recover the costs of improvements when he sells his land.

As Table 2.2 demonstrates the Government realized only BZ$1.2 million in land tax revenue in 1995. This is estimated at around 30-40%[16] of outstanding land tax amounts—collection being hampered primarily by weaknesses in the land administration system. IDB estimates[17] that by the end of 1994 arrears were in the order of BZ$9 million. Land tax rates are currently calculated by the Valuation Section of the Lands and Surveys Department, using a variety of methods, depending on the situation. The most common approach, applicable to most rural lands is based on 1% of unimproved value-where the assessment is based on similar conveyances and characteristics of the location. The use of unimproved value is theoretically to remove disincentives to the improvement of land.

The Land Tax Act calls for a re-evaluation of land every three years. At present, land in many cases is being assessed based on 1980 values. Given the current system of land record administration and level of resources within the Lands and Surveys Department, it is probably impractical to introduce a more context-sensitive form of rating requiring increased levels of field inspection. Using the facilities of the LIC and available land resource information, coupled with other criteria (e.g., distance to road, level of infrastructure provision, recent land sales in the area), a partially automated mass valuation procedure could be devised, as long as an appropriate appeals

Table 2.2 - Lands & Surveys Dept. - Revenue collected - 1995

Revenue Source	*Amount BZ$*
Crown Rent	724,841.30
Land Tax	1,207,391.64
Purchase price	1,537,424.15
Registration Fee	170,441.61
Stamp Duty	2,120,653.12
Sale of Maps	22,554.25
Sale of Charcoal	445.62
Forestry Permit	348,137.29
Occupation Fee	1,311.00
Royalty	1,117.28
Advance Deposit	9,207.31
Payment of Departmental Advance	8,400.00
Deposit	5,000.00
Total	**6,156,978.57**

Source: Lands and Survey Department.

[16] Barnes (1995), World Bank (1994).

[17] IDB - Land Administration and Secured Transactions Project, Project Memorandum, 1996.

procedure was in place. However, it should be noted that any systematic and long-term improvement in land valuation is, by definition, based on a completed legal cadastre.

Lease rental rates. Current lease rental rates are well below market value (Table 2.3). This has led to the situation where land is held in large, frequently underutilized, parcels. Raising these rates to near market value would reduce the demand for land and ensure that once allocated, land is used efficiently. Further, if markets prevail and site improvement is implicit within them, this would obviate the need for the "development" clause (and the associated government inspection of parcels prior to converting leasehold to freehold). However, in recommending revision to lease rates, it should be noted that affordable provision of leased land has been viewed by successive governments as a social safety net-aimed at reducing land consolidation and landlessness, so prevalent in other Central American countries. This social objective, however, could be better achieved by revising rates so as to establish a progressive increase in rates based on acreage (ensuring cheaply available small farm plots) or intended use.

Table 2.3 - Land rental rates

Locale	*Rental (BZ$ /acre/year)*
Rural land	$2 / $3
Village lot	$5
Belize City / Other major towns	$35
Other Towns	$5 / $10

Source: Lands and Surveys Department.

Billing and collection. Given the low rates of collection reported in connection with both lease rental and land tax, it is clear that a different approach is required to billing and collection. Under the 'Land Administration and Secured Transaction Project," IDB will investigate the potential for removing billing and collections from the Lands and Surveys Department to a separate Unit, or to the Inland Revenue. The Lands and Surveys Department are currently experimenting with the use of local bailiffs in Corozal.

Revision of other taxes relating to land. There are a number of other taxes and fees collected in the course of land administration. These should be reassessed to maximize collection rates.

Stamp duty is collected following the issuance of title. It is rated at 5% of the land value, although anecdotal evidence suggests that it is often underpaid—there being little incentive for the buyer and seller of land to correctly declare the true purchase price. It is suggested that reducing the level of stamp duty—to more accurately reflect administrative costs—and strengthening the requirements for accurate reporting would result in far greater levels of collection.

Removal of legal constraints

The procedure used to allocate national land and to subsequently administer it has resulted in a significant number of farmers lacking secure title and, consequently, access to credit. IDB have identified a number of legal constraints that may require revision.

Barnes (1995) notes that the establishment of secure boundaries and the ability to borrow against movable property is essential to increased agricultural production. At present the laws of Belize make it difficult to obtain formal credit without land. The IDB project will

examine changes in the law to allow interests in accounts receivable, bills of sale, etc., to count as collateral.

At present, those holding unregistered leases are unable to use these as collateral. This reduces the availability of credit for development of the private sector and discourages the adoption of improved agricultural practices. This policy is particularly biased against small farmers lacking other means of servicing debt. In practice this has limited bank lending to wealthier clients.

While commercial banks are willing to take long term (e.g., 20 year) registered leases as collateral for loans, the "national land lease" requires that the lease holder first obtain permission to offer the lease as collateral. This is commonly given where the loan is to be used to improve the land. However, where the loan is for a non-land related investment, permission is often denied.

A further problem concerns Government's ability to force forfeiture of land due to rental and tax arrears, without due process. This puts banks at distinct disadvantage and discourages lending. Delays are also caused in the transfer of title or encumbrance as the MNR must first assess that all taxes have been paid.

3. Conclusions and recommendations

Recent studies undertaken under several major technical assistance projects have identified that, while significant progress has been made in resolving land use conflicts and in improving farming systems, the only way forward—given the limited land resources of Belize—is to put in place a generally accepted system of land use planning, capable of ensuring that land is allocated for its "best use" and through enforcing restrictions on land use. This is seen as a cornerstone of a three-way effort that will also require renewed efforts to intensify agricultural activity and administer land allocation and transaction.

While population-driven land pressure may have eased due to decreased immigration, the population age structure and distribution of land resources will ensure that the demand for land will continue to increase in many areas of Belize. Continued agricultural expansion on unallocated public lands will increasingly involve marginal lands and threaten the integrity of protected areas and forest reserves. Efforts need to be made to ensure the best and most efficient use of existing productive agricultural land.

Land rights are a major limitation to the productive use of land. These need to be regularized to allow access to credit and to encourage investment in land and agricultural productivity. Farmers are reluctant to invest in long-term conservation practices without security of ownership. Efforts are required to regularize the immigration status[18] and land rights of small farmers—to allow them to fully participate in agricultural production and the land market.

[18] Note that refugees, documented and undocumented aliens are unable to obtain title to land, although documented aliens can lease or "rent" land (10 acres).

Existing milpa agricultural practices are largely inappropriate for areas facing a shortage of land. There is an urgent need to intensify small farmer agriculture. This will require that Government provide a range of support services including agricultural extension and marketing advice. Policies and projects should learn from past experiences and adopt a comprehensive approach to farming systems, in the context of the social and cultural conditions found in the specific area and developed in the context of a national agriculture/trade policy framework.

The current land allocation procedure is incompatible with the concept of 'best use" of land or the equitable allocation of resources and will frustrate efforts at computerization. Government should utilize existing land information to ensure that leases are allocated only where the land is suitable—according to planning principles—and that the size of parcel match the intended use. The Programme to increase awareness of these issues on the part of District Lands Officers should be extended. A study should be carried out (perhaps in the context of the forthcoming IDB Land Administration Support Project) to examine the feasibility of utilizing medium-accuracy GPS to undertake pre-survey/planning of areas identified for leasing.

Land pricing should be revised to encourage the productive use of available land and to decrease speculative pressures. Upward revision of the rates at which public lands are sold/leased and of land taxes and removal of legal constraints to investment will significantly improve the functioning of the land market and reduce many of the distortions and pressures currently being experienced. These measures will reduce speculation, increase the area under productive agricultural use and remove the need for the "development" clause in land leases. Selling and leasing rates should be reviewed, and a method found to apply these in a progressive manner, safeguarding the affordability for small-holder agricultural farmers.

Billing and collection of land tax and lease rental should be devolved either to the Inland Revenue or to some other Government agency. In the case of the latter, the collecting agency should be allowed to retain a percentage of revenue collected as an incentive to monitoring and enforcement.

The Physical Planning section should be strengthened (at least 2 more staff) to reflect the demands placed on it. This increase in capacity should be used to revitalize the Special Development Area Programme and support activities as envisaged under the computer-based Land Information System.

The revised Land Utilization Act should be passed, and a concerted effort made to bring the implications of this to the attention of the other line ministries, particularly those with responsibilities for aspects of land use (e.g., Agriculture, Economic Development, Tourism and the Environment). Every effort should be made to ensure that participation as guaranteed under the revised Act remains a high priority among participating bodies.

Government should acknowledge that the LUA, the SDA Programme and sectoral committees are inappropriate and insufficient to address national level planning issues and, that without high-level intersectoral coordination, the SDA Programme and other initiatives will

likely fail to achieve their potential. Every effort should be made to sustain the tripartite relationship currently operated under the NARMAP Project Coordinating Committee, perhaps at a technical level.

The CEDS initiative and the institutional structures that accompany it should be utilized to review that information needs for planning. Initiatives aimed at strengthening sectoral planning capability (e.g., in MOA) should aim to provide complementary capability to that already existing in the MNR.

The Ministry of Natural Resources should focus its efforts on completion of the existing Programme to computerize the system of land records. Government should ensure that the Land Information Center and the Lands and Survey Department have the capacity both to handle the expected increase of information under the proposed IDB Land Administration Project and to sustain these efforts (at land registration) after the completion of the project. Completion of nationwide registration will go a long way towards regularization of the land situation in Belize, simplify its administration and increase revenue to government.

The upgrading of the Southern Highway is likely to accelerate social, economic and environmental change in Southern Belize. Every effort should be made to understand and mitigate the harmful effects of these changes through the application of the planning, agricultural support services and improved land rights/allocation.

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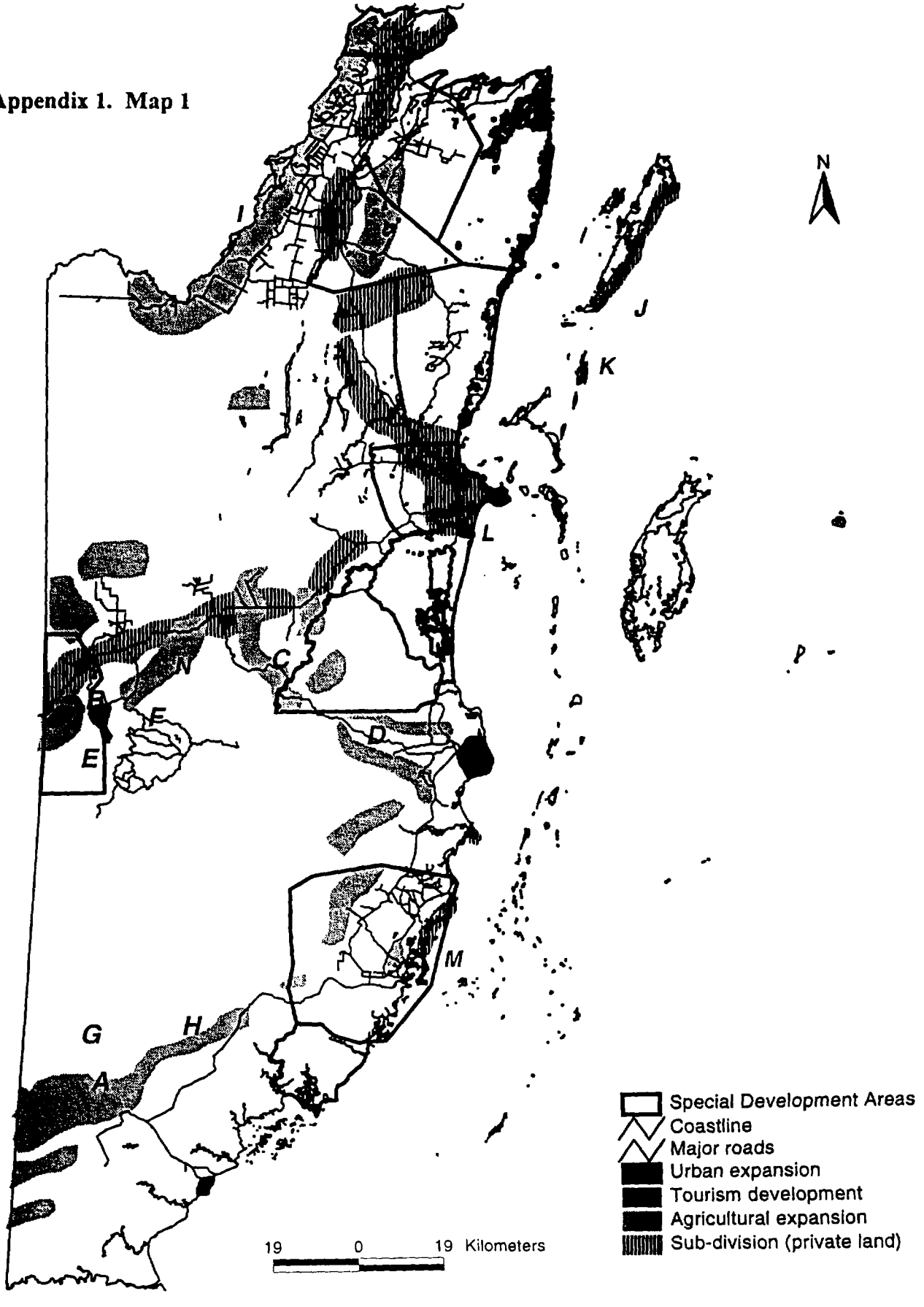
Appendix 1. Map 1



Source: Lands and Survey Department, BCES, Coastal Zone Management Project

Appendix 2: Map 2

Source: Land Information Centre

Appendix 3. Map 3

Source: Land Information Centre, King et al , 1993

Annex II

BELIZE

Forests and Protected Areas

May 30, 1996

World Bank
Caribbean Division
Country Department III
Latin America and the Caribbean Region

Contents

Abbreviations

AAC	Annual Allowable Cut
ANDA	Assistant of National Development Agency
BAS	Belize Audubon Society
BCES	Belize Center for Environmental Studies
CSO	Central Statistics Office
CVSS	Council of Volunteer Social Services
FAO	Food and Agriculture Organization
FCCC	Framework Convention on Climate Change
FPMP	Forest Planning and Management Project
GDP	Gross Domestic Product
GEF	Global Environment Facility
IUCN	The World Conservation Union
LIC	Land Information Center
NPASP	National Protected Area Systems Plan
NARMAP	Natural Resources Management and Protection Project
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
ODA	Overseas Development Agency
PFB	Programme for Belize
SDA	Special Development Area
TFAP	Tropical Forest Action Plan
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WWF	World Wildlife Fund

Summary

At present the forest cover in Belize is fairly extensive (57%) and, due to selective logging practices, relatively intact. However, the human and financial resources needed to manage this ecological wealth are inadequate and anthropongenic pressures which impact directly on the well-being of forest resources and protected areas continue to grow unchecked. Pressing issues need to be addressed soon if Belize is not to go the way of so many other tropical countries—irreversible damage and opportunities foregone. Belize does still have a reasonable opportunity to manage its resources soundly.

Threats to forest resources and protected areas are compounded by the inadequacy of resources to effectively manage and protect them. While the contribution of traditional forest products to the economy has decreased over the last thirty years and leveled off, demand for land, together with population pressures in key forested areas, is increasing. A direct result of these pressures, combined with inadequate land allocation policies which defacto promote extensification rather than intensification, has resulted in increasing encroachment and excisions within Forest Reserves and Protected Areas. Concurrently, timber exploitation is exceeding sustainable yield estimates and illegal logging—although recently slowed—has been high in the recent past and could increase again.

On the positive side, the importance of the forest sector is being recognized as vital for protective purposes (watershed, slope stabilization, carbon sequestration, biodiversity and critical habitats) and for its contribution to the tourism sector (second highest hard currency revenue earner for Belize). Increasingly, as tourism revenues climb, the value of forest conservation, intact ecosystems and protected areas are recognized. The area of forests under protective status has increased over time. However, Forest Reserves and Protected Areas are under increasing pressures and given their precarious immutability remain prone to excisions and encroachment. These trends present a complex scenario in trying to evaluate the best use of forest resources in Belize.

Some preliminary recommendations can be made. Representatives from both the government, NGOs and the private sector agree that reversing the current land allocation practices to a more sustainable management of land resources, including the forest sector is of the greatest importance. Land allocation and planning in coordination with pertinent government bodies, including the Forest Department, communities, the private sector and NGOs, are the key to effective, sustainable management of the forest sector and its future. These recommendations are dealt with extensively in Annex I - Land Use and Land Allocation. At the same time, attractive financial incentives and innovative arrangements for forest management need to be explored at the community level. Relationships established between the Forest Department and NGOs and communities to manage forest resources should be expanded and strengthened. Privately owned forest lands should be targeted for sustainable management through policy, legislative measures, and fiscal incentives and sharing of technical information. In accordance with forest policy, forest production should be carried out on a sustainable basis to ensure the long term viability of production to meet both internal needs and maximize revenue from exports. Conservation and management of Forest Reserves and

Protected Areas should be accorded increasing priority with realistic and creative options for revenue generation and international assistance on a larger scale. Limited Forest Department resources need to be continuously targeted to ensure that sustainable management of both privately and nationally held forested lands is supported, that the benefits contributed by the forest sector are maximized and irreversible damage to forest ecosystems minimized.

1 Overview of forests and protected areas

Forest resources

Forest area

The area of Belize is roughly 21,728 km^2 of which 57% is forest cover comprising broadleaf and needle-leaf forest (see Appendix 2, Map of Land Use). Table 1, provides estimates of forest and vegetation types.

Table 1: Vegetation classification of Belize

Forest Type	*Area ha ('000)*	*% of Land Cover*
Broad leaf forest	1,173	49.53
Needle-leaf forest	56	7.07
Swamp forest	205	9.4
Mangrove forest	31	1.4
Scrub	318	14.6
Herbaceous communities	45	2.1
Agriculture	338	15.56
Urban settlement	7	0.34
Approx. Total (rounded off)	**2,173**	**100.0**

Source: NARMAP (1995).

Forest reserves

Forest Reserves make up approximately 20% of the land area of Belize (see Table 2) and are the management responsibility of the Forest Department. These forested areas are set aside for the purpose of water and timber production, recreation, wildlife protection, scenic viewing and other values.[1]

Table 2: Forest reserves of Belize: estimated areas

Site Name	*Establishment Last SI*	*Area est. (acres) 1996*
Chiquibul Forest	54 of 1995	147,889
Commerce Blight & Silk Grass *#	41 of 1989	5,452
Columbia River *#	40 of 1977	102,940
Deep River Forest*#	49 of 1941 66 of 1990	78,574
Freshwater Creek *#	12 of 1980	60,177
Grants Work Forest *#	95 of 1989	7,906
Machaca Forest *#	23 of 1987	3,756
Manatee Forest *#	21 of 1959	103,878
Mango Creek Forest *#	62 of 1989	35,549
Maya Mountains Forest (inc. Trio #)	13 of 1979 66 of 1990	128,111
Mountain Pine Ridge Forest *#	49 of 1977	126,825
Sibun Fores *#t	48 of 1977	106,392
Silk Grass *#	60 of 9182	4,806
Sittee River Forest *#	47 of 1977	94,156
Swasey Bladen Forest *#	90 of 1989	1,779
Terra Nova	133 of 1993	6,781
Vaca Forest Reserve *#	165 of 1991	52,352
TOTAL		**1,067,323**

** Leases given or being given within the Reserves*
 # Squatters within the Reserves
Source: LIC and the Forest Department.

Protected areas

In addition to the 20% area of Belize in Forest Reserves, approximately 14% of land area has been designated into some category of protective status which is largely forested (see Table 3 and Appendix 2, Map of Forest Reserves/Protected Areas). Two aspects which impact directly on the well-being of these areas are: (i) applicable legislation does not guarantee immutability of the areas; and (ii) the present management arrangement, while an excellent start, does not encompass all areas requiring management. The management for six protected areas is now formally in the hands of the Belize Audubon Society (BAS) - see Box 1.

[1] McCalla, 1994.

Table 3: Parks and nature reserves

Site Name	*Establishment Last SI*	*Area (acres)*	*Management*
Nature Reserves			
Bladen Branch	66 of 1990	99,678	FD
Tapir Mountain	58 of 1994	6,744	BAS
Bourdon Canal Nature *#	88 of 1992	5,255	FD
National Parks			
Aguas Turbias	44 of 1994	8,760	FD
Blue Hole	109 of 1986	665	BAS
Chiquibul	55 of 1995	286.289	FD
Five Blues Lake	52 of 1994	4,061	Friends of Five Blues
Guanacaste	46 of 1990	58	BAS
Laughing Bird Caye	167 of 1991	1.4	BAS
Rio Blanco #	41 of 1994	100	FD
Monkey Bay	45 of 1994	1,799	FD
Sarstoon-Temash *#	42 of 1994	41,898	FD
Payne's Creek	43 of 1994	31,678	FD
Wildlife Sanctuaries			
Cockscomb Basin	27 of 11990	86,929	BAS
Crooked Tree	95 of 1984	41,297	BAS
National Monuments			
Half Moon Caye	30 of 1982	9,771	BAS
Species Conservation (under National Lands Act)			
Bird Caye (in prop. Manatee Lagoons Conservation Area)	1977	0.5	BAS
Un-named Caye (in prop. Manatee Lagoons Conservation Area)	1977	0.4	BAS
Doubloon Bank Caye	1977	0.8	BAS
Little Guana Caye	1977	1.5	BAS
Un-named Caye (between Placencia and Monkey River)	1977	0.4	BAS
Man o'War Caye (in prop. Southwater Caye Conservation Area)	1977	0.8	BAS
Un-named Caye (between Sand Point and Ambergis Caye)	1977	0.8	BAS
Marine Reserves (not terrestrial)			
Glover's Reef	170 of 1994	81,237	Fisheries
Hol Chan	38 of 1993	2,759	Fisheries
Private Managed Resource Protected Area			
Rio Bravo Conservation and Management Area	1989	92,614	PFB
TOTAL		801,598.6	

** Leases given or being given within the protected area*
 # Squatters within the protected area
Source: Data gathered from LIC, Fisheries and Forest Departments

Box 1. Agreement between the Government of Belize and the Belize Audubon Society

The Belize Audubon Society (BAS) has been informally involved in park management in Belize since 1982. In November 1995, their role in protected areas management was formally recognized in a ground-breaking agreement between the Government of Belize (GOB) and BAS. The agreement, for an initial three years, mandates the BAS to jointly manage and develop with GOB, six protected areas. These areas include: Half Moon Caye Natural Monument, Crooked Tree Wildlife Sanctuary, Cockscomb Basin Wildlife Sanctuary, Guanacaste National Park, Blue Hole National Park and Tapir Mountain National Park. The BAS is responsible for formulating and implementing detailed management plans, recreational activities, public awareness campaigns and education relating to the protected areas and the GOB is responsible for providing infrastructure and ensuring security. The agreement authorizes BAS to manage all related concessions and collect all related fees, of which 20% are contributed to the Protected Areas Conservation Trust (see Box 3) and 10% to the GOB, providing the remainder is used for the management and development of the Protected Areas.

Protected Areas, that is, areas which have been established under the National Park Systems Act of Belize, include: Nature Reserves, National Parks, Wildlife Sanctuaries and

National Monuments. Additional protected areas are designated under the National Lands Act to protect specific species. Marine reserves are established under the Fisheries Act. It is estimated that protection needs of most threatened species and critical habitat is met under the current network of Forest Reserves and Protected Areas (NARMAP, 1996). Nonetheless, there is lack of representation of specific sites, mostly wetlands. There is also some concern that several critical habitats in the coastal zone also lack protection, however several initiatives are underway which may result in appropriate protective measures being taken. Those sites considered important for further study are listed in the NPASP document. An additional area of concern is the protection of species whose critical habitat is scattered due to the nature of the migration, or nomadic life patterns. Under the NARMAP Project, a National Protected Areas Systems Plan for Belize (NPASP) has been developed. The NPASP makes a number of recommendations to ensure the adequate representation of ecosystems in the protected areas system plan as well as their effective management. Priority recommendations of the NPASP are outlined in Box 2. The proposed NPASP recommends that these species are best protected through specific legislation, "maintenance of environmental quality throughout the country" together with protection of critical sites. It must still be noted that quantitative data regarding biodiversity is largely non-existent. Administration and management of protected areas is divided across ministries, which results in weakened coordination and fragmentation of protection efforts.

Box 2. National Protected Areas Systems Plan (NPASP)

A National Protected Areas Systems Plan (NPASP) for Belize was developed by the Programme for Belize under the NARMAP Project, a cooperative project between the Government of Belize and USAID with technical assistance from the WWF-USA and Winrock International Institute for Agricultural Development. The Policy Committee of the NARMAP included representation at the level of Permanent Secretary from the Ministries of: Natural Resources, Tourism and Environment, and Agriculture and Fisheries.

Recognizing the need for a framework for a national protected areas system, the NPASP attempts

* to guide policy for the establishment of protected areas;
* recommends protected area coverage and management objectives;
* suggests an enabling administrative and managerial structure;
* identifies resource requirements and support mechanisms;
* integrates the Protected Areas System within national land use and economic development planning, as a component of national policy.

NPASP recommends institutional reform and coordination, identification and implementation of revenue generation and management of critical sites. The difficult goals of the NPASP will require additional consensus building and firm commitment by key decision makers. It is now the responsibility of both the technical experts and senior officials to move this agenda forward. A summary of the NPASP will be sent to the Cabinet for approval of its recommendations and priorities.

In addition to the environmental goods and services obtained specifically by designating these areas as protected areas, their importance with regard to the tourism sector is particularly important for Belize. It is estimated that tourists visit, on average, three protected areas during their stay in Belize. The value of protected areas in terms of aesthetics and ensuring that such areas are ensured for future generations is also extremely significant. The recently enacted Protected Areas Conservation Trust (PACT) is a significant milestone in Belize's recognition of the importance of its protected areas (see Box 3).

Box 3. Protected Areas Conservation Trust (PACT)
The Protected Areas Conservation Trust Act was passed in 1995. The PACT was created to provide a long term financial mechanism to ensure the protection and enhancement of natural and cultural resources of Belize. The PACT is financed by a BZ$7.50 conservation fee imposed on foreign tourists through purchase of airline and cruise ship tickets. In addition, 20% of entry fees to protected areas will also be contributed to the PACT. The PACT would be augmented by bi- and multi-lateral funds. Those eligible to apply for funds under the PACT include government agencies, NGOs, private businesses and individuals. PACT funds are not intended to replace standard environmental protection responsibilities of ministries and departments. Likely use of funds includes strengthening protection and management of protected areas (including buffer zones), infrastructure needs, education, training and public awareness programs. On a more limited basis, development of appropriate eco-tourism will also be supported.

Source: W. McCalla, et al. (1996).

The BAS now facing an uphill struggle to provide adequate presence in the protected areas as well as to build necessary infrastructure and ensure appropriate management of these protected areas with limited resources. However, there are some 26 protected areas, of which 16 are at without any formal management plan. The Forest Department intends to start developing a model management plan for the Bladen Branch Nature Reserve later this year. To ensure their long term viability, other provisions for protection and management of protected areas will have to be explored by the Forest Department. This will take innovation, leadership and assistance. It is a very important task, given the significant role that protected areas proved to the tourism sector (see Annex VI - Tourism) and in providing other critical environmental goods and services.

Forested private lands/forested national lands

Some 57% of Belize is under forest cover, and 34% of Belize (Forest Reserves and Protected Areas) is legally under some form of protection, however precarious. Even assuming that most of these reserves and protected areas encompass forest lands, it is reasonable to assume that over 40% of the forest estate is either privately owned or in national lands. Clearly a significant part of the forest domain falls outside of Forest Reserves or Protected Areas. The Forest Department's input in guiding management of forest resources on private lands and national lands through policy, strategies, existing and planned legislation (revised Lands Utilization Act) becomes an important consideration. Currently there is no policy regarding management of forested lands on private or national lands.

Forest department capacity

The Forest Department has an extensive mandate and only limited resources to fulfill it. The Forest Department comprises four divisions, including Management (responsibility for Forest Reserves), Research, Utilization and Conservation (responsibility for Protected Areas) which are in essence technical advisory units to the Territorial Divisions which are directly responsible for forest management on the ground. The total staff of the Forest Department at present is just over 50 persons. The Conservation Division, for instance totals some 10 persons, including forest rangers and guards. Increasingly, the duties of all forest rangers and guards will be extended to include conservation responsibilities. Despite severe resource limitations, the Forest Department has made headway in several areas. The Forest Department is discussing an improved Draft Forest Policy, several important pieces of legislation have been drafted and are under consideration (see forest legislation) and draft management plans in four

Forest Reserves have been completed under the ODA financed Forest Planning and Management Project (FPMP) and part of a fifth. Areas within these Forest Reserves, suitable for production forestry, are selectively felled based on 40-year cutting cycles—these management plans are based on sustainable conservation and development of areas under Forest Reserve status. The preparation of management plans is planned for areas where land tenure is secure and threats minimal, and a rough idea of quality is pre-established. Management of Forest Reserves falling outside where the FPMP project provides assistance, is still in the process of being developed—currently there is no management planning whatsoever for eleven Forest Reserves. While it is within the mandate of the Forest Department to prepare management plans for these reserves, none have been prepared to date. This is becoming critical in areas where Forest Reserves are under threat from population pressures, agricultural expansion, and uncontrolled logging.

There are five types of forest licenses under the Forest Rules. These include: A forest license for sustained yield working of timber or other forest produce; a forest license not on a sustained yield basis; a forest permit for the working of timber or other forest produce in a timber salvage area where the royalty value of the produce does not exceed one thousand dollars; a petty permit for the working of timber other forest produce where the royalty value of the produce does not exceed fifty dollars; and a chicle license.[2] A new concession license based on the principle of sustained yield has recently been drawn up for areas which are covered by management plans. These licenses require a security deposit, exact an annual cutting permit fee, a road fee and royalty fees on each tree extracted based on log volume. Most concession licenses appear to be awarded on a political basis rather than on technical merit of applications, environmental considerations or auctioning of rights.

A number of comprehensive reports have been prepared on the forest sector under various technical assistance projects. These reports are not being shared adequately with decision makers and potential donors. These reports make valuable and specific recommendations regarding the revitalization of the forest products industry and the management of the forest sector. The idea of a national forest inventory has received resistance because of its projected cost, and the urgency of other forest related priorities, therefore data will continue to be extrapolated from reports which are 20-30 years old.

The Forest Department has redeployed its resources and is tentatively exploring increased enforcement arrangements together with other entities such as the Belize Defense Force for monitoring and enforcement. The Forest Department has also moved ahead with some very innovative arrangements in the management of protected areas. The Belize Audubon Society (BAS) has been formally given responsibility for the management of 6 protected areas. Approximately 4 other protected areas are being managed through private or community based efforts. With respect to monitoring, the Forest Department recently requested BACONGO (Belize Alliance of Conservation NGOs) to assist them in monitoring a recently controversial concession to Malaysian logging interests in the Toledo District. However, because of limited capacity, infrastructure and insufficient funds, the Forest Department staff is not able to fully plan for, manage, and monitor the resources for which it is responsible. Between BAS and several other private, NGO or community based efforts, some

[2] McCalla, 1996.

management is being undertaken in 10 protected areas, however the remaining 16 are not covered by any management plan. Encroachment into forest reserves and protected areas, excisions, loss of royalties, and weak extension are all contributing to the decline of forest resources.

Local level capacity

NGOs and the Government, and in particular the Forest Department and the Department of Agriculture recognize the importance that local communities, and in particular the role that forest fringe communities can play in the planning and management of forests and protected areas. Given the limited resources available to the government and NGOs, it is also recognized that these local communities represent a largely untapped human resource. A number of efforts are underway to involve the communities in decision making and management of forest resources. These efforts are labor intensive, require long term commitment and technical guidance by their sponsors and must include some aspect of revenue generation for the communities to ensure success and sustainability. Any community level interventions will suffer the same constraints as central government. It is hoped that NGOs can facilitate such efforts and assist in raising resources for community level efforts. BAS intends to sub-contract the Crooked Tree community to manage the Crooked Tree Wildlife Sanctuary. Community level efforts are still inadequate due to limited availability of resources, and a general lack of awareness by the communities of the role that they could play.

NGO capacity

NGOs have a very substantial role to play in the planning and management of forests and protected areas in Belize. NGOs acknowledge their responsibilities as advocacy agents and to maintain a concerted approach, the principal environmental NGOs have joined together under an umbrella organization called Belize Alliance of Conservation NGOs (BACONGO). Likewise, development NGOs have joined together under ANDA, the Association of National Development Agencies. Lastly, the Council of Voluntary Social Services (CVSS) is also filling an important function, particularly at the community level. In addition to advocacy, NGOs are known to act as watchdogs, monitoring adherence of government, industry and individuals to policy, legislation and regulations. Of critical importance in Belize, has been the role that NGOs are filling in the management of protected areas. The Belize Audubon Society now manages six protected areas and the Belize Center for Environmental Studies (BCES) is developing a management plan for the proposed Port Honduras Marine Reserve. Other NGOs have played a part in developing small scale projects with communities living on the fringe of Forest Reserves or Protected Areas. NGOs' abilities to implement programs at the community level, their strengths as extension agents and as mediators put them in a key position to resolve conflicting demands for land use and to act as effective communicators. In addition, their important fundraising abilities, planning and links to international NGOs enable them to access resources to which government would not normally be eligible. The resources of NGOs in Belize are stretched at present and recommendations for increased responsibilities would have to be carefully matched with realistic revenue generating options.

Legislation

Revision is currently underway for the Forest Act, the National Parks System Act and National Parks Regulations, the Wildlife Protection Act, and the Forest Fire Protection Act. The most advanced of these is the revised Forest Act—a parenting body of legislation which consolidates existing forest legislation, includes the concepts of sustainable yield, environmental protection and multiple use with particular emphasis on conservation. The revised Forest Act is currently being discussed at the end of March 1995 and after review by the Permanent Secretary is expected to be submitted for cabinet approval. The Forest Rules were amended in 1995 and reflect revised levels of royalties for species currently being extracted from Belize's forests. The Forest Department has a role to fulfill under the proposed revised Land Utilization Act which states that the Land Utilization Authority will include the Chief Forest Officer or representative of the Forest Department. Enactment of this key piece of legislation will ensure that appropriate input from the Forest Department is provided in guiding the planning for forested lands covered by Special Development Areas, especially those which are adjacent to Forest Reserves under threat from incursions.

2 *The economic and environmental importance of forests and protected areas*

Forest production

In real economic terms, Belize has been experiencing a continuing decline in forest production. The forest sector's official contribution to GDP is at approximately 2.5% and is likely to continue at this level without increased input. Recent studies have indicated that the area of forest considered suitable for forest production, sustained yield forestry, totals only 99,000 ha or 4.4% of the land area. An additional 2,162,000 ha or 9.6% of land area could be considered as timber production areas if one included forested national lands and forested private lands bringing the total to 14%.[3] Only select concessions in a few Forest Reserves are subject to sustained yield practices. Estimates are based on studies which consider factors such as poor forest cover and topography (slope) which relegate large areas of forest as suitable for protection purposes only. Additional areas for non-protective purposes such as roads and streams are also deemed unsuitable for production forestry.

Table 4. Timber production in Belize

Year	*Annual timber production in ('000) ft^3*	*Annual timber production in ('000) bd. ft.*	*Annual timber production in ('000) m^3*	*Value US$ '000*	*% of GDP*
1990	3,268	16,339	92.31	9,431	2.27
1991	4,099	20,493	115.77	11,228	2.53
1992	4,276	21,380	120.79	11,957	2.58
1993	4,208	21,042	118.88	11,618	2.32
1994	4,870	24,351	137.57	14,315	2.49
1995	4,464	22,324	126.12	12,564	N/A

Source: board feet and value figures provided by CSO, 1996.
Conversion figures used: 1 ft^3 = 5 bd. ft./ m^3 = 177 bd. ft.

[3] Alder, 1993.

There is currently a ban on the export of mahogany, cedar, rosewood and zircota. There is also a ban on the export of timber exceeding 12" in cross-sectional area. The royalties revised under the Forest Amendment Rules of 1995 are at a sensible level. For example, a recent estimate of expected royalty levels to be collected from the Chiquibul forest, based upon the results of a logging experiment carried out by the Forest Department, were valued at 17% of the estimated gross value of the forest product output (Neil Bird).

Table 5. Exports and imports of forest products

Year	*Imports US$ '000*			*Exports US$ '000*			*Trade Balance US$ '000*	
	Total	*Forestry Products*	*%*	*Total*	*Forestry Products*	*%*	*Total*	*Forestry Products*
1992	274,248	3,107	1.0	119,209	3,055	2.6	127,240	544
1993	280,924	4,127	1.6	118,938	2,285	1.9	(143,517)	(1,842)
1994	259,953	3,062	1.3	127,505	3,815	3.0	(105,186)	753
1995	258,514	2,836	1.0	142,921	1,965	1.4	(115,593)	(871)

Source: IUCN (1996) and CSO (1996).

Tourism

The contribution of Belize's forests in terms of environmental goods and services is very significant and given the increased value of tourism (currently at 15% of GDP which is likely to be underestimated given underreporting by hotels) and its dependence on the sustained quality of its natural resources including forest ecosystems. A substantial portion of Belize's tourism is internal with an increased trend in diversified visits[4] (see Annex III - Coastal Management). It is estimated that tourists will visit an average of three protected areas. BAS figures show that 17,000 persons visited the four protected areas managed by BAS in 1995. The Hol Chan Marine Reserve received some 38,000 visitors. Belize's Development Strategy reflects the increased importance of this sector and is supportive of the general consensus that forest use should move from resource mining to sustainable use and that Protected Areas should be increasingly valued for their contribution to this sector. The Forest Department would like to increasingly merge the management priorities of Forest Reserves and Protected Areas given their common benefits to the environment.

Erosion control and watershed protection

Forest cover fulfills the role of soil stabilization and watershed protection. These values however are difficult to calculate even by order of magnitude. There are 16 major catchments in Belize, all of which drain to the coastal waters of Belize,[5] consequently they are not only critical in ensuring the nation's supply and quality of water but are also of significant importance to the health of fragile ecosystems downstream, such as mangroves and especially the barrier reef. There are an additional 15 catchments which are difficult to categorize. Insufficient data makes it difficult to measure the effects of deforestation with regard to increased sedimentation in rivers, damage to the reef and other ecosystems. An environmental monitoring program has been recommended which would facilitate quantifying the important role of intact forests with regard to watershed protection.

[4] Diversified in the sense that many tourists combine coastal (the reef) visits with travel to the hinterlands (interviews with BTB).

[5] NARMAP, 1995.

Biodiversity

Because logging is highly selective due to the marketability of so few species, logged forests remain relatively intact with small effects on Biodiversity and habitats. Belize is a country high in biodiversity: one hundred and twenty one species of mammals, five hundred and four species of birds, one hundred and seven reptiles and twenty six amphibians. There are 4,000 native flowering plant species. Not enough information exists at present to quantify the value of biodiversity in Belize, but it is clear that it is high. Surrounding countries are more likely to exhibit fragmentation of critical habitats, degraded ecosystems and higher levels of threatened and endangered species due to intense population pressures. El Salvador has 25 times the population density of Belize, Honduras five times and Costa Rica, six.

Belize is a signatory of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and the Belize wildlife moratorium is in place with provision for it to be extended in perpetuity. NGOs have expressed the desire to extend this moratorium in perpetuity to ensure that hunting is never considered as a sector to be developed. Illegal hunting by local populations is considered by some to be a localized problem.

Ongoing research in the area of biodiversity, which is of national and global significance will clearly continue to be externally funded. Several NGOs are active in research efforts in reserves and protected areas (BAS and BCES/TNC) and private efforts (Program for Belize (PFB) in the Rio Bravo area. It is vital that the Conservation Division of the Forest Department continue to serve as an effective focal point to coordinate resulting data and to increasingly guide NGOs where critical data is needed.

Carbon sequestration

The Framework Convention on Climate Change (FCCC) promotes carbon emission reduction and also the protection and enhancement of greenhouse gas sinks, i.e., forests. As such, carbon sequestration projects are an interesting option for conserving Belize's forest cover. Power companies for example are increasingly willing to pay for carbon credits to offset potential regulations limiting their carbon emissions. A pilot project is underway between the Programme for Belize with the support of The Nature Conservancy (TNC) and 5 US power companies. Under this innovative pilot project, a land purchase of a forested block of 14,400 acres (destined for agricultural conversion) was made. A long term plan for its economically and environmentally sustainable management of the forested area is being developed. The power companies are paying US$2.6 million over ten years and it is estimated that 3 million tons of CO_2 credits are possible. The Programme for Belize estimates a one off value of 1 ha of standing forest, which is sufficient for purchase and contribution to an endowment to ensure long term management. The Programme for Belize is also exploring the possibility of subsequently exploring sustainable yield felling on lands set aside for carbon sequestration to bring in additional revenue. This step is intended to realistically address pressures for land use and to generate income.

Medicinal plants

The pharmaceutical potential of the forest ecosystems in Belize are of international significance and recognized by scientists and international bodies worldwide. The government quite reasonably feels that until the extent of its wealth in biodiversity is known, it cannot enter into bio-prospecting agreements. Belize is only now exploring such oppotunities. There are several interesting local initiatives on-going which document medicinal uses of plants and explore other potential uses of forest resources.

Fuelwood

Fuelwood is used for both household cooking needs and for the production of white lime. Very little quantitative data are available for either. It was estimated in 1991 that 30% of households used fuelwood for cooking and that the amounts involved did not pose a danger to forests. With the removal of tariffs on cooking gas, it is likely that this will be even less of an issue in the future. Fuelwood consumption for white lime production was considered to be fairly substantial, given its important use in application to citrus plantations. However informal sources indicate that increasingly, amounts are produced by mechanical crushing of natural dolmitic limestone at a small plant in the Toledo District and that many limestone kilning operations have gone out of business.

3 *Pressures and issues affecting forests and protected areas*

The two principal causes of deforestation in Belize are primarily (i) farming: milpa farming, small holder farming and commercial farming; and (ii) logging. There is a lack of precise data to quantify deforestation in Belize; however, there is no doubt that deforestation is affecting the country's natural land cover. Expansion in smallholder agriculture, milpa farming, commercial agro-industry, and other land converting activities are all resulting in deforestation. A NARMAP supported project has been launched to compare satellite image data from 90/91 and 93. In anticipation of the results of this study to determine deforestation rates, no conclusions are drawn at present regarding the actual deforestation rate. The study will be completed in May. Until now, estimates of deforestation rates for Belize vary widely. According to WRI (1992), the rate of deforestation for Belize from 1981-1985 was 0.7%, whereas WRI (1994) estimated deforestation from 1985-1990 to be 0.2%. Estimated areas of current annual land conversion due to agriculture (see Annex I) imply that the deforestation rate is still closer to 0.7%-1% mark, a rate which is relatively high considering the low population density of Belize. Very rough back-of-the-envelope estimates indicate that milpa farmers could be converting up to 7,100 acres of forest per year, smallholder agriculturalists up to 5,000 acres of forest per year and commercial agriculture is responsible for up to 5,000 acres of cleared forest lands per year—implying a deforestation rate of 0.5-0.6% attributable to agricultural expansion alone. These calculations assume for example that agricultural expansion results in the likely conversion of forest lands rather than other land types.

Population pressures are having and will continue to have a signficant impact on the demand for land. With regard to impact on forests and protected areas, the most interesting data pertaining to land pressures, are based on intimate knowledge of where the population pressures and demand for lands are the most intense and certain factors such as the Southern Highway Project. Based on informal consultations, this is crudely estimated in Appendix 3 - Map of Land Pressures. Evidence points to pressures for land conversion interfacing with the Columbia River, Deep River, and Maya Mountains Forest Reserves in the Toledo District, the Cockscomb Basin Wildlife Sanctuary in the Stann Creek District. Additional agricultural expansion pressures are mounting along the Manatee, Sittee River and Sibun Forest Reserves, and the Mountain Pine Ridge and Burdon Canal are experiencing tourism development and urban expansion pressures respectively. The privately managed Rio Bravo Conservation and Management Area is under threat by surrounding agricultural communities as is Freshwater Creek Forest Reserve (which has already been partially excised) in the north.

Population pressure

In 1993, a UNHCR survey found that the total country-wide population, including Belizean nationals, immigrants, recognized refugees and undocumented and documented immigrants was at 236,252 persons. This is approximately 15% larger than the officially projected population figure for 1992 of 199,000 persons, estimated from the National Population Census conducted in 1991. This report assumes that the 236,252 figure was roughly correct, however it assumes that population growth trends and regional pressures are more important than agreeing on an exact population figure. Annual population growth was 2.7% between 1980 and 1991. Urban growth was estimated at 1.5%, while rural growth was estimated at 3.2 % with some districts (Toledo) experiencing annual population increases of up to 4.7%. Although there is some evidence that these rapid growth rates are declining, there is still ample need to worry about the effects of this growth and the fact that 44% of Belize's population is under the age of 14.

Poverty and deforestation

Rural poverty is more intense in the Southern Districts of Toledo and Stann Creek. Land shortages compounded with pressures from landless poor have resulted in increased degradation of the natural resource base in these and other areas under pressure (see Appendix 3 - Map of Land Pressures), particularly threatening forest reserves and protected areas. Measures which are recommended in the Annex I on Land Use and Land Allocation hold that modifications of land allocation practice and increasing land taxes on privately held lands would increase availability of lands for agricultural purposes, which would certainly have positive impacts by: increasing availability of land resources for the landless poor and decreasing pressures on fragile ecosystems and lands otherwise unsuitable for agricultural exploitation. Surveys have also shown that small farmers are receptive to more stable farming practices (Pulver & Arya, 1993) which would encourage farmers to move away from practicing shifting agriculture and reduce potential migration into Forest Reserves and Protected Areas. Efforts are particularly important in areas under pressure.

Demand for land and agricultural expansion

There are limited amounts of good agricultural land in Belize (only 16%). The emphasis of the Belizean economy however has been based on development of the agriculture sector. The policy of the Government has been land for all its citizens despite the fact that there is very little land suitable for agricultural development. This has naturally led to increased pressure to convert forest lands for agricultural purposes (see Annex I). Studies have shown that based on current agricultural practices and assuming high population growth the land requirements in the Cayo, Stann Creek and Toledo Districts will result in continued encroachment into Forest Reserves and Protected Areas, increased hillside clearing and agricultural expansion at unsustainable rates. (The recent reduction in immigration rates from neighboring contries into rural areas should somewhat reduce rural population pressures and agricultural expansion). Already there are reports of widespread hillside clearing in the Stann Creek District, deforestation and declining fallow periods in the Toledo District and incursions into the Mountain Pine Ridge Forest Reserve in Cayo District.[6] It is estimated that expansion can be slowed (but not stopped) using intensified agricultural practices and improving demarcation and monitoring of Forest Reserves and Protected Areas.

Southern Highway Project

The Southern Highway Project is likely to increase pressure for agricultural expansion with subsequent repercussions on forest lands in Southern Belize. Mitigating the impact of the road is critical to ensure the safeguarding of key ecosystems and species. Land use planning and measures (see Annex I - Land Use and Land Allocation) and community involvement, especially in forest fringe communities should be supported by the project and carefully monitored.

Inappropriate land use

As noted previously, land planning specialists have estimated that about 16% of Belize is suitable for agricultural purposes. Recent LIC data shows that 15.56% of land is under agriculture. Given that land converted for agricultural purposes does not always correspond to suitable land use, some lands suitable for agriculture are still available, however these remaining lands are not always particularly accessible. In Belize, some 42% of lands are privately owned, other reserves, including Forest Reserves and Protected Areas total 34%, and leased land is at roughly 11% leaving approximately 13% of national land, little of which is suitable for agricultural expansion as a land bank. King, et al. (1993), classified lands according to their potential for agricultural use. Grades 1 and 2 are those best suited for agricultural purposes. It is estimated that some 7,000 ha of Grades 1 and 2 agricultural lands are within Forest Reserves and Protected Areas. The total of national lands representing Grades 1 and 2 is 369,000 ha,[7] of which 7,000 represents only 1%. Grade 3 land, while occurring with greater frequency in Forest Reserves and Protected areas, requires "skilled management"[8] due to its marginal potential. It is unlikely that agriculture would be considered "best use" for these marginal lands given the need for inputs. The Forest Department should

[6] Pulver & Arya 1993.
[7] King et al., 1993.
[8] King et al., 1993.

clearly focus its priorities maintaining the overall immutability of forest reserves and protected areas (given their limited agricultural value) by clearly demarcating, strengthening management of those areas which are likely to come under the most intense pressures and by actively participating in the land planning process.

Nonetheless, given the above situation, the small percentage of good agricultural lands which are under protection is of some interest to farmers and therefore land use planners. The Forest Department recognizes that a land shortage is looming on the horizon and is very concerned about the current appropriation of unsuitable lands for agricultural use. Where lands are already under agricultural production and where land resource assessment is consistent with good agricultural potential, the Forest Department is willing to discuss dereserving for agricultural use. While this is commendable, this process will be largely dependent on an appropriate land use planning mechanism being adopted and very effectively implemented (see Annex I - Land Use and Land Allocation), not continuing to condone past illegal incursions. Protected areas which are critical for biodiversity or watershed protection, etc., should not be considered at all. An evaluation of areas critical for biodiversity conservation has been made in the NPASP document and this information should also be used in evaluating where land use planning requires the explicit guidance of the Forest Department where forest reserves and protected areas are under threat.

Currently, forest lands (particularly forest reserves) are been and continue to be dereserved without appropriate planning. This occasionally has led to inappropriate use and deforestation in areas which are often best suited for protection. There are several examples of forest lands being appropriated for agricultural use which have failed due to the poor soils upon which they were located. For example, several efforts to grow citrus on marginal lands have resulted in short term economic gains, however, the soils are in fact marginal, require significant inputs and likely to be exhausted in the medium-term. Citrus growers admit that citrus groves on marginal lands (for instance sloping lands) have in fact required costly additional inputs—and have not proven to be cost effective in the medium term. Land has been dereserved both for protective purposes (becoming National Parks for instance) and development purposes, sometimes significantly altering the land areas under the authority of the Forest Department.

Agricultural practices

The limited area of land suitable for agricultural proposes would lead one to assume that agriculture should increasingly focus on diversification, intensification and research. Unfortunately, poor land allocation and planning, inappropriate fiscal incentives and inadequate resources for development of the agriculture sector have contributed to the clearance of forested lands unsuitable for agriculture. Milpa farming has resulted in large swathes of cleared forest lands. Expansion of the citrus industry has also resulted in land conversion—not always on suitable lands, and sometimes resulting in excisions of forest reserves. If citrus prices fall from current levels however, only well managed citrus plantations on suitable lands are likely to break even or profit.

Illegal logging, unsustainable felling and timber production

There is no accurate data available on the extent of illegal logging taking place in Belize. In the past (as recently as the early 1990s), illegal logging has resulted in significant losses in revenue and environmental damage for Belize. Unfortunately, little data is available to quantify the extent of the problem. The Quintennial Review of the Belize TFAP (1994) estimated that exports of Mahogany in 1992 exceeded the official Forest Department figure of Mahogany fellings by 74%. Plumptree (1993) estimates that the volume of lumber leaving Belize, mainly destined for Mexico is at least three times the officially recorded figure. Recently however, it is widely believed that illegal logging has decreased. This is due to the changed economic situation in Mexico (the destination of many illegally felled logs) and increased vigilance by the Forest Department together with the Belize Defense Force in Forest Reserves and particularly along the borders. Nonetheless, it must be ensured that monitoring and enforcement of Forest Regulations remain a priority of the Forest Department, to ensure maximizing potential revenues through legitimate concession licensing and ensuring sustainable forest production.

Despite the lack of accurate quantitative data, some estimates have been made informally of the sustained yield production feasible from the total area of Belize Forest Reserves. These estimates assume a sustainable Annual Allowable Cut (AAC) of 29,536 m^3 per year based on a 40 year cutting cycle. Taking the forested lands on national and private lands category, an additional 61,569 m^3 can be assumed, bringing the total AAC for Belize to approximately 91,000 cubic meters.[9] The AAC for Cedar and Mahogany has been separately calculated at 6,041 m^3 per year. Timber production in 1995 was 126,120m^3. Given that sawmill intakes for Cedar and Mahogany are approximately one third are for these two species, the AAC for Cedar and Mahogany is significantly abused and the overall AAC for Belize is also being exceeded. Forest production in Belize is clearly not being carried out in a sustainable manner, especially if losses from illegal logging, underinvoicing by volume and value of exports are also taken into account.

There is justifiable concern about the unsustainable logging of mahogany and certain hardwood species and the unlikeliness of additional hardwood being made available in commercial quantities. In 1992, it was estimated that Belize was possibly losing upwards of BZ$1.0 million (US$0.5 million) in revenue from uncollected royalties. If one divides the royalties collected in 1995 (US$457,500) by timber production figures for 1995 (4.6 million ft^3), the average royalty rate collected per ft^3 would be US$0.10 which is extremely low considering that almost one third of production is estimated to be mahogany and cedar (at a royalty rate of US$0.62), with other species ranging from US$0.06 to 0.26. Collection has improved somewhat (see Table 6), given that production (see Table 3) has only marginally increased from 1992. Collection of royalties could still be increased at least two-fold.

Table 6. Royalties collected on forest produce

Year	*US$*
1990	246,250
1991	252,550
1992	376,500
1993	381,500
1994	554,150
1995	457,500

Source: CSO 1996.

[9] Alder, 1993.

Belize has been experiencing a long term decline in forest production which is likely to continue without increased input into the forest sector. One of the objective of Belize's development plan objective is to revitalize and develop timber production and processing in the private sector. However, little has been done. There is currently no policy addressing the supply of timber from the private sector or from national lands for that matter. A number of studies have been completed which analyze potential expansion, however, without prioritization or resources, the recommendations are not being implemented. Although it is estimated that Belize is likely to be exceeding its Annual Allowable Cut, it is unable to meet its own requirements for forestry products. The Forest Department must seriously consider measures to be taken in order to continue meeting forest internal production and export demands (95% of export is to Mexico). At the same time, although a more careful analysis is needed to analyze this shortfall, these figures reinforce the need to increase the emphasis on sustainable conservation and use of the forest resources. Efforts to expand forest production sustainably in the private sector and on national lands should be explored.

Forest products industry

Studies indicate that the forest products industry is small, and economies of scale difficult to achieve. Recommendations for investment are therefore difficult. While the ban on the export of cedar and mahogany timber (>12" in cross-sectional area) may result in some increase in the production of processed wood in Belize, growth of the industry is constrained by the lack of equipment and trained, skilled staff. The ban on timber exports is unlikely to improve the forest products industry according to a study by Thomson (1995), although from a conservation perspective it may prove somewhat effective in the short term only. With regard to the ban on exports on timber it remains to be seen whether its impact will be positive from an environmental perspective, as the Thomson study also states that such bans can down the price of domestic logs giving "less incentive to maximize harvested volume from any specific tree." Tax concessions and fiscal incentives (such as exemptions on the duty of wood processing equipment) have been recommended to improve the competitiveness of the industry.

Resources

The most significant constraint to adequate planning and management of forests and Protected Areas is resources, both human and financial. The Government of Belize has recently undergone a "retrenchment" which severely cut the staffing of the Forest Department. Financial resources depend on the perception of value of the environmental goods and services provided by forests and protected areas and increased attributable revenue generation. At present, real and estimated quantifiable revenues to government and BAS being generated by forests and terrestrial protected areas under their mandate are presented at Table 7.[10] There is ample room to increase revenues generated by forests and terrestrial Protected Areas. Important steps have already been taken in this direction, i.e., PACT (see Box 3), however it is of critical importance to improve collection of revenues and to explore new revenue generating mechanisms. The Forest Department should work with communities (on a pilot basis first) to

[11] These do not include any estimation of the national values of watershed protection or erosion control, or more difficult aesthetic considerations, nor the global values of biodiversity protection, carbon sequestration.

increase collection of royalties. All programmed technical assistance projects should include development and implementation of revenue generation.

In addition, critical technical assistance which provided human resources, training and funding for implementation of critical programming is coming to an end. The USAID supported NARMAP project will be completed in June of 1996. The ODA supported FPMP project has been extended until 1998, however will be focusing on the management of only four Forest Reserves (Freshwater Creek, Chiquibul/Mountain Pine Ridge, Columbia River/Maya Mountains (portion of)). It is unlikely that ODA or USAID will be in the position to offer additional technical assistance in the future. NGOs are also experiencing a slowing in financing as they also relied extensively on external sources of financing which are coming to an end. The financial picture is therefore fairly bleak, underlining all the more importance to an exercise of prioritization and creative implementation and financing. More positively, there are indications that both UNDP and the Commission of European Communities will increasingly support environmental priorities with an emphasis on community level intervention and tourism respectively. Both of these can certainly be oriented towards the planning and management of forests and protected areas. GEF is currently developing its Meso-America Biological Corridor Regional Project which has significant implications for several Forest Reserves and Protected Areas in Belize. GEF is also is continuing to fund its Small Grants Program at an increased level. These scarce resources will have to be carefully guided to ensure that the critical needs of Belize are addressed.

Table 7. Real and estimated revenues generated by forests and terrestrial protected areas

Real revenues (1995)	*US$ ('000)*
Forestry permits	174
Royalties from forest produce	457
Protected area entrance fees (1993)	88
Hol Chan and BAS managed areas only	not known
Watershed protection/erosion control	unquantifiable
Potential revenues (1996)	
Forestry permits (moving towards auctioning)	not known
Improved collection of royalties from forest produce	914
Expanded or increased protected area entrance fees (US$5.0 x110,000)[a]	550
Introduction of park concessions	not known
PACT (US$3.25 x 150,000)[b] (collection of conservation fee only)	488
Introduction of protected areas use license	not known
Watershed protection/erosion control	not known
Carbon sequestration (Rio Bravo Pilot Project) $2.6 million over 10 years	260
Global benefits	not known

a. NARMAP (1996): Assumes increased protected area visitation from 40% to 88%) and growth in tourism.
b. 133,097 visitors in 1995.

4 *Conclusions and recommendations*

Conclusions

Forest sector development in Belize should move towards sustainable use based on increased growth of eco-tourism and increasing the perceived importance of protective functions of the forest sector. Given the small timber production (and agricultural) potential of Belize, and the fact that environmental goods and services provided by Belize's forests may

soon surpass the value of traditional forestry products, it is important that the full range of forest goods and environmental services integrated into land use policy and forest management policy. Belize's recently drafted Development Strategy reflects the increased importance of the tourism sector and supports the move from resource mining to sustainable use and recognition of the signficant value of Protected Areas and their contribution to this sector.

Land Management. Agricultural expansion is the largest threat to forest lands and to a certain degree is inevitable given the government's policy of land for every citizen and its emphasis on development. Improved land allocation procedures and land use management will decrease the problem of unsustainable land use allocation and ad hoc leases inside Forest Reserves. Increased use of the Land Information System and Geographic Information System, which has been established in the Lands and Survey Department, will contribute to improving the allocation process and optimize appropriate land use and management (see Annex I - Land Use and Land Allocation). The NPASP document should be used to guide Forest Department input to the planning process where difficult decisions need to be made potentially affecting areas which are critical for protection purposes. While underlining the critical environmental goods and services provided by Forest Reserves, on an exceptional basis and only on the basis of informed and pragmatic decision making, the Forest Department would have to consider divesting itself of certain lands deemed highly suitable for agriculture to avoid the potential loss of more fragile forest areas more suitable for protective purposes. This type of compromise would hopefully result in more fragile lands being maintained under forest cover and those more suitable for agricultural production being made legally available. Nonetheless, the Forest Department should not give in to community pressures to excise Forest Reserves before alternatives for more sustainable and intensive agriculture are explored. Increased prioritization should be given to the Department of Agriculture in developing agricultural production alternatives which would increase sustainability of agricultural practices, and reduce shifting agricultural practices and consequently demand for land. While decentralization of the planning process is supported, guidance from the technical perspective needs to be provided by senior level officers.

Forest Reserve and Protected Area Management. Together with the Ministry of Agriculture and Fisheries and The Ministry of Tourism and Environment, relevant NGOs, communities (through local government) and the private sector, the Forest Department should explore alternative means of safeguarding and managing forest resources and in particular Protected Areas. Innovative projects which meet conservation objectives and explore alternative means of management and revenue generation (outside of extraction) in the forest sector should be developed together with Village Councils, community based organizations, and NGOs where appropriate. Pilot schemes to explore the potential of local management together with a percentage of fiscal returns going directly to the managing body should be initiated. Based on satisfactory performance, the relationship between Belize Audubon Society and the Forest Department should be extended and strengthened and the model adapted and replicated with other bodies (including community level management) where suitable. The quest for additional resources for the management of protected areas should be supported in a collaborative manner by both the Forest Department, relevant Ministries and these other bodies.

Coordination of efforts regarding management of Protected Areas will have to be ensured by taking some formal steps to establish a coordinating body—this has been suggested by the NPASP and alternatives should be further explored by all parties involved. Those areas which have been suggested by the NPASP as necessary to ensure adequate representation of ecosystems, protection of critical habitats and species in the protected areas system, should be designated as soon as possible.

Timber production. In real numbers, it appears that there is little room for expansion of timber production from natural forests, but efficiency can be improved, and additional species explored. In order to improve sustainability of ongoing operations, there is a need to strengthen capacity to: manage available resources, ensure sustainability of current extraction, monitor ongoing logging and improve the availability of data. Delineating areas deemed suitable for production forestry and drafting management plans is a much needed and important initiative which should continue to be supported and replicated. Support for sustainable forest production on private lands should become a priority. The extent to which forest products industry expansion is possible has been addressed in a number of studies. It is now up to the Forest Department to respond to specific recommendations by prioritizing their work program.

NGOs. NGOs are encouraged to strengthen their role in the areas of land use planning and forest management. This would be facilitated by increased transparency of the land allocation and land use systems. All the NGOs require access to additional resources in the form of grants or revenue generating mechanisms to tackle the issues with which they deal. NGOs should continue to strengthen and build on means of becoming self-sustaining with respect to operating costs. Options with regard to revenue generating alternatives such as eco-tourism ventures should be further explored with support from the private sector (particularly tourism), more developed countries and partnerships with international NGOs.

General conclusions. In conclusion, forest and Protected Area conservation and management issues can be successfully addressed through improved implementation of policies, prioritization of actions, creative revenue generation and targeted investment and technical assistance. On a more specific level, increased contribution to GDP and a more accurate quantifiable accounting of environment goods and services provided by the forest sector would greatly increase political will internally. This issue could be at least partially addressed through: (i) increased communication at the inter-ministerial level; and (ii) improving awareness of the forest sector's contribution to tourism, watershed protection, Biodiversity, as buffer zones for national parks, potential forest production and its role in safeguarding future options.

Improved management capacity could be achieved through more streamlined prioritization of actions and targeted technical assistance. Recommendations of this report have the following objectives; (i) ensure that planning takes into account the full range (and limitations) of goods and services provided by forest lands and products; (ii) increased management and revenue generation capacity of the forest through conventional and alternative means (including private sector, community and NGO involvement); (iii) increased guidance of technical assistance to ensure implementation of critical actions and realization of appropriate priority research (i.e., sustainable agriculture and forest production) and; (iv) adopt

fiscal, institutional, and legal measures which support forest production on a sustainable basis and maximize revenue generation.

Recommendations

1. Strengthen land use planning vis-à-vis forest (and protected area) goods and services

Ensure contribution of Forest Department (and scientific community) input, at senior levels, to the development and implementation process of special development areas. Priority in this area accorded to Special Development Areas (SDAs) which interface with forested lands and where pressures for agricultural expansion and population growth are the highest (see Appendix 3 - MAP of Land Pressures). Land use planning should prioritize the input of the Forest Department to SDAs specifically in forest fringe communities where conflicting demand for land use requires informed decision making, mitigation and negotiation in an integrated manner. Consultation with local government, community leaders and community dwellers on developing priorities for land use which impact on the forest domain should be a priority. This process should be led by the Minister of Natural Resources. The requirement to clear land as part of leasing arrangements should be lifted without further delay so as not to support deforestation.

Develop management plans for critical areas. The possible cooperation and assistance of Physical Planning should be explored by the Chief Forest Officer (with input from the Principal Forest Officer - Management and Forest Officer - Conservation).

Improve inter-ministerial coordination and communication on potential of forest functions with relation to land use. This recommendation goes hand in hand with the two above. The Forest Department should take part in the above process to consider concessions and commitments on long term land needs and priorities with specific physical targets. The proposed land use policy currently in draft should incorporate these decisions. Like wise the Hydrology Department should actively participate to ensure adequate protection of key watersheds. Inter-ministerial coordination, communication and increased use of the recently established Land Information Center (LIC) is recommended at the technical level and the decision makers level.

Improve access to completed reports. The Forest Department should review and prioritize the recommendations of reports completed under TA projects and take a more pro-active role in general in publicizing the role and potential of the forest to decision-makers, the general public and NGOs. This exercise should be carried out internally.

2. Strengthen forest and protected area management and increase revenue

Extend the preparation of management plans to Forest Reserves not currently encompassed by FPMP. It is the mandate of the forests to develop management plans for these reserves to support the above recommendation and also to underscore the valuable contribution of Forest Reserves to Belize with regard to tourism and their great importance in terms of environmental goods and services. Explore NGO and community based management and revenue generation options for Forest Reserves and forest fringe communities.

Draft management plans for Protected Areas not currently encompassed by the BAS agreement. Priority should be accorded to those areas considered critical by the NPASP report which interface with strong population pressures and agricultural expansion trends (see Appendix 3 - Map on Land Pressures). Increase possibilities for revenue generation through visitor (and other) fees. Explore NGO and community based management and revenue generation options for protected areas and forest fringe communities.

Develop and implement pilot Forest Reserve or Protected Area management plan complete with fee structure, concessions, national and international study tours, handicrafts ideas and community planning. This should be developed under planned TA (such as GEF - Meso America Biological Corridor or EC/UNDP TA). Criteria for site selection should include potential for visitation and need for intervention based on level of pressure.

Develop innovative arrangements to strengthen enforcement and monitoring capacity for forest management. Bodies, such as the Belize Defense Force and local law enforcement bodies, forest fringe communities (local government) and NGOs, may be helpful, as suggested in previous studies; the deployment of a certain amount of border guards or the mere presence of (knowledge of) monitoring bodies in key areas would greatly impact on the level of incursions into the forest and the transport of illegal lumber. Increase training for forest guards and rangers as well as interested communities and NGOs specific to their potentially important role in deterring to illegal logging and incursions. The Village Councils Act should be amended to empower village councils in the monitoring of Forest Reserves and Protected Areas.

Improve capacity to collect and analyze statistics. For example: forest products industry statistics, records by district, accounting of log exports, collection of royalties, etc. The lack of accurate, quality data is affecting the process of policy formulation. The private sector, communities and law enforcement bodies could all participate in such efforts particularly if there was financial incentives (for communities and private sector anyway). Sawmills could be licensed with requirements for statistical returns and maintenance of wood intake and output by species. Spot checking, given the limited manpower available would be required to monitor such efforts. A percentage of the fines or royalties collected on logs/timber otherwise illegally exported could be allocated to the monitoring body (community).

Enact key legislation. There are some key pieces of legislation currently being revised which are important in enabling the improved management of forest and in particular Forest Reserves and Protected Areas. These include the Forest Act as well as the Wildlife Protection Act, the National Parks System Amendment and National Park Regulations. Their enactment is vital in order to provide the legal basis for sustainable management of forest resources. Despite only minimal resources to implement such legislation, it is nonetheless very important to have a framework from which to proceed.

3. Increase sustainability of agriculture

Most importantly, application of sound land use planning using existing knowledge of land use suitability should guide any further agricultural expansion. In addition, however, the key to reducing land conversion attributed to agricultural extensification is to introduce sustainability into agricultural practices—loss of soil fertility is an important constraint to the agricultural sector. Also, increasing local consultation and participation to improve and introduce agricultural practices is critical as is the need to increase access to credit at lower levels of interest (through technical assistance projects). To prepare for changes in the trade regime, there is a vital need to increase agricultural research. In view of the limited resources currently available to Belize, technical assistance needs to be targeted towards adaptive research to establish new cash crops and to explore marketing possibilities. While cautiously recommending intensification rather than extensification, there is a critical need to review the current and potential impact of agricultural pollution (see Annex I) and to ensure that intensification is developed in an environmentally sustainable manner especially in terms of potential impact on water bodies and the globally important barrier reef.

4. Adopt measures to ensure sustainability of forest production and increase revenue generation

All forest concessions in Forest Reserves should have forest management plans based on sustained yield. Concessions which are not based on sustained yield management should not be granted. Forest concession licenses should be granted based on competitive bidding.

Fiscal incentives should be made available to private producers to increase revenues from limited forest production. Consider export taxes on logs as well as lumber rather than an export ban, this would increase the incentive to supply domestic processors. Impose export quotas which could be auctioned off rather than outright export bans. Provide limited fiscal incentives to timber processors such as: exemptions from tax duties on imports of equipment. Remove royalties and grant tax concessions on sustainably managed private production forests. Require licensing of sawmills. As in the mining sector, require performance bonds to ensure that loggers adhere to sustainable practices.

Develop a pilot project, with a forest fringe community (Village Council), to monitor a specific concessionaire or a forested area which is under pressure from illegal logging activities (border areas). Compensate participation of village with percentage of royalties which would have been foregone from illegal logging activities, sawmilling activities, etc.

Develop a policy and strategy for management of forest resources held by the private sector. Redirect some Forest Department resources towards providing guidance to the private sector. Revenue generation is possible based on services offered (sustainable management plans for production forestry at a fee).

Strengthen and support marketing initiatives. Ensure cooperation between government, private loggers and PfB in PfB's efforts to explore marketability of secondary species.

Explore replicability of PfB's Carbon Sequestration pilot project when Government of Belize has adopted a policy position.

Increase efficiency of private sector through training programs and exchange of technical programs supported by technical assistance. Establishment of nurseries and plantations. Explore interest of private sector.

Replicate the option of wealthier international NGOs adopting management control of protected areas in cooperation with the Forest Department ("Adopt a Park"). Also explore individual corporate sponsorships. Such initiatives would reflect the global benefits of safeguarding of Belize's natural patrimony.

Table 8. Prioritized recommendations

Priority	*Recommendation*	*Responsibility*	*Financing (Potential)*
Short Term	**Land use planning:**		
	- ensure contribution of FD input, at senior levels, to the development and implementation process of Special Development Areas (with priority accorded to Special Development Areas (SDAs) which interface with forested lands and where pressures for agricultural expansion and population growth are the highest - see Appendix 3 - MAP of Land Pressures).	Ministry of Natural Resources (FD, and Land Utilization Authority)	GOB
Short Term	**Forest and protected area management and revenue generation**		
	- pilot project - Develop and implement pilot Forest Reserve or Protected Area management plan complete with fee structure, concessions, national and international study tours, handicrafts ideas and community planning. Criteria for site selection should include potential for visitation and need for intervention based on level of pressure.		GEF —MABC, UNDP
	Develop innovative arrangements to strengthen enforcement and monitoring capacity for forest management:		
	- with other bodies, such as the Belize Defense Force and local law enforcement bodies, forest fringe communities (local gov't) and NGOs. The Village Councils Act should be amended to empower village councils in the monitoring of Forest Reserves and Protected Areas.	FD, BDF, Village Council	EC, UNDP
Short Term	**Increase sustainability of agriculture:**		
	- in view of the limited resources currently available to Belize, technical assistance needs to be targeted towards adaptive agricultural research to establish new cash crops and to explore marketing possibilities.	Department of Agriculture	IDB
	- review the current and potential impact of agricultural pollution and to ensure that intensification is developed in an environmentally sustainable manner.		EC
Short Term	**Support sustainable forest production and increase revenues from forest production:**		
	- prepare forest management plans, based on sustainable yield for all forest concessions in Forest Reserves.		
	- issue concessions licenses based on sustainable yield management plans only based on open, competitive bidding	FD	GOB
	- Develop a pilot project with a forest fringe community (Village Council), to monitor a specific concessionaire or a forested area which is under pressure from illegal logging activities (i.e., border areas). Recompense participation of village with percentage of royalties which would have been foregone from illegal logging activities, sawmilling activities, etc.. .	FD, Village Council	IDB, UNDP, EC
Med.- term	**Strengthen land use planning:**		
	- improve inter-ministerial coordination an communication on potential of forest functions with relation to land use.	FD	GOB
	- improve access to completed reports. The FD review and prioritize the recommendations of reports completed under TA projects and take a more pro-active role in general in publicizing the role and potential of the forest to decision-makers, the general public and NGOs.	FD	FPMP
	-develop management plans in place in critical areas (see next box)	FD	tech. assistance (TBD)
Med.-term	**Forest and protected area management and revenue generation:**		
	- extend the development and implementation of management plans to Forest Reserves not currently encompassed by FPMP and Protected Areas not assumed by BAS	FD, local gov't, NGOs	Corporate sponsors Int'l NGOs bi- and multi-lateral tech. assistance
	- enactment of key legislation: Forest Act as well as the Wildlife Protection Act, the National Parks System Amendment and National Park Regulations.	Minister of Natural Resources	GOB
Med.-term	**Support sustainable forest production and increase revenues from forest production:**		
	- impose auctionable export taxes on logs (as well as lumber) rather than an export ban, to increase the incentive to supply domestic processors and generate revenues.	FD, Trade, Ministry of Econ. Dev.	GOB/ tech. assistance (TBD)
	- develop a policy and strategy for management of forest resources held by the private sector offer exemptions from tax duties on imports of forest processing equipment. remove royalties and grant tax concessions on sustainably managed private production forests. require performance bonds for all concessionaires to ensure adherence to sustainable practices.	Sawmills, Local Gov't communities	
	- require licensing of sawmills (with requirements for statistical returns).		
	- improve capacity to collect and analyze statistics (i.e., forest products industry statistics, records by district, accounting of log exports, collection of royalties, etc.).		
	- explore replicability of PfB's Carbon Sequestration pilot project when Gov,t. is ready to take a position on policy.		
	- replicate the option of wealthier international NGOs adopting management control of protected areas in cooperation with the FD ("Adopt a Park").		
	- explore individual corporate sponsorships. Such initiatives would reflect the global benefits of safeguarding of Belize's natural patrimony.		
Long-term	**Support sustainable forest production and increase revenues from forest production:**		
	- establishment of nurseries and plantations	Private sector	
	- Increase efficiency of private sector thorough training programs and exchange of technical experiences	FD/ Private sector	

MABC=Meso America Biological Corridor.
FD=Forest Department.
*Medium-Term=1-3 years .

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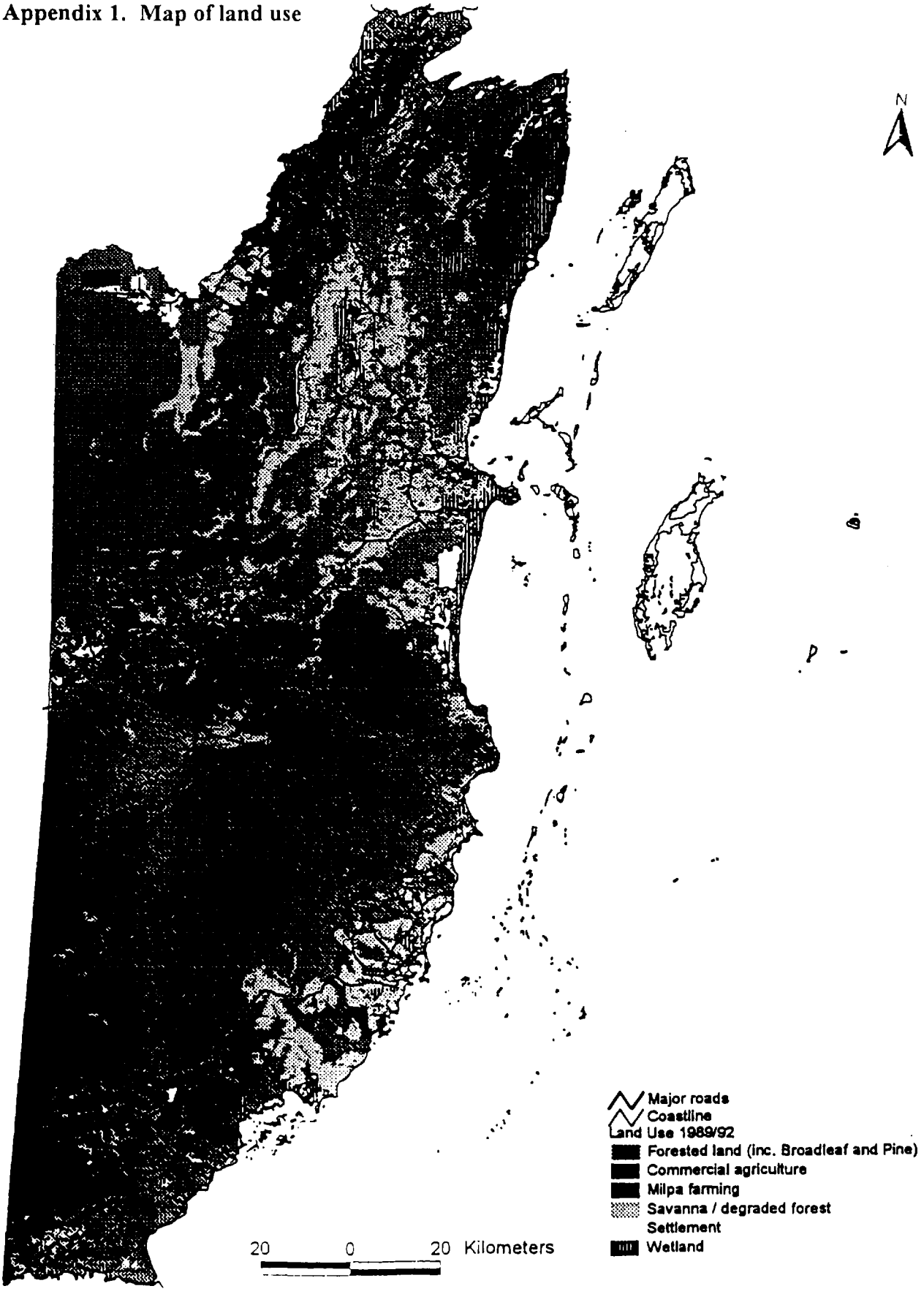
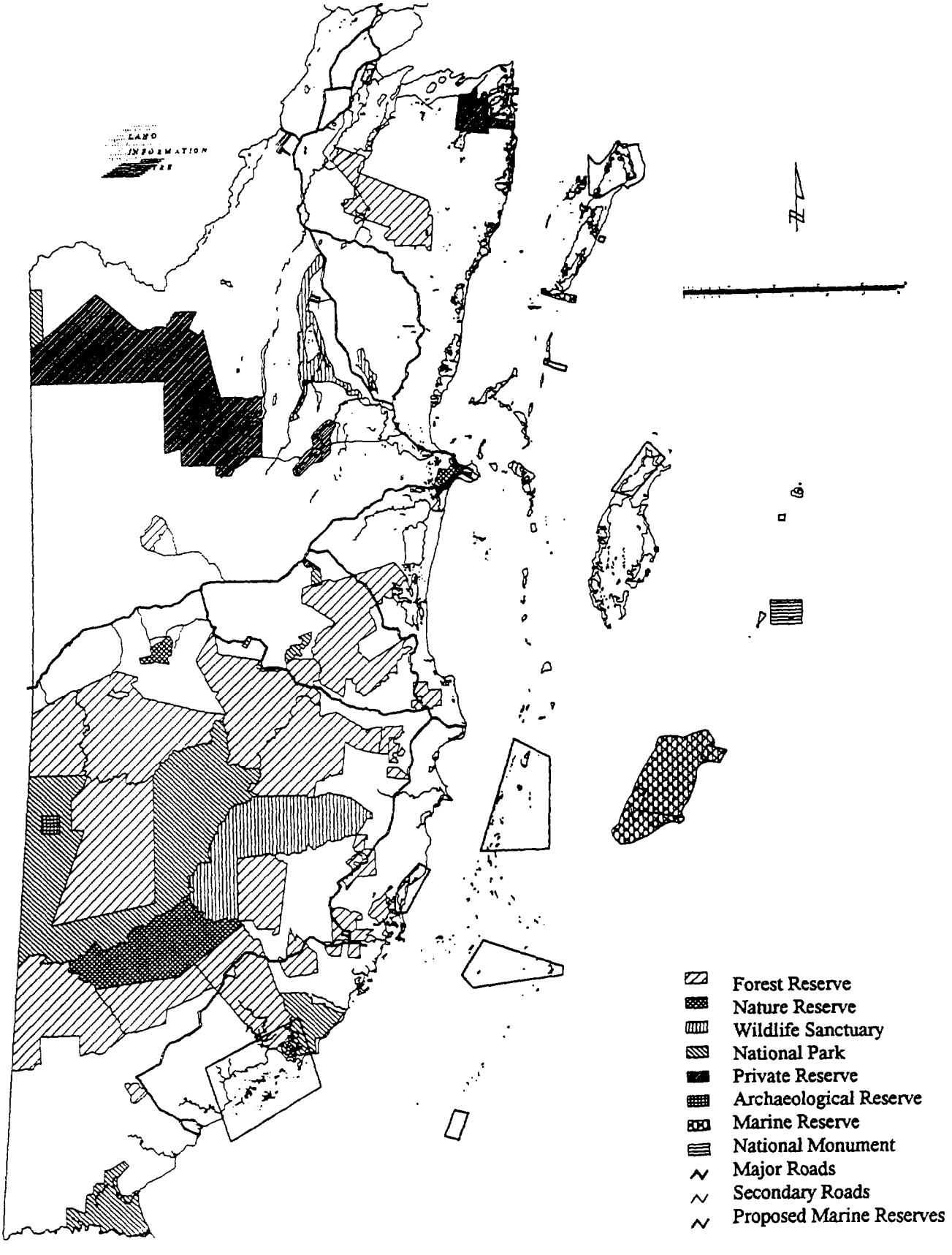
Appendix 1. Map of land use

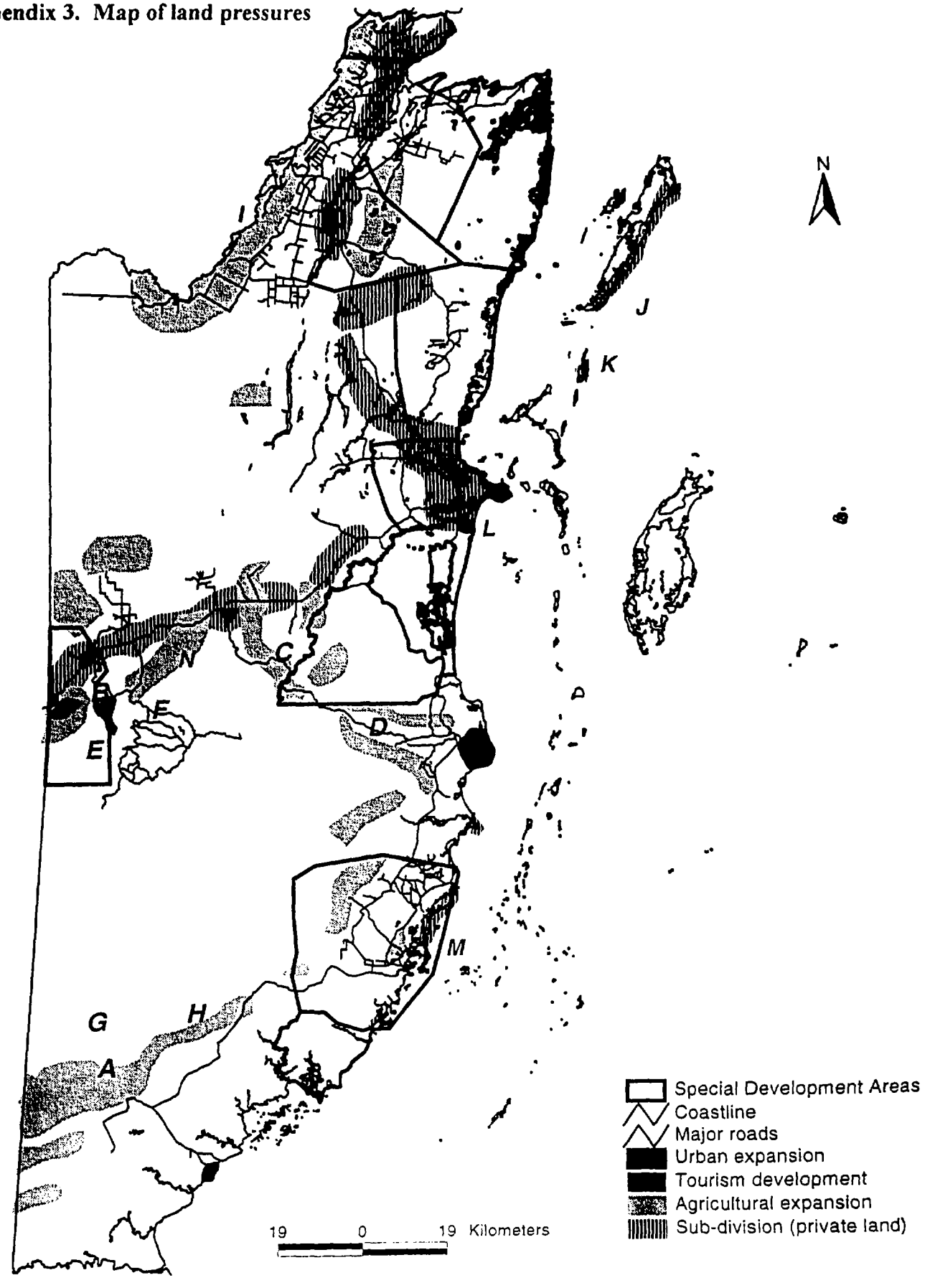


Source: Land Information Centre

Appendix 2. Map of Forest Reserves/Protected Areas



Appendix 3. Map of land pressures



Source: Lands and Survey Department, BCES, Coastal Zone Management Project

Annex III

BELIZE

Coastal Zone Management

May 30, 1996

World Bank
Caribbean Division
Country Operations III
Latin America and the Caribbean Region

Contents

Abbreviations

BECES	Belize Center for Environmental Studies
BOD	Biological Oxygen Demand
BTB	Belize Tourist Board
CARICOMP	Caribbean Coastal Marine Productivity
CFRAMP	Caribbean Fisheries Resource Assessment and Management Program
CHPA	Central Housing and Planning Authority
CZM	Coastal Zone Management
CZMC	Coastal Zone Management Committee
CZMP	Coastal Zone Management Project
CZMU	Coastal Zone Management Unit
DOE	Department of the Environment
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
FPMP	Forest Planning and Management Project
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GIS	Global Information Systems
HIID	Harvard Institute of International Development
ICRI	International Coral Reef Initiative
ICZM	Integrated Coastal Zone Management
LIC	Land Information Center
LUA	Land and Utilization Authority
MR	Marine Reserves
NARMAP	Natural Resources Management and Protection Project
NEAC	National Environmental Action Committee
NPAP	National Protected Areas Plan
ODA	Overseas Development Administration
PACT	Protected Areas Conservation Trust
SDA	Special Development Areas
TOA	Tour Operations Association
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
UWI	University of the West Indies
WASA	Water and Sewer Authority

Summary

The Belizean barrier reef is the second longest in the world, after the Australian Great Barrier Reef, is one of the "Seven Underwater Wonders of the World" and is currently a candidate for designation as a World Heritage Site. The state of the coral reef was designated by a Smithsonian expert as pristine in the 1970s, but more recently as "almost pristine." Approximately half of Belize's national territory is under the sea.

The main threats to the reef are from: a) algae growth, which destroys live coral, and is stimulated by the nutrient enrichment of rivers and coastal and marine waters from heavy fertilizer use, principally on bananas, domestic sewage pollution and agro-industrial effluents; b) sediment in marine waters which prevents sun and light reaching the reef and occurs because of soil erosion from agricultural practices, clearcutting and deforestation, marine dredging and sand mining, and destruction of seagrass beds and mangroves, which destroys their function as filters; and c) declining water quality from agrochemicals, industrial wastes, and plastics. The ecological balance of the reef is disrupted by overfishing of certain species, hurricanes which cause serious damage to the coastal zone, and uncontrolled diving, commercial and sports fishing which can cause localized damage. Periodic threats arise from oil-drilling and movement of rigs in coastal areas and the potential for an oil spill is constant.

Some 40 percent of Belize's population lives in the coastal zone and most of the commercial, residential and tourism-related building permits issued in Belize in recent years have been for construction in coastal areas. Production of citrus fruit, banana, sugarcane and aquaculture has expanded on the fertile coastal plains and along the coastal watersheds. Principally, the coastal area supports tourism and fisheries: fisheries account for 3.5% and tourism 16% of GDP, with some 80% of all tourist accommodation in the country located on the coast and cayes. A quantitative estimate of the commercial value of the reef to Belize, even combined with its unquantified functional values as sink, filter, habitat and breeding ground, and stabilizer and buffer against coastal erosion, understates its value to Belize and to the world as a whole.

Main Recommendations

Fisheries. Sustainable management of fisheries resources is integrally related to the health of the reef and its environs, as well as to the income and employment generated by the fishing sector. The Fisheries Department will need to continue policies that provide both incentives and penalties for non-compliance with seasonal and size and weight regulations related to fishing of targeted species. License fees for fishermen and boats should be reviewed regularly and should be used as a disincentive to the expansion of fishing when necessary. At present, manpower and funding constraints prevent adequate monitoring and enforcement of existing regulations to protect specific species. Diversification of exploitation of marine resources should help to redress depletion of lobster and conch resources, always provided that the new commercial activities are profitable and are accessible to individual fishermen. The Fisheries Department will need assistance to develop strategic and management plans for diversification of fisheries.

Aquaculture. Although potential negative impacts are not yet evident at the current level of development, there are concerns over rapid expansion and the introduction of non-native species. Aquaculture producers, in turn, are concerned by the impact of intensive agricultural production in citrus and bananas on mariculture activities. The impacts of pollution from pesticides and fertilizers, as well as the disposal of waste from these industries in coastal areas, have a damaging effect on water quality as well as on the mangroves, on whose natural productivity the fisheries depend. Given its rapidly growing export value, aquaculture activities will require close surveillance and regulation to ensure that they are neither the recipients of agricultural pollution nor the cause of coastal zone degradation.

Tourism. The interests of the tourism sector, which has considerable potential for growth, require that the coastal zone remain pristine. If it does, tourism can be a major source of conservation revenues. Recommendations for this sector are contained in Annex VI: Tourism.

Administration of the Coastal Zone. Currently, the Coastal Zone Management Committee (CZMC) and the Coastal Zone Management Project (CZMP) Steering Committee ensure coordination at senior and technical levels between the various agencies with responsibilities in the coastal zone. That coordination has also improved through the participation of key agency representatives in the National Environmental Action Committee (NEAC), established by the Department of the Environment (DOE) to evaluate environmental impact assessments. The CZM Unit (CZMU) has helped to focus attention on the critical issues that face the coastal zone beginning with the vitally required monitoring and evaluation of the health of the coastal zone. Should the current proposal to convert the CZMU to a statutory body not be approved, measures must be taken to ensure the continued operation of so valuable a technical body. While the CZMU should continue to concentrate on the complex issues relating to the coast, the DOE should retain its national mandate for control and prevention of pollution, since many of the sources of pollution that affect the coastal zone originate on land.

Monitoring and Management. The DOE needs continued funding for its ongoing national water quality monitoring program since most of the impacts on the coastal zone occur on land and are carried to the coastal zone by rivers and streams. The CZMU needs continued financing for its critical coral reef monitoring program to determine the health of the reef and provide baseline data from which to measure the impacts of the mitigation and management programs to be developed. These two studies complement each other and both are high priority.

Belize currently has only two marine reserves: Ho Chan and Glovers Reef; several other marine protected areas have been identified but, in most cases, lack management plans. NGOs in Belize have been entrusted by the Government with the management of protected areas to an unusual and laudable degree. Their continued participation in management of marine reserves will be essential if management is to be effective. The CZMC recently produced a development policy for the Cayes and planning guidelines for the Turneffe Islands. Since nearly 70% of the cayes are already claimed through lease or ownership by individual Belizeans and since the mainland shoreline attracts urban and tourism development, Belize urgently needs assistance with zoning and planning for the entire coastal zone.

Efforts by Belize to control pollution of its coastal waters will be ineffective without the cooperation of its two neighbors: Mexico and Guatemala. Mechanisms are in place for a dialogue with Mexico but need to be created with Guatemala.

The costs of water quality and reef monitoring studies, of zoning and planning and of implementation of related mitigation and management programs are high, but these costs should be weighed against the costs of inaction: loss to the world of a unique resource and loss to Belize of foreign exchange and employment from fisheries and tourism. Tourism in particular has high potential for growth and it is urgent to preserve the natural assets on which it is based.

Financing of Coastal Zone Conservation. This report proposes that a "Belizean Barrier Reef Foundation" be established, managed by the CZMU, which should continue to receive external assistance until it is strengthened and self-financing. The objective would be to raise funds from external and internal sources for conservation of the reef and the coastal zone. All of the current and other proposals for revenue generation in Belize should be examined. The Foundation would promote its objectives in Belize and abroad and would create appropriate financial mechanisms to raise funds. The Foundation should be designed to receive funds from a variety of sources, including development agencies.

The Foundation's long-term objective should be to establish an endowment to finance management of the protected areas and implementation programs for sustainable uses of the coastal zone. The immediate objective would be to finance the work of monitoring the reef and the causes of coastal zone degradation, mitigation of these impacts and management of sustainable uses of the coastal zone, through planning and zoning, economic incentives and regulations. Most of the funding would finance the work program of the CZMU, but the DOE should receive funding for specific studies such as its current water quality monitoring program, the Fisheries department for plans to diversify exploitation of marine resources, and tourism agencies to develop a strategy and management plan for tourism.

The preservation of the reef is of global importance but its sustainable use is essential to Belize, which may become even more dependent on fisheries and tourism if protected markets for bananas, citrus and sugar become less favorable in future. A cooperative international effort would appear to be the only way to attain global and national objectives.

1 Overview

The Belizean barrier reef is the second longest in the world, after the Australian Great Barrier Reef, is one of the "Seven Underwater Wonders of the World" and is currently a candidate for designation as a World Heritage Site.[1] The continental shelf is 275 km long and 15-40 km wide. The coastal area is a complex system comprising the 220 km barrier reef, the three offshore atolls, many patch reefs, extensive seagrass beds, hundreds of cayes bordered by sand and mangrove, dense mangrove forests, and lagoons and estuaries. In 1993, Belize extended its territorial limits from 3 miles to 12 miles—and its Exclusive Economic Zone to 200 miles—and as a consequence, approximately half of Belize's national territory is under the sea.

The NNE-SSW fault scarps can be traced across the shelf, creating a series of five ridges. The eastern two are over 1000 m below sea level, at the edge of the shelf which plunges abruptly to more than 3000 m depth. The western three ridges are in shallower water and form important coastal features that create four coastal divisions on a north-south axis: the Coastline, Inner Lagoon, Outer or Barrier Platform, and Coral Atolls. The coastal zone also divides naturally, on the basis of bottom sediments, bathymetry, depositional environment, salinity, currents and reef structure, into four regions from north to south: Ambergris, Belize, Stann Creek and Punta Gorda. (More detailed characteristics of each region and its divisions are contained in Appendix 1.)

The role of the coastal zone

The reef complex is of global importance in terms of its biodiversity.[2] The component ecosystems are closely interlinked, with activities in one having far-reaching impacts on another. They support many species of significant commercial value to fisheries and to other interests, such as the pharmaceutical trade. A number of species of commercial value depend on the seagrass beds (e.g., conch) and coastal waters provide a habitat for endangered species such as manatees, crocodiles, marine turtles and many species of birds. The mangrove environment provides an essential nursery area for juveniles of a number of commercial species. Furthermore, the reef, mangroves and seagrasses, play a critical role in stabilizing and protecting the coastline against erosion and storms, and can even lessen the impact of hurricanes on the coast and hinterland. The wetlands, including mangroves, of the coastal zone act as a natural sink for terrestrial run-off and pollutants, particularly from the sixteen major watersheds that drain into the numerous lagoons throughout the coastal area.

Some 40 percent of Belize's population lives in the coastal cities, towns and villages and this coastal population is estimated to have grown at over 8% in the decade to 1992. Most of the commercial, residential and tourism-related building permits issued in Belize in recent years have been for construction in coastal areas. Production of citrus fruit, banana, sugarcane and aquaculture has expanded on the fertile coastal plains and along the coastal watersheds.

[1] World Heritage Sites are natural or cultural sites of "outstanding universal value" identified by individual countries and recognized by the members of UNESCO.

[2] The scientific community is divided as to whether reefs function as sinks for carbon dioxide; if they do, the value of the barrier reef will be enhanced even more.

Principally, though, the coastal area supports tourism and fisheries, two major economic activities in terms of income and employment. Fisheries employ some 3500 people and tourism some 1800 directly in tourist accommodation and an unquantified number in tourism-related services. According to the Central Bank, fisheries account for 3.5% and tourism accounts for 16% of GDP. Currently some 80% of all tourist accommodation in the country is located on the coast and cayes.

A quantitative estimate of the commercial value of the reef to Belize, even combined with its unquantified functional values as sink, filter, habitat and breeding ground, and stabilizer and buffer against coastal erosion, understates its value to Belize and to the world as a whole. The International Coral Reef Initiative (ICRI), which aims to focus attention on the declining state of coral reefs worldwide, estimates that as much as 10% of the earth's coral reefs have been seriously degraded. Consequently, Belize's major and relatively pristine reef ecosystem, with its unique marine biodiversity, has global value, as recognized by UNDP/GEF funding for the Coastal Zone Management Project (CZMP) and the current application for World Heritage designation.

The state of the coastal zone

A qualitative evaluation of the current state of the coastal zone is provided in "The State of the Coastal Zone Report (CZMP, 1995)"[3] "The ecological health of the coastal habitats is largely unknown due to the absence of long-term monitoring, although such programs are now being developed. Expert opinion on the status of coral reefs now characterize them as "almost pristine" in contrast to the "pristine" denotation afforded in the 1970s. (Personal Communication 1995 made by Dr. Ian McIntyre of the Smithsonian Institution.) With increasing development and population pressures on the cayes, along the mainland coast, and miles inland, the delicate balance of these natural systems is invariably being altered."

Unfortunately, monitoring and evaluation of reef systems is a developing science. Research on tropical agriculture was given an impetus in the sixties when it seemed that much of Asia would die of starvation. Massive investments also took place in outer space exploration in the sixties for political reasons and, more recently, the developed world raised substantial sums, through the Montreal Protocol, to combat the effect of chlorofluorocarbons (CFCs) on the earth's ozone layer. No such similar impetus has driven research into tropical marine areas, at least until the December 1994 initiative by Australia, France, the USA, the Philippines and others that created ICRI. Where satellite imagery and GIS techniques have facilitated the quantification of deforestation, this technology does not, as yet, function over deep water. Measurement and analysis of the status of any particular marine ecosystem, even when localized, as is generally the case, continues to be expensive in terms of high- and low-level manpower and equipment (underwater equipment and divers, boats, laboratories on land, computer systems and software). The absence of baseline data prevents an assessment of reef degradation, except anecdotally.

As yet the different and commingled impacts of the different land-based impacts on tropical reef systems defy quantification and prioritization. Enough is known from accumulated

[3] All references in this chapter are listed in References.

experience, however, to identify qualitatively the various impacts on the coastal areas. Such impacts, which in Belize originate mainly on land and to an unknown extent from transboundary pollution, almost always also cause degradation on land. Since priorities cannot as yet be established between contributing factors to the coastal degradation and the impacts of each cannot as yet be quantified, most projects that have attracted community and regional attention, such as the Chesapeake Bay and Mediterranean projects in the developed world, have attempted to address a range of the most serious known contributing factors.

The consequences of continued development pressures on coastal areas and on reefs, in particular, is not visible in the early stages, nor was the functional value of the coastal zone or the fragility of the tropical marine environment well understood until recently. The growing evidence of pollution of beaches, impacts of oil spills, coastal erosion, loss of biodiversity and overfishing, has caused many Caribbean countries to create an institution to begin to address coastal zone management issues as an integrated program. National efforts have been strengthened and coordinated by regional initiatives, both within CARICOM and the Wider Caribbean. Belize has made considerable progress in the last three years in improving the state of knowledge about its coastal zone, mainly through the work of the CZMP. The status of the coral reefs, estuaries and wetlands, mangroves, seagrass beds and marine wildlife is discussed in the sections that follow. Measures to monitor the state of the coastal zone as well as evolving management policies for the zone are discussed in the section on "Monitoring and Management of the Coastal Zone."

The coral reefs

There is as yet no firm estimate of the total area of coral reefs in Belize, but some 65 coral species have been identified. The components of the reef system are: (a) Belize Barrier Reef. The northern reef off Ambergris Caye is fairly continuous and lies several km from shore. Further south, around Gallows Point, the reef lies 10-30 km offshore and is less continuous, with many cuts and channels across it. The best developed reefs are found in the Central (Stann Creek) region. Further south, the reefs off the Toledo District become discontinuous again and end in a hook-like formation near the Sapodilla Cayes, some 40 km from shore; (b) three coral atolls to the east of the reef barrier, which have been described as "the finest structures of their type in the Caribbean Sea" (Stoddart, 1962). These are Turneffe, Lighthouse Reef, and Glover's Reef; (c) fringing reefs that are restricted to the coastal area between Placencia and Punta Ycacos; relatively few corals are present, instead these reefs are dominated by species tolerant of variable salinity and highly turbid conditions; and (d) patch reefs which are widespread in the faroes and on the barrier reef platform, but are virtually absent in the northern coast of the barrier reef lagoon.

Many of the same activities and environmental conditions that have preceded coral reef degradation in other countries are now occurring in Belize, although the impacts are mild compared to other locations in the Caribbean. Low levels of coral bleaching were reported from scientists and field staff in several sites in previous years, but, in 1955, over 50% of coral colonies were affected by this bleaching in most areas surveyed. The cause is unknown but, fortunately, corals can recover eventually. Black band disease has been recorded at all three atolls and along the barrier reef, and has been a major problem in the heavily used Hol Chan area. The disease is considered "natural" but the frequency of black band and other diseases has

been positively correlated with ecosystem stress and environmental pollution in other countries. The outbreak at the Hol Chan Marine Reserve from 1991-92 was treated successfully.

The main effects of reef pollution and their causes are known in Belize though they cannot be quantified or prioritized:

- algae growth destroys live coral cover and is stimulated by the nutrient enrichment of rivers and coastal and marine waters from heavy fertilizer use, principally on bananas; domestic sewage pollution from treatment facilities, septic systems and sewage outfalls; and from agro-industrial effluents with high BOD;

- sun and light are essential to sustain coral life, but siltation of rivers, coastal and marine waters create water turbidity or can even cover reefs with sediment, as has been observed in localized sites along the barrier reef and along the fringing reefs around the coast in Placencia. Siltation occurs because of agricultural practices which increase soil erosion, particularly in the Stann Creek and Toledo Districts; clearcutting and deforestation, much of it for agricultural purposes, some along river banks and primarily in the south; marine dredging and sand mining operations; and salvaging of shipwrecks, although not many sites are currently being salvaged. Divers and snorkelers, if in sufficient number, can disturb the seabed leaving localized areas of coral siltation as reported at the Hol Chan Marine Reserve in 1991-92. Destruction of mangroves and seagrass beds results in increased sediment reaching the coral from land sources;

- overall declining water quality, which is a general threat to the entire Caribbean basin, is destructive to the fragile reefs and is caused by: agrochemical pollution from heavy use of pesticides, herbicides and fungicides, mainly entering into rivers via watersheds; industrial pollution that includes waste oil, caustic acids and chemicals, primarily entering the Belize and New Rivers; and persistent plastic pollution from fishing lines, nets and ship-generated debris, which are found in low to moderate levels throughout the reef system, including the atolls;

- the ecological balance of the reef is disrupted by overfishing of certain species;

- although only 5% of the cyclones in the tropical Atlantic reach Belize, major hurricanes in 1931, 1955, 1961, 1974 and 1978 caused substantial damage to the coastal zone; and[4]

- direct destruction by anchors from diving, boating and commercial fishing operations is localized and public awareness campaigns and the involvement of divers in protecting the reef resources are reducing occurrences.

Periodic threats to the reef and seagrass beds are created by oil-drilling and from movement of rigs in coastal areas. The potential for an oil spill near the reef is constant: international fuel tankers enter Belize waters monthly, local fuel barges make weekly trips to some cayes, and most atoll-based resorts bring in fuel by boat. Global warming and other causes

[4] Because of the vulnerability of Belize City, located on a low lying river delta, the seat of Government was moved 80 km inland to Belmopan in 1971.

of increased water temperatures, together with depletion of the ozone layer which leads to increased UV radiation that may negatively affect coral polyps, have been linked to coral bleaching.

Estuaries and wetlands

Estuaries and wetlands act as a natural sink for terrestrial run-off, trapping sediments and toxins which may damage coral reefs and other offshore fragile areas, and as a habitat for numerous species, some threatened. Development pressures are considered the primary threat, followed by agricultural and agro-industrial pollution. Destruction of coastal vegetation and natural estuarine systems leave local populations and infrastructure more susceptible to the damaging effects of tropical storms, including both wind damage and tidal/storm surge flooding. Very few estuaries and wetland areas, apart from those with extensive mangroves, have statutory protection in Belize, but several are being recommended as future protected areas in studies to identify a range of ecosystems for inclusion in a nation-wide protected areas system.

Several estuaries are inside designated Special Development Areas, which are the responsibility of the Ministry of Natural Resources. Jurisdictional overlaps arise in the management of estuaries and wetlands, as is common with areas that traverse terrestrial and marine boundaries. Better coordination of efforts to manage estuaries and wetlands is required by the CZMU, Forest Department, Ministry of Agriculture and the Department of the Environment (DOE). Also, ratification of the Ramsar Convention on Wetlands Protection would attract international recognition of Belize's important wetland habitats. It would also facilitate regional cooperation to minimize pollution from Chetumal Bay, since Mexico is a signatory to the Convention.

Mangroves

Mangroves in Belize are defined (by S. Zisman, Mangrove Specialist) as all ecosystems comprising at least one of the following: Red mangrove (Rhizophora mangle), Black mangrove (Avicennia germinans) and White mangrove (Laguncularia racemosa). When growing in association with any of these species or when growing in a brackish environment, Buttonwood (Conocarpus erectus) also forms a mangrove ecosystem. Regulations to protect mangroves were drawn up in 1989 (Forests (Protection of Mangroves) Regulations, S.I. No. 52) which required permits for mangrove clearance. Although amended in 1992 to increase the level of fines and sanctions, the regulations failed to reverse the deteriorating state of mangrove resources in Belize City, the main conurbation, in the face of urban expansion, tourist development and real estate speculation. Exacerbating the deterioration of the mangroves, is the increased inflow of chemical and biological pollutants and sediment from developments in the hinterland.

To address the problem, funds were provided in 1992 by the Overseas Development Administration (ODA), under the Forest Planning and Management Project (FPMP) in the Ministry of Natural Resources, for a mangrove specialist to assess the situation and make recommendations for mangrove protection, including a "Mangrove Management Plan." Those findings are contained in S. Zisman's July 1993: "Final Report of the Mangrove Specialist:" this section on mangroves is based on that report and on personal communication with the author.

Belize has approximately 190,000 acres of mangroves and some 90-95% of all mangroves in Belize are believed to be still intact. Clearance of mangroves requires a permit, because they are legally required to be retained as buffers along all watercourses, including the coast. Mangroves are not used for charcoal, as in other developing countries; their traditional and legal harvesting for scaffold poles and markers for lobster pots is a minor and declining use. The rapid growth of coastal settlements in Belize City and surroundings (where about half the mangroves have been cleared) and in Ambergris Caye and San Pedro has led to localized clearing of mangroves. Studies are currently underway to quantify the extent of mangrove clearance; rough estimates suggest that nearly all mangrove clearance in 1991 and 1992 was done without a permit.

The Forest Department has faced internal constraints in implementing its responsibility for mangroves: with little expertise in mangroves, overburdened senior staff and general staff shortages, lack of suitable transport for monitoring and enforcement, and low awareness among conservation officers of the regulations affecting mangroves. Simultaneously, developers and the public have been unaware of mangrove regulations, or, the low risk of prosecution and inadequate fines have not deterred clearance by those aware of the regulations.

Consultation between the Lands and Survey Department, which issues development permits, and the Forest Department, remains poor but forms for new lease holders now identify the need for a permit for mangrove clearance. Similarly, mangrove areas are included in the maps that indicate where land leases require prior consultation with other Government Departments. A Mangrove Manager was appointed in the Forest Department in 1993 charged with enforcement of permit regulations and designation of protected areas that include mangrove areas.

A 1993 list of sites suitable for immediate designation as mangrove protected areas is shown in Appendix 2. Subsequently, the Minister of Natural Resources designated the Sarstoon/Temash Wildlife Sanctuary, which contains approximately 2,270 acres of the best developed riverine mangrove in Belize, and Paynes Creek Wildlife Sanctuary, next to the Deep River Area, in the Port Honduras region, which has approximately 1,565 acres of mangrove. These new designations more than double the mangrove area already under the National Parks System Act. As of July 1993, the overall area of mangroves in a reserve, including Forest Reserves and Private Nature Reserves, totaled 26,358 acres or 13.7% of the total mangrove area.

To date, despite the designation of these protected areas, there are no management plans (which should be drafted by NARMAP) and, therefore, no active management of these mangrove reserves, with the exception of 5 acres at the Hol Chan Marine Reserve run by the Fisheries Department. Draft legislation was drawn up in 1993 for "Forest (Protection of Mangroves) Regulations" that would repeal the existing Mangroves Regulations and include a number of changes, such as: increasing the fees for permit applications to cut mangroves,

specifying in greater detail the criteria for granting permits, and requiring an EIA for mangrove clearance.[5] This draft legislation should be enacted.

Improved coordination between the Departments of Lands and Survey and Forests will at least identify the existence of mangroves in areas where building permits are requested. Passage of the draft legislation is important as a statement of principle and even as a deterrent, given existing development pressures in coastal areas. This would not, however, resolve the issue of limited capacity within the Forest and Lands and Survey Departments to monitor permit applications and unauthorized clearing during construction. Management plans should be drawn up for those mangrove sites already designated as protected areas and more sites should be designated, in line with the Government's capacity to draw up management plans for such reserves. Again the constraint is manpower and funding.

Seagrass beds

The shallow lagoons between the mainland coast and barrier reef and inside coral atolls provide ideal habitat for the development of often extensive seagrass beds. Seagrass beds provide breeding or feeding areas for numerous marine species including lobster, conch, and many commercial fish species. Several species of conservation value depend on seagrass, including sea turtles and manatees. They serve as an important trophic link between mangrove and coral reef ecosystems; many reef inhabitants commute to seagrass beds each day (or night) to feed. Seagrass beds—with mangroves—also trap and accumulate sediments, preventing them from settling on coral reefs. No broad scale assessment of the current status of Belize's seagrass beds has been conducted and their total distribution and area is not known. Nevertheless, from observation, seagrass beds appear to be in good condition. There are localized threats from marine dredging operations, siltation, nutrient enrichment, herbicide run-off and propeller scarring. Heavy metals can also accumulate in seagrasses and be transferred into the food chain. Seagrass beds are being monitored as part of the national coral reef and water quality monitoring programs (see below).

The Geology and Petroleum Office, Ministry of Science, Technology and Transportation issues oil exploration leases and marine dredging permits, which can seriously damage seagrass beds. Informal cooperation between this Office and the Department of Fisheries normally results in dredging applications being reviewed by that Department and the CZMC (see below). The Advisor to the CZMP recently prepared "Marine Dredging Guidelines" as an advisory document for the Ministry and for dredging permit recipients.

In future, the application and review process for oil exploration leases and marine dredging permits should be formalized to include automatic review by the CZMC, the Fisheries Department and the DOE. Applicants should be required to submit a full EIA for each operation which should identify the prevention and mitigation measures for impacts on the entire coastal zone, not only seagrass beds, in which they will be operating.

[5] The wide mandate of the Environmental Impact Assessment Regulations already requires an EIA where large-scale or sensitive mangrove clearance is proposed.

Threatened marine species

Because of the large number of marine species in Belize, several are likely to be threatened with extinction, but reliable information exists only for four species: crocodiles, sea turtles, manatees and birds. Details of the current status of each of these species is contained in Appendix 3. Marine wildlife contributes to Belize's image as an eco-tourism destination, as do the terrestrial reserves for jaguars and baboons. Like these terrestrial reserves, marine reserves could generate revenues from tourism, always provided that access to the reserves is controlled to prevent disturbance to the wildlife.

The CZMU has recommended the designation of selected areas with high densities of crocodiles as protected areas, and proposed the Northern Lagoon of Turneffe Islands and the Northern Cayes of Lighthouse Reef. The CZMU also recommends that any proposed development in areas believed to support crocodile nesting areas should be subject to an EIA, including a protection plan for the nesting areas. The CZMU is proposing a crocodile awareness campaign to foster a better understanding of their habits and ecological significance.

A Sea Turtle Recovery Action Plan was prepared in 1992 and although the document needs to be updated the recommendations remain valid. The plan entails: (a) a year-round moratorium on the harvest of all sea turtle species and their eggs, similar to the ban in effect in Mexico and Guatemala. Since turtles are highly migratory, transnational cooperation is essential; (b) a public education campaign informing residents and visitors about the laws protecting sea turtles; and (c) the establishment of protected areas for the main turtle nesting beaches, particularly the marine reserve in the Sapodilla Cayes and the proposed Bacalar Chico protected area. "Voluntary Community Sanctuaries" may be the only viable management options for the privately owned nesting beaches, as is already the case at Manatee Bar, where land owners abide by community guidelines, such as lighting that does not distract sea turtles, construction set-backs, protection of beach vegetation, a ban on beach sand mining, etc.

Protection of known manatee concentration areas would be cost effective, since it would provide enforcement, as well as education, research, tourism and income generating potential. Based on current knowledge, the following areas are recommended for manatee protection: Lower Belize River and adjacent waters, Southern Lagoon Area, Deep River/Port Honduras area, Placencia Lagoon and Big Creek area, Chetumal Bay to High Bluff.

The "State of the Coastal Zone Report, 1995," recommends that new coastal protected areas should attempt to include as much littoral forest as possible, because it provides essential habitat for birds and other wildlife, primarily in the cayes. All marine coastal protected areas should maintain natural beach vegetation cover, including sea wrack (washed up seagrass and algae) and low thicket/scrubs. Cayo Rosario should be legally protected in the system of crown reserves; management of this area could potentially be done by the staff of the proposed Bacalar Chico Marine Reserve and Wildlife Sanctuary. Government approval of the Ramsar Convention and designation of further wetland areas, should help to ensure protection of more wildlife habitat. Cooperation with Mexico will be necessary to control pollution of Chetumal Bay which flows into Belize's shallow Northern Shelf Lagoon, where there is poor circulation of water; any increase in pollution could have a devastating effect on the species that nest there.

2 *Sectors dependent on the coastal zone*

The two sectors that depend most on the coastal zone are fishing and tourism.

Fishing

The gross value of total fisheries exports reached almost $26 million[6] in 1995 (see Appendix 4). Live lobster exports were valued at $13.0 million (with an additional $1 million from whole cooked lobster), white farmed shrimp at $8.7 million, and conch at $2.4 million. The main fishing areas are in the central and southern and northern coasts, followed by Glovers Reef, and Lighthouse Reef and the Turneffe Islands. Approximately 70% of all fishery production is exported.

Fisheries contribute some 3.5% of GDP and the industry is characterized by small scale commercial interests, using some 700 boats and providing jobs for about 3000 people. Most fishermen are members of one of five Fishermen's Cooperatives, which process, package and market the individual catches, and provide ice, fishing equipment and soft loans to their members. The fishing fleet comprises open boats, sloops, canoes and some ten non-national shrimp trawlers which operate mainly in the southern waters of Belize through joint venture agreements with the cooperatives.

Concerns about overfishing of lobster and conch are expressed frequently, but the official statistics do not show a clear pattern. These statistics do not capture illegal catches (out of season and/or under-size) nor independent fishermen's activities, which have both received an incentive from the local tourism industry, especially for lobster. The acknowledged decrease in individual catches and in the average size of lobsters are attributed by cooperatives to the increase in the number of fishermen, which, in turn, indicates that overfishing is occurring. In the south, in particular, unauthorized trawling from neighboring countries, as well as illegal practices by local fishermen, are believed to have seriously depleted wild stocks. The fisheries industry has expanded in the absence of proper management plans and of insufficient monitoring and enforcement because of the enormity of the task and lack of funding and manpower.

The fishing industry is regulated through the Fisheries Act and managed by the Fisheries Department of the Ministry of Agriculture and Fisheries. The core staff consists of 16 established posts; in addition there are a number of other employees whose posts have been funded from various sources other than the Government budget. These include five staff to manage the Hol Chan Marine Reserve, three staff at the Glovers Reef Marine Reserve, five at the proposed Bacalar Chico Marine Reserve, and the staff at the CZMU. There are five units in the Department with responsibilities for: conservation compliance, coastal zone management, aquaculture, quality control and research. The Fisheries Department laboratory is mainly used for quality control of export products. A Fisheries Advisory Board which advises the Department on fisheries policies, includes delegates from the Cooperatives. The work of the CZMU of the Fisheries Department is discussed, in conjunction with the CZMP, below.

[6] All $ amounts are in Belizean dollars, US dollars are specified as US$.

The compliance unit enforces policies to protect major marine resources, such as lobster, conch, shrimp and turtles; the unit also participates in education and awareness campaigns. In order to protect catches of lobster and conch from depletion as a result of previous overfishing, lobsters are regulated by a closed season from February15 to June 14 and conch from July 1 to September 30, and both are regulated by size and weight restrictions. A preliminary assessment in 1994 indicated that the reproductive peaks for lobster would be better covered if the closed season started a month earlier, i.e., as now, on February 15. Licences are also used as regulatory mechanisms and were raised recently to $25 for fishermen and range from $25-5,000 for boats. The Department has five patrol boats for its compliance unit and there are approximately 30 fisheries prosecutions annually. While better staffed and equipped than many Fisheries Departments in CARICOM, the Belize Fisheries Department, with responsibility for a sea area that extends 200 miles out from a long coastline and covers one thousand cayes, can barely monitor the nearshore area between the mainland coastline and the barrier reef.

Given the fluctuations in lobster and conch catches, the Government has encouraged diversification of exploitation of marine resources. The Fisheries Department tried in recent years to interest investors in deep sea fishing operations, partly to relieve the pressures on near shore fishing, but these operations have not so far met with success. The failure to date seems to be related to the difficulties of finding suitable investors. Aquaculture, as discussed below, has been a highly successful venture. Several marine resources that could be developed commercially have been identified: sea-weed, shark fishery, and mullet, octopus, squid and oyster fisheries.

The Caribbean Fisheries Resource Assessment and Management Program (CFRAMP), a six year project with Canadian financing, has its headquarters in Belize and works closely with the Fisheries Department. CFRAMP provides assistance with basic research, training, fishery management planning and institutional and infrastructure building.

Aquaculture

After an initial pioneering phase, the contribution of cultured shrimp to fisheries exports in 1994 was 51% in tonnage and 33% in earnings. The Aquaculture unit in the Fisheries Department monitors the activities of this sector of the fisheries industry, which presently includes six shrimp farms and one shrimp hatchery run jointly by the Government of Belize and the People's Republic of China. The six farms cover more than 1200 acres of ponds, and are located along the mainland coast from a little north of Belize City to just south of Independence Village in Toledo. Unskilled labor requirements are typically low in mariculture, where the permanent labor force required for shrimp culture is estimated at an average of 7-8 workers per 100 acres of ponds.

Aquaculture is believed to have considerable potential for economic growth and, to that end, has been given investment incentives that include tax holidays and also exemption from the 5% export tax on seafood. Although potential negative impacts are not yet evident at the industry's current level of development, there are concerns over its rapid expansion and the introduction of non-native species. Aquaculture producers, in turn, are concerned by the impact of intensive agricultural production in citrus and bananas on mariculture activities. The impacts of pollution from pesticides and fertilizers, as well as the disposal of waste from these industries

in coastal areas, have a damaging effect on water quality as well as on the mangroves, on whose natural productivity the fisheries depend.

Tourism

As discussed in Annex VI, tourism contributes some 15% of GDP and some 25% of export revenues, and nearly 80% of tourist accommodation is in the coastal zone. Although an unquantified number of tourists visit Belize principally for nature and archaeological tourism, the vast majority of tourists travel to Belize for marine-related reasons, principally diving, snorkeling, sportsfishing, sailing and other water sports. Consultants from the Harvard Institute of International Development (HIID) in 1995 concluded that the success of the tourism sector in Belize is directly related to the lack of degradation of its natural assets and particularly its marine assets. This analysis also indicated that tourism numbers would decline if the quality of the reef became degraded. These consultants also determined that tourists were willing to pay for the conservation of the reef and other natural assets in Belize, provided such taxes are earmarked for conservation.

Recommendations

Fisheries. Sustainable management of fisheries resources is integrally related to the health of the reef and its environs. The Fisheries Department will need to continue policies that provide both incentives for compliance and penalties for non-compliance with seasonal and size and weight regulations related to fishing of targeted species. License fees for fishermen and boats should be reviewed regularly and should be used as a disincentive to the expansion of fishing when necessary. At present, manpower and funding constraints prevent adequate monitoring and enforcement of existing regulations to protect specific species. Diversification of exploitation of marine resources should help to redress depletion of lobster and conch resources, always provided that the new commercial activities are profitable and are accessible to individual fishermen. The Fisheries Department will need assistance to develop strategic and management plans for diversification of fisheries resources.

Aquaculture. Given its rapidly growing export value, aquaculture activities will require close surveillance and regulation to ensure that they are neither the recipients of agricultural pollution nor the cause of coastal zone degradation.

Tourism. The interests of the tourism sector, which has considerable potential for growth, require that the coastal zone remain pristine. If it does, tourism can be a major source of conservation revenues. Recommendations for this sector are given in Annex VI.

3 *Administration of the coastal zone*

Integrated Coastal Zone Management (ICZM) is a dynamic process in which a coordinated strategy is developed and implemented for the allocation of environmental, socio-cultural, economic and institutional resources to achieve the conservation and sustainable multiple use of the coastal zone. As such, ICZM is a new concept in the Caribbean region and in Belize, where traditionally a sectoral approach is followed. In the Caribbean context, the

pattern adopted by those countries that are developing ICZM is to have a lead agency responsible for setting policies, leading research and data collection, and helping to coordinate the activities of other agencies with responsibilities for the coastal zone.

The major agencies involved in coastal zone management are the CZMU under the Fisheries Department, the Forest Department, the Lands & Survey Department, the Housing & Planning Department, the Department of the Environment (DOE), and the Office of Geology & Petroleum. In addition, other departments and ministries have a role to play, these include the Hydrology Department, the Meteorology Office, Water & Sewerage Authority and the Ministry of Health.

Belize first considered an integrated approach to CZM in August 1989, when, driven by concern about the impact of development activities on the coastal zone, a Coastal Resources Management Workshop was convened. The National Development Plan for 1990-94 recognized the importance of coastal zone management to the sustainable development of the country. A Coastal Zone Management Unit (CZMU) was first established in 1990 within the Fisheries Department, Ministry of Agriculture and Fisheries, with responsibility for coordinated management of the coastal zone.

In 1993, the CZMP was initiated with assistance from the Global Environmental Facility (GEF) as funding agency and the United Nations Development Programme (UNDP) as implementing agency. The project document recognizes that: "the variety of reef formations occurring within the territorial limits of Belize are unparalleled in the Caribbean." The overall objective of the five-year project is to preserve the high biodiversity of the coastal zone by ensuring the sustainable management of its resources and to assist in the development of an integrated coastal zone management program for Belize. The project includes assistance with policy formulation, training, research, and environmental education, combined with the development of resource management plans and the strengthening of the CZMU. The project will take place in three phases and the final phase will involve the development of an action plan, which includes a zoning scheme for the coastal zone, recommendations for additional protected areas, protocols for monitoring mechanisms and definitions of a management framework, policies and legislation.

Cabinet authorized the establishment of the Coastal Zone Management Committee (CZMC) to facilitate working relations between all the agencies involved in coastal zone management, to encourage the sharing of information, and to contribute to the creation of feasible government policies, plans and programs. Recommendations from the Committee are passed both to the CZMP Steering Committee and to the Permanent Secretaries of the major ministries involved. The following bodies are represented on the Committee: Fisheries Department, CZMU, CZMP, DOE, Forest Department, Lands and Survey Department, Belize Tourist Board, Hydrology Department, Geology and Petroleum Office, Housing and Planning Department, Public Health Department, Water and Sewerage Authority, Ministry of Economic Development, University College of Belize, Belize Tourism Industry Association, Belize Center for Environmental Studies, Belize Audubon Society, Coral Caye Conservation and the Belize Institute of Environmental Law and Policy. This Committee is the author of the "Cayes Development Policy" referred to in Chapter 4 of this report.

The CZMP Steering Committee was established to oversee implementation of the CZMP and inter-ministerial coordination. The members are the Permanent Secretaries of the Ministries of Agriculture and Fisheries, Natural Resources, Tourism and Environment, and Economic Development, together with the Fisheries Administrator, Chief Forest Officer and Chief Environmental Officer, as well as the Chief Technical Officer of the UNDP/GEF CZMP, a representative of the CZMU, and the UNDP liaison officer. The Committee sets priorities and assists in their implementation and is advised by the CZMC.

The proposed Coastal Zone Management Authority. Currently, the Minister of Agriculture and Fisheries has presented a paper to Cabinet requesting endorsement of a proposal to establish a Coastal Zone Management Authority. While there is no question about the importance of the issues that have led to this proposal or about the value of empowering one agency with a holistic view of the coastal zone, there must necessarily be questions about the timing of a proposal to create a new statutory body, when the Government is in a period of retrenchment. As a statutory body, the CZM Authority would be required to raise its own funds and would be able to earmark those funds for its special purposes. To that end, the CZMP and CZMU engaged the services of consultants to explore funding options. The results are contained in the HIID study (Nov. 1995) which recommended the immediate introduction of the diving/sport fishing permit, discussed above, but also a marine dredging royalty/environmental impact fee, a pesticide charge as an incentive to reduce use of pesticides and a product charge on non-biodegradable goods. The latter charges are based on the polluter pays principle. These innovative ideas go in the right direction, although collection of some of these fees may not always be easy. Nevertheless, the financing requirements of the CZM Authority and the proposed marine reserves will require innovative thinking if adequate funds are to be found to finance the Authority, since funds will not be available from general revenues for some years to come, if ever.

The Cabinet has currently deferred action on creating the Authority. If the CZMU is not converted into a statutory body, questions arise about the status and future of the Unit, which is located in the Fisheries Department. The CZM Unit/Project have helped to focus attention on the critical issues that face the coastal zone, has written a first comprehensive report on the state of the coastal zone, has produced several valuable planning, analytical and regulatory documents, and is beginning the vitally required monitoring and evaluation of the health of the coastal zone. Should the current proposal to convert the unit to a statutory body not be approved for any reason now, measures must be taken to ensure the continued operation of so valuable a technical body.

One of the great advantages of raising the status of the CZMU to that of an Authority is the enhancement this should bring to its capacity to coordinate the work of other agencies and to influence the design of policies for the coastal zone. While considerable progress has been made in recent years, such coordination will be crucial to the good management and hence the conservation of coastal zone assets in future. Steps already taken to improve the management of the coastal zone are discussed in the section that follows.

The Department of the Environment (DOE), Ministry of Tourism administers the Environmental Protection Act (EPA) of 1992. This Act establishes the DOE and outlines its functions, which are wide ranging. The Act covers the control and prevention of pollution,

prohibition of dumping, the EIAs, and control of nutrients. The immediate priorities of the DOE are water quality and solid waste management, and the establishment of an EIA process for major projects. Recently promulgated pollution regulations should facilitate more effective monitoring and prevention of pollution within the coastal zone. One of the major elements of the USAID NARMAP project is to strengthen the DOE particularly in EIA, monitoring and effective coordination. The DOE has created a National Environmental Action Committee (NEAC) whose responsibility is to evaluate EIAs. Currently, the CZMU makes recommendations on EIAs for the coastal zone to the NEAC. The NEAC is a powerful tool for coordinating and monitoring actions in the coastal zone. There is good coordination between the DOE and the CZMU, not only through the NEAC but also through the DOE's membership of the CZMC and its responsibility for pollution monitoring and prevention.

The Lands and Survey Department is responsible for the allocation, management and surveying of national land. This Department has several different sections, despite considerable recent downsizing, including a National Estate Office, a General Registry, and a Valuation Department. It also conducts mapping and physical planning through geographic information systems (GIS) at the Land Information Center (LIC).

Under the Land Utilization Act, a Land Sub-division and Utilization Authority has been established (LUA). The LUA reviews all private subdivisions and makes recommendations to the Minister. The Act also allows for the designation of Special Development Areas (SDAs); these are areas which require special planning for the better utilization of land. They are usually multi-use areas and can be designated for various reasons, e.g., conflicting development pressures. Sub-committees are subsequently set up for the preparation of zoning plans for the SDAs.

Within the coastal zone, one of the most important functions of the Department is the allocation of national land for leasing. Zisman (1992) notes that the Department lacks any working mechanisms for ensuring that the allocation of land is in accordance with land use zoning plans produced by other agencies. To improve this situation the Lands and Survey Department has adopted a policy to review all lease application in excess of 25 acres, to determine whether other agencies should be consulted. The National Lands Act requires that all lease applications for more than 500 acres include an EIA. This requirement may not be as effective in the coastal zone where developments much smaller than 500 acres may have major impacts. (Other procedural improvements relating to mangroves are noted in that section.)

Current Government policy provides for giving/selling land to Belizeans. National land is sold at a very low price, because the prices were set thirty years ago and have not been revised. The Cayes Development Policy document of the CZMP discusses the implications of the sale of cayes to private interests. The recommendations of that document are discussed below and are published in full in Appendix 5.

The ODA has an ongoing project to set up a conservation based GIS, as part of the Forest Planning and Management Project (FPMP). The LIC was set up within the Lands and Survey Department in 1992, and consists of four staff members, whose salaries are provided by the Government. The aim of the LIC is to promote the use of GIS within Government such that each Ministry will have a GIS and the LIC will become the central repository. The Forest and

Fisheries Departments have a GIS. The LIC responds to requests from other agencies and has produced maps of forest reserves, mangroves and national parks. Recently LIC has started computerizing the land tax records.

Department of Housing and Planning. This Department comes under the Ministry of Housing, Urban Development, Cooperatives and Industry. The Department administers the Housing and Town Planning Act, and provides for the establishment of a Central Housing and Planning Authority (CHPA). The CHPA may carry out housing schemes and may also prepare schemes to regulate development for any land area. Areas subject to schemes become "planning areas," and local authorities are empowered to enforce such schemes. To date, planning schemes have been prepared for Corozol Town, Belize City and Ambergris Caye. Land use plans for such areas require Ministerial approval to be adopted, but prior to such adoption, interim control powers are granted to the local authorities. (Belize City and Ambergris Caye are currently acting on control powers). This department has only two planners and, therefore, very limited physical planning capacity.

Office of Geology and Petroleum. This Office falls under the Ministry of Science, Technology and Transport and controls mining, dredging and exploration for minerals, with a staff of approximately 25 persons. It is especially important to CZM because it controls dredging and filling operations and beach stability/erosion. The Office administers the Mines and Minerals Act (1988). Under this Act, a quarry permit is required when extraction of material is less than 16,000 cubic yards and these permits have to be renewed annually. No permit is required if the owner of private land is taking material for construction on their property and for their own use. A Mining License is issued when extraction exceeds 16,000 cubic yards; conditions, including environmental, may be attached to a Mining License. Mining regulations, which will include fees, royalties, rentals and penalties, are currently being prepared In general the mining fees are low for coastal exploration—in part because of the lack of success of these operations to date and consequently the paucity of interest by new companies. This Office is also responsible for addressing coastal erosion from man-made causes such as clearance of mangroves, e.g., Caye Caulker, and from natural causes, e.g., at Sibun Bight. There is no regular monitoring of coastal erosion or, indeed, much local expertise to undertake mitigation measures.

Recommendations

Administration of the Coastal Zone. Currently, the CZMC and the CZMP Steering Committee ensure coordination at senior and technical levels between the various agencies with responsibilities in the coastal zone. That coordination has also improved through the participation of key agencies in the NEAC, established by the DOE to evaluate environmental impact assessments. The CZM Unit/Project has helped to focus attention on the critical issues that face the coastal zone beginning with the vitally required monitoring and evaluation of the health of the coastal zone. Should the current proposal to convert the CZMU to a statutory body not be approved for any reason now, measures must be taken to ensure the continued operation of so valuable a technical body. While the CZMU should continue to concentrate on the complex issues relating to the coast, the DOE should retain its national mandate for control and prevention of pollution, since many of the sources of pollution that affect the coastal zone originate on land.

4 Ongoing and proposed monitoring and management measures for the coastal zone

Monitoring

As noted recently by the HIID consultants: "While many of the causes of coral and marine degradation are well established, reliable models of the magnitude and extent of damage are not available. Quantitative estimates of damage functions are very important in crafting a proactive policy agenda. The costs of poor information can be large over-investment or under-investment in environmental protection policies with consequent misallocation and waste of scarce resources. Models and data from other countries, though a valuable source of information, must be adapted to the specific context of Belize. Given the wide uncertainty today, the value of additional information is currently very high and justifies a significant investment in monitoring and data analysis capabilities."

Despite the volumes of studies conducted in Belize since the 1950s, there has been no general and consistent assessment of the health and/or degradation of the coral reef ecosystems, but this is beginning, as are other specific reef management activities. The prime mover in these initiatives is the CZMU with assistance from the CZMP.[7] The CZMU is critical to the improvement of management of the coastal zone as is evident from the work done during its short lifetime, as described below. A main objective of the CZMP has been the collection of baseline data in order to create the capacity for monitoring impacts on the reef. Only with a better quantification of impacts can a mitigation and protection plan be designed and implemented.

The National Coral Reef Monitoring Program

Efforts to monitor the coral reef on a national scale were initiated by the CZMU in 1992. The monitoring system that was originally adopted proved to be too labor intensive, although the data collected will serve as a baseline for future monitoring efforts. A new program is being developed to incorporate underwater video technology and image analysis capabilities.

The Caribbean Coastal Marine Productivity (CARICOMP) program, with assistance from Canada, comprises a network of marine laboratories throughout the Wider Caribbean region that monitors changes in the productivity of coral reef, seagrass and mangrove ecosystems. Belize hosts two full CARICOMP sites at present and new sites are being added. The data is processed at the University of the West Indies (UWI) in Jamaica, where baseline data will be compiled and made available to the region.

[7] The term CZMU will be used in the remainder of this report to discuss the combined efforts of the CZMU of the Fisheries Department and those of the Coastal Zone Management Project (CZMP) financed by the UNDP/GEF.

The National Water Quality Monitoring Program

To meet the requirements of the 1992 EPA, the DOE contracted with the Escuela Agricola Panamericana (Honduras) and Colorado State University (USA) to establish an environmental water quality monitoring program for Belize. The ensuing report, with financing from USAID under the NARMAP project: "Environmental Water Quality Monitoring Program-Final Report," June 1995, presented environmental profiles for the 16 major catchments in Belize. These profiles include environmental characteristics, as well as current land uses, and present a comprehensive summary of the current state of knowledge about each major river system. As suggested by the risk index, the rivers potentially most affected by industrial, urban and agricultural land uses are in the northern and central catchment areas of the country. The top three are the Belize river, followed by the New River and North Stann Creek, where both agriculture and agro-industry are in close proximity to river stretches. An assessment of the initial data establishes, as a priority, the need to quantify the characteristics of the Belize river systems by sampling at lower gauging stations closest to the coastline and downstream of river border crossings within shared catchments with Guatemala and Mexico.

This study makes a major advance in identifying baseline data required for water quality assessment and also for an analysis of the chemical and biological impacts on the coastal zone. The study is being developed as a collaborative initiative between the CZMU/Fisheries Department, DOE, National Hydrological Service, Public Health and WASA. Considerable funds will be required to implement the continued collection and analysis of the required data and to develop a central laboratory, but this project is essential to quantify the major causes of coastal zone degradation and, therefore, appropriate mitigation measures. Financial mechanisms need to be created to fund continued data collection, collation and analysis and the subsequent design of mitigation and prevention programs. The study will also require regional funding, since Belize receives transboundary pollution from Mexico and Guatemala. National efforts to mitigate pollution impacts on the coast will be thwarted if the transboundary pollution continues.

Management

Designation of marine protected areas

Marine ecosystems cannot be as easily identified and classified as terrestrial habitats and ecosystems, because limitations to water penetration through satellite imagery preclude habitat mapping at anything but a very coarse scale. The costs of underwater mapping are too high to permit anything but localized analysis. Unlike in Australia, where the entire Great Barrier Reef is a managed National Park, with different zones for commercial and recreational fishing, diving and preservation, the barrier reef in Belize has only limited protection.

The first protected areas to be established in the coastal zone were the seven Crown Reserves, which were created under the Crown Lands Ordinance in 1977 to protect important roosting and breeding colonies of seabirds and shorebirds. The National Lands Act superseded the Ordinance and continues to provide for the reserves; the Ministry of Natural Resources has statutory responsibility and has delegated management to the Belize Audubon Society (BAS).

Biodiversity conservation is a primary or subsidiary objective of protected marine areas. Marine protected areas are classified as:

(1) strictly protected areas (to be used for biodiversity conservation and non-consumptive uses only) which are managed by the Forest Department and in which there are two categories: (i) National Parks such as Laughing Bird Caye, which was established in 1991, covering 21 ha, and is managed by BAS; (ii) Natural Monuments, of which the Half Moon Caye Natural Monument is the only monument in a marine area. Established in 1982, covering 3,955 ha, the Natural Monument is managed by BAS.

(2) marine reserves, which are established under the Fisheries Regulations of 1977 through a 1983 amendment and are administered by the Fisheries Department. Management objectives are: protection, research, visitation, education, and controllable extractive uses, normally within specific zones. Belize has so far designated only two marine reserves: Hol Chan (covering 1,116 ha) in 1987 and Glovers Reef (covering 32,876 ha) in 1993. Such marine reserves may incorporate adjacent land areas: Hol Chan includes a number of mangrove cayes, but the cayes on Glovers Atoll are excluded from reserve management because they are privately owned. The best known reserve is Hol Chan, which is described below.

The Hol Chan Marine Reserve. A proposal for a marine park was first presented to the Government of Belize in 1972. Lobbying efforts by local and international conservation groups intensified in 1986 when an increase in tourism was imminent. The reef areas subject to most stress were already showing evidence of degradation caused by overfishing, anchor damage and numbers of visitors. In May 1987, the Hol Chan Marine area was officially declared a protected area by the Minister of Agriculture. The reserve is located approximately four miles south of the old fishing village of San Pedro. The Hol Chan Cut, a channel in the reef, and the surrounding areas along the interrelated and interdependent lagoon and mangrove habitats were included so that the whole ecosystem could be protected and monitored. The reserve status was expected to restore the reef to its earlier more pristine state and minimize future damage.

The boundaries of the Hol Chan Marine Reserve are clearly marked by permanent buoys to inform divers and fishermen that they are entering a protected area. In a good example of cooperation between beneficiaries and administrators/regulators, local dive operators assisted the Hol Chan Marine Reserve with the installation of mooring buoys to protect the reef from damage. The live-aboard dive boats have also installed and maintain their own mooring buoys. A national mooring buoy program is planned by the CZMU.

The three management zones roughly correspond to the natural boundaries of the three distinct ecological habitats of the coastal ecosystem. By designing each zone for specific uses, the recreational and commercial value of the resource can be effectively maximized. The reserve has also served as a catalyst for environmental education and research on the status of biological diversity and the general health of the reef around San Pedro. The Hol Chan project was financed by the Government of Belize, by USAID and by the World Wildlife Fund, USA. Since April 1995, the project has been managed by a Board of Trustees under the Hol Chan Trust Fund and revenues from the fees charged to vessels entering the reserve are earmarked for operational expenses.

The number of visitors to Hol Chan increased steadily from 33,669 in 1990/91 to 37,825 in 1994/95, but leaped to 50,411 in 1995/96. Several observers believe that the current numbers of visitors to Hol Chan should be reduced and that present levels of diving and snorkeling exceed the carrying capacity of the reserve. At the same time, studies conducted at the reserve indicate the greater abundance and average size of commercially important fish species inside versus outside the reserve's boundaries.

Proposed and recommended protected areas. The CZMU has identified three areas for priority designation as new marine reserves:

(1) the Bacalar Chico area, in Ambergris Caye, which is being developed as a protected area in collaboration with the Coral Caye Conservation and the International Tropical Conservation Foundation, with funding from the European Union. The reserve will have terrestrial and marine components and will be designated both as a nature and marine reserve. Mechanisms to regulate development on private lands that lie within the boundaries of the overall protected area are being sought through the provisions of the Ambergris Caye Master Plan;

(2) the proposed Caye Caulker protected area will have a terrestrial and marine component and preparatory work is underway with the assistance of the Siwa-ban Foundation; and

(3) the extension of Laughing Bird Caye National Park, to include the entire Faro, is being promoted through the Placencia Chapter of BAS.

Preliminary management plans have been prepared for all these areas, public consultations have been held and reserve staff have been appointed for Bacalar Chico through the Fisheries Department.

Management plans have been completed for two other areas proposed as marine reserves: South Water Caye and Sapodilla Cayes, and are nearing completion for the Snake Cayes in Port Honduras, with assistance from NGOs like the Belize Center for Environmental Studies (BECES) and the Nature Conservancy. Community-based interest groups have already been established for a number of the potential protected areas. A number of other sites have been recommended for protection but further work is required before designation can be considered. Among these, the highest priority sites are at Turneffe Atoll, particularly as a protected habitat for the crocodile; the Blue Hole and other popular Reef areas; and Mexico Rocks at Ambergris Caye, which could be managed in association with Hol Chan Marine Reserve and the proposed Bacalar Chico protected area.

Potential World Heritage Sites. Six existing and proposed protected areas (Glovers Reef, Half Moon Cay, Bacalar Chico, South Water Caye, Laughing Bird Caye and adjacent waters, and the Sapodilla Cayes) have been nominated for designation as part of a multi-cluster World Heritage Site under the World Heritage Convention. A final decision is expected later in 1996.

Implications of protected area status

The Fisheries Department, through the CZMU, is responsible for the establishment and management of marine reserves. Much of the preparatory work done for both the existing and proposed marine reserves was done with assistance from NGOs and international agencies (as discussed below). The Conservation Division was established within the Forest Department in 1992 with responsibility to manage protected areas established under the National Parks Systems Act, but, for want of human and financial resources, is not currently managing any of the designated sites within the coastal zone. The Forest Department recently entered into an agreement with BAS for the management of the Half Moon Caye National Monument. BAS is also responsible for the Crown Reserves and for the private Shipstern Nature Reserve.

Currently, there is no coordinating procedure for managing sites that include both marine and terrestrial components, which are protected under different legislation and by different ministries. Complicating the issue is the inclusion of private and leasehold land in some of the proposed protected areas. A draft National Protected Areas Plan (NPAP) has been prepared by the Programme for Belize, which recommends the possible establishment of a "Protected Areas Coordinating Unit" to oversee management of both terrestrial and marine protected areas. Such an initiative is valuable since a division between terrestrial and marine environments is irrelevant and counterproductive in much of Belize. Furthermore, the Program for Belize's initiative draws on existing expertise within a variety of public and private organizations, so that its costs are minimal.

NGOs have traditionally played a significant role in the management of protected areas on public lands in Belize. The extent of the trust between Government and NGOs is unusual and laudable. Even if the proposal for a Coastal Zone Management Authority is approved, with its own sources of funding (as discussed above), there would remain a huge management task if the many protected areas that are proposed are to have functioning management plans. At the same time, the proposed protected areas appear to offer the best hope for the conservation of Belize's marine resources. Consequently, strong cooperation between the CZM Authority/Unit, Government agencies and NGOs will be essential to develop shared responsibilities for the management of the proposed marine reserve network.

Environmental education programs to educate the general public and visitors about the coastal zone have been hampered by inadequate funding. Such programs induce conservation of natural resources by local communities and, therefore, reduce conservation costs. A number of NGOs are now assisting the CZMU with this agenda.

Preliminary zoning scheme for coastal areas

Data on coastal habitats and resources are being collected by a number of NGOs and research institutes and are supplied to the CZMP for incorporation into a GIS system for the coast, which is based on aerial photography and some satellite imagery. The Unit collaborates with the Land-Use Committee and Housing and Planning Ministry to identify coastal ownership and usage. The CZMP has appointed short-term specialists in planning and zoning, GIS and remote sensing, and data analysis to assist with this work.

In December 1995, the CZMC issued the "Cayes Development Policy." The report noted that Belize's barrier reef and atoll system includes about 1065 cayes which are largely composed of coral sand, mangroves or a combination of both. They vary in size and are regarded as one of Belize's greatest assets. The increasing demand by both nationals and foreigners has led to 67% of the cayes currently being claimed through lease or ownership. The consequent development pressures are having an increasingly negative impact on these coastal resources, including a diminishing of the aesthetic appeal of one of the country's main tourism and recreational attractions. Several of the larger and more accessible cayes are already substantially developed, such as Ambergris, Caulker and St. George's. Others such as Moho, South Water and Chapel are now entirely developed for tourism and recreational purposes. The report sets out regulations for the sustainable use and the long-term protection of these cayes.

While the report is directed primarily at management of the cayes, its recommendations constitute a summary of regulations that should apply throughout the coastal zone. For that reason, its recommendations are reproduced in Appendix 5 to this report. The Cayes Development Policy constitutes a comprehensive integrated management plan for the fragile cayes which would benefit the entire coastal zone. The Proposed Cayes Development Policy is a major step forward in planning for the coastal zone. and its guidelines should be formally adopted by Government.

The CZMU just published location specific development guidelines for the Turneffe Islands. The CZMU recently undertook an assessment of the existing uses and the natural characteristics of the terrestrial environment of these islands with the objective of conserving their natural assets, both marine and terrestrial. This valuable planning exercise is in accordance with the draft Cayes Development Policy and observance of the guidelines should be made mandatory by developers.

Transboundary Pollution

In 1991, the Governments of Mexico and Belize exchanged Notes for cooperation on the use of international rivers and an agreement was signed on cooperation for the protection and improvement of the environment and conservation of the natural resources of the border zone. Among other matters the two countries agreed to share information on efforts to address water pollution. A major threat to the Belize coastal zone and its wildlife habitats is caused by pollution flowing to the reef from Chetumal Bay in Mexico. In the case of Belize and Guatemala, there has been little communication about upstream uses of shared waterways and possible downstream impacts on the receiving country; historically, communication and exchange of data between Belize and Guatemala has been extremely limited because of past territorial disputes and diplomatic difficulties. Efforts by Belize to control pollution of its coastal waters will be ineffective without the cooperation of its two neighbors: Mexico and Guatemala. Mechanisms are in place for a dialogue with Mexico but need to be created with Guatemala.

Recommendations

Monitoring and Management. The DOE needs continued funding for its ongoing national water quality monitoring program since most of the impacts on the coastal zone occur

on land and are carried to the coastal zone by rivers and streams. The CZMU needs continued financing for its critical coral reef monitoring program to determine the health of the reef and provide baseline data and to formulate mitigation measures and management programs. These two studies complement each other and are both high priority.

Belize currently has only two marine reserves: Hol Chan and Glovers Reef. Several other marine protected areas have been identified but, in most cases, lack management plans. NGOs in Belize have been entrusted by the Government with the management of protected areas to an unusual and laudable degree. Their continued participation in management of marine reserves will be essential if management is to be effective. The CZMC recently produced a development policy for the Cayes and planning guidelines for the Turneffe Islands; these are good initiatives which should be approved and implemented. Comparable work for other sites is needed. Since nearly 70% of the cayes are already claimed through lease or ownership by individual Belizeans and since the mainland shoreline attracts urban and tourism development, Belize urgently needs assistance with zoning and planning for the entire coastal zone.

The costs of water quality and reef monitoring studies, of zoning and planning and of implementation of related mitigation and management programs are high, but these costs should be weighed against the costs of inaction: loss to the world of a unique resource and loss to Belize of foreign exchange and employment from fisheries and tourism. Tourism in particular has high potential for growth and it is urgent to preserve, mainly through zoning and development guidelines combined with economic incentives and mitigation measures, the natural assets on which it is based.

5 *Financing of coastal zone conservation*

The Belize Barrier Reef is a world class marine resource that is currently being managed by the Government of Belize with partial assistance from global public and private funding. The task of conserving the reef's assets from national and transboundary pollution, development impacts and natural causes of erosion is enormous and beyond the capabilities of Belize. The only other country in the world with comparable assets is Australia, whose financial, technical and human resources far exceed those of Belize. Logically the challenge of preserving the reef should become an international effort, led, of course, by the Government of Belize, but with considerable supplementary resources—financial, technical and human—delivered by the rest of the world.

The activities and functions of the CZMU, as described in this report, are crucial to the future conservation of the reef and the coastal zone in general. The Government has currently deferred a decision about converting the CZMU into a statutory body—possibly because of concern about the Authority's ability to become financially sustainable. Continued financing of the unit is essential, even if the Government of Belize is currently constrained in its ability to provide counterpart funding, equipment or technical staff. The resources that are being monitored and managed are of global importance so that a major international effort should be mobilized to strengthen the CZM Unit and provide it with the resources to continue its highly relevant work program. Only with a strong CZMU will the vital coordination between agencies with responsibilities for the coastal zone succeed.

The fisheries and tourism sectors both depend on the health of the coastal zone for their continued existence and between them they contribute some 20% of GDP. Since the people engaged in these activities benefit from the existence of the reef, they should be most concerned with maintaining it in a pristine state. Commercial fishermen must all already be licensed, although the license fees (at $25 may be too low). In its analysis of which beneficiaries should pay for the conservation costs of the reef, the HIID team proposed a diving and sports fishing permit where the revenues would be destined for coastal zone management and to support the marine protected areas. The consultants estimated that between $1.3 - 2.0 million could be raised just from the diving/sports fishing permits annually. Although tourists are being taxed increasingly in Belize, the consultants believe that the quality of the marine assets are so high and the Belizean tourism product is so diversified that tourists are willing to pay conservation taxes in return for the privilege of access to the resources. The caveat specified by the tourists is that revenues raised should be earmarked for conservation and should not enter general revenues.

The HIID consultants also recommended that marine dredging royalties and environment impact fees could raise $262,500 annually for the general revenues of the Department of Geology and Petroleum; that a pesticide charge should be applied to users in an attempt to curtail pesticide use, which they calculated would raise $1.9 million for reinvestment in low-impact, sustainable agriculture; and a product charge on non-biodegradable goods could raise $500,000 for general revenues. The consultants recommended for future implementation: bio-prospecting fees, carbon sequestering fees, effluent taxes, development charges or tradable development rights, and mangrove clearance charges or a mangrove mitigation bank. Some of these recommendations are beyond Belize's capacity to administer, given the current retrenchment in civil service staff. Nevertheless, creative thinking about financial mechanisms to raise funds for conservation from beneficiaries and polluters of the resource should be pursued.

Belizean NGOs have raised funds for management of protected areas from local and external donors for years. No quantification of the amount of funds raised has been done. The NGOs have only recently had access to fees to offset operating costs. The PACT legislation imposes a users fee for conservation from tourists on their departure from Belize (BZ$7.50 in addition to the existing departure and security tax of BZ$22.50). Tourists have recently been charged a fee for visiting national parks and reservations. Such fees will be used for the operational costs of the reserves, with 5% set aside to create an endowment to help stabilize funding in the future. The level of such funding depends on the number of tourists visiting Belize, as well as the successful promotion of these areas and the provision of appropriate facilities for visitors in the reserves.

Most financial mechanisms for raising funds for conservation are concentrated on sources in Belize itself. Only the NGOs have appealed more broadly for assistance. BAS is opening a 501 (3) (c) account for tax-deductible donations in the USA. The Program for Belize "sells" a piece of Belizean forest for US$50, for which the contributor receives no title but the satisfaction of contributing to conservation. The possibilities of obtaining funding for carbon-offset schemes from utility companies abroad to preserve the terrestrial protected areas should be pursued, as has been done, notably, by Costa Rica. Belize might wish to expand on the opportunities available under the "Joint Implementation" provision of the Climate Convention.

The main constraint on implementation of these proposals is the capacity of the Government to manage the promotion and negotiation that such concerted efforts entail.

A potential external source of funding for sewage and solid waste disposal is from the MARPOL Convention for the Wider Caribbean. Belize has just become a signatory of all five annexes relating mainly to garbage, sewage, hazardous waste and oil. The signatories agree to protect their marine environment from these impacts but Belize is unable to dispose benignly of pollution arising from within its own borders, therefore it will need help to dispose of additional waste from ships. The MARPOL agreements contain provisions for international assistance for investment projects, although this component is only intended to finance the incremental costs of collection and disposal of waste. Development agencies have in some cases (the World Bank in the OECS countries, for example), assisted countries to improve the management of national waste, so that they can assume their responsibilities for ship-generated waste under the MARPOL Convention. Belize would seem to be a prime candidate for assistance to improve its inadequate land-based facilities for collection and disposal of solid waste and sewage, which currently are major pollutants of the coastal zone and deterrents to a growth in tourism. The assistance could be justified for protection of the reef which is a global resource. Given Belize's absorptive capacity, the Government would currently require grant funding for such waste facilities.

Recommendations

This report proposes that a "Belizean Barrier Reef Foundation" be established and managed by the CZMU, which should continue to receive external assistance until it is strengthened and self-financing. The objective would be to raise funds from external and internal sources for conservation of the reef and the coastal zone in general. All of the current and other proposals for revenue generation should be examined. The Foundation would promote its objectives in Belize and abroad and would create appropriate financial mechanisms to raise funds. The Foundation should be designed to receive funds from a variety of sources, including development agencies.

While its long-term objective should be to establish an endowment, the immediate objective would be to finance the work of monitoring the reef and the causes of coastal zone degradation, mitigation of these impacts and management of sustainable uses of the coastal zone, through planning and zoning, economic incentives and regulations. While most of the funding would finance the work program of the CZMU, other agencies such as the DOE should receive funding for specific studies such as its current water quality monitoring program, the Fisheries Department for plans to diversify exploitation of marine resources, and tourism agencies to develop a conservation strategy for tourism. A portion of current revenues should be set aside for an endowment, the interest from which would finance management of the protected marine areas and relevant studies and management plans for sustainable uses of the coastal zone.

The preservation of the reef is of global importance but its sustainable use is essential to Belize, which may become even more dependent on fisheries and tourism if protected markets for bananas, citrus and sugar become less favorable in future. A cooperative international effort would appear to be the only way to attain the global and national objectives.

Appendix 1. Characteristics of coastal zone regions

Although forming parts of a single continuum, the marine environment cannot be described in the same way as the terrestrial. A generally accepted marine habitat classification has yet to be devised on a national scale and a provisional system (described in the Report of the Marine Biologist) has had to be developed as part of this project. Use of biological communities alone is anyway less appropriate in the marine environment proper, and should be taken in conjunction with physical features such as water depth, substrate, currents, turbidity etc. All these features are therefore described in this section.

The Belizean continental shelf is 275 km long and 15-40 km wide. The NNE-SSW fault scarps can be traced across the shelf, here creating a series of five ridges. The eastern two are over 1000m below sea level, at the edge of the shelf which plunges abruptly to more than 3000m depth. The western three ridges are in shallower water and form important features. These features create four coastal divisions on a north-south axis: the Coastline, Inner Lagoon, Outer or Barrier Platform, and Coral Atolls. The Belizean coastal zone also divides naturally into four regions form north to south—Ambergris, Belize, Stann Creek, and Punta Gorda—on the basis of bottom sediments, bathymetry, depositional environment, salinity, currents, and reef structure.

The Ambergris Region

This region extends from the Mexican waters in the north southward to a line connecting Little Rocky Point, Hick's Caye and St. George's Caye. It includes five regions.

The Northern Initial Coastline extends from the mouth of the Rio Hondo to Rocky Point (North). It appears to be defined by faulting and is little modified by erosion or deposition. The Northern Lagoon Coastline, extending from Rocky Point (North) to Little Rocky Point, is dominated by coastal lagoons lying behind sand barriers. No rivers exit directly into the sea without an intervening lagoon and there is little offshore deposition of terrestrial sediment; instead, carbonate sediments are spread evenly along the coast. By contrast, the terrestrial sediments are accumulating on the coastal sand barriers, which are expanding at the expense of the lagoons.

In the northern part of the Ambergris Region, the inner lagoon is represented by Chetumal Bay, characterized by shallow conditions, sediments of calcareous sands and silts, and sluggish south-flowing currents. It is bounded in the south by Bulkhead Shoals, an extensive mud-mound complex lying off the Northern River Lagoon. South of the shoals lies the Northern Shelf Lagoon, a transitional area between the shallow Chetumal Bay and the deeper Southern Shelf Lagoon.

The Outer Platform lies on the first ridge of the continental shelf carrying Ambergris Caye, Caye Caulker, Caye Chapel and Long Caye; it is also distinguished by a line of mangrove cayes set well back form the reef edge. This area supports a wide variety of habitats although, except for parts of Ambergris and Caye Caulker, the reef crest and inner fore reef generally have few living corals. Sandy carbonate sediments predominate, in coarse, slightly muddy, sands and rubble beds stabilized by *Thalassia* and *Halimeda* fields. Prevailing currents are moderately

strong, running in a south-westerly to westerly direction. A relatively large amount of information is available on the area and a variety of habitats have been described.

The Belize Region

The Belize Region extends from the line connecting Little Rocky Point, Hick's Caye and St. George's Caye south to a line drawn die east form the mouth of the Mullins River. Four divisions are distinguished.

The Central Lagoon Coastline differs from the Northern primarily by the presence of several major river mouths (Belize, Sibun, Mullins). Sediments therefore differ, comprising shell and rough quartz sand. The zone of coastal ridges is very marked and extends as an area of shifting sands to c. 100 m offshore. The lagoons are also believed to be older landscape features. Some of the highest and clearest beaches in the country occur along this coast.

In the Belize Region, the Southern Shelf Lagoon is a transitional area becoming progressively deeper to the south. Inshore, the sediments contain much quartz sand derived from the river outflows. The proportion of quartz sand diminishes further offshore, and lime muds dominate on the east. The Outer Platform is a transition zone between the flat expanse of the northern area and the well-developed reef systems of the south. It is cut by the English Caye or Eastern Channel, probably an ancient river bed, and carries a string of mangrove cayes set back form the reef edge. Most of the Outer Platform inside the barrier reef carries dense *Thalassia* meadows. On the reef itself, these meadows grade into coral rubble forming a mosaic with patch reefs and "pavement" covered in algal turf or sand. This back reef area then passes into the threes zones of the reef crest, inner fore-reef and outer fore-reef. There is a distinct change from north to south through the region in the Outer Platform environment, displayed in reef topography and the relative density and distribution of coral species.

The Coral Atolls division of the Belize Region includes the important sites of Turneffe and Lighthouse Reef. The latter is the furthest land offshore and lies, like Glover's Reef, on the third ridge on the continental shelf. They are separated from the barrier reed by water 360-1100 m deep. Turneffe rises from the sea floor well below the limit of coral growth; coral reefs form a belt around the shoreline but Turneffe is unique in Belize in not having a well-defined reef flat or reef virtually surrounding a shallow lagoon with no coral. Lighthouse Reef covers a total of 78.5 sq.miles and consists of a well-developed reef rim with only three major channels. Several cayes lie on the rim, including Half Moon Caye. The lagoon is shallow and contains many patch reefs. The most remarkable feature is the "Blue Hole," a drowned sinkhole created by subaerial erosion during a period of lower sea-level. Both the reef flat and the zone of living coral of the eastern reefs are exceptionally wide. The western reefs form a very narrow fringe.

Stann Creek

This region extends form the Mullins River south to a line drawn between Pine Ridge Creek and Silk Cayes and five divisions are identified. It contains two major continuous portions of the barrier reef, Tobacco and Columbus Reefs, and is the most diverse in terms of reef types, organisms and bottom topography. It is also the most intensively studied.

The Central Deltas Coastline is characterized by small deltas and small coastal lagoons with beach-ridge barriers. The rivers contribute substantial quantities of sediment to the shore line. Small reefs occur inshore right along coast. The Placencia peninsula, a long sand spit is also a unique coastal feature. The Southern Lagoon lies between the coastline and the line of cayes to the east, and continues to deepen from c. 12-20m in the north to 20-30m in the south. There are several shoals but the bottom is generally smooth. This is prime shrimp habitat.

The Southern Reef Complex is probably the most diverse area in the entire coastal zone. It is an area of sandy shoals, long ribbon reefs, coral pinnacles, rhomboid reefs, small shelf atolls (faroes), deep channels and small "blue holes." One of the most biologically rich areas of the entire reef lies within the ringed reefs of the Pelican Cayes. Numerous studies have been undertaken, identifying a range of habitats. The Outer Platform is also very diverse, and is the most intensively studied section of reef in Belize. Extensive *Thalassia* meadows cover most of the area, which also contains the longest stretches of unbroken barrier reef. At the northern end of the area there is a series of "blue holes," and unique features including a submarine cavern and a formation of fractures exposing deep layers of peat. A large field of sand bores lies south of Carrie Bow Caye.

The Coral Atolls division is represented in this region by Glover's Reef, 32km long and 12km wide, which is the prototypic Caribbean atoll and the best developed of the three offshore reefs. It possesses great diversity of reef types and the central lagoon is unique due to its depth and the number of patch reefs and pinnacles carpeting the lagoon.

Appendix 2. Sites suited for immediate designation as protected areas - marine and mangrove

A number of sites in the coastal zone have been identified as prospective protected areas. Preliminary work, ranging from superficial to detailed, has already been undertaken on the majority of these areas. Some form of statutory designation is proposed for these areas although the form of designation and the exact area involved is yet to be finished.

Prospective marine protected areas

Bacalar Chico (Ambergis Cay)	Terrestrial and marine. Planning in advanced stage.
Mexico Rocks (Ambergris Cay)	Patch reef complex and cave. Recommended to protect uncommon reef type and to relieve visitor pressure on Hol Chan MR. Preliminary surveys undertaken.
Caye Caulker (Siwa Ban)	Terrestrial and marine. Rapid Environment Assessment and preliminary Ecological Assessment undertaken.
Shipstern Caye & Lagoon	Extension of protected area coverage to include important wetlands integral to the Shipstern ecosystem. NB: Shipstern Nature Reserve is privately-owned and provision has not yet been made for long-term security of conservation management.
Four Mile Lagoon	Recommended as an important site for manatee. No further information currently available.
Blue Hole (Lighthouse Reef)	Recommended, as unique natural feature of high visitation value. Designation allows for improved visitor control.
Belize River mouth to Moho Cay	Recommended, as an important manatee site close to Belize City and to assist controls on over-development in area.
Northern & Southern (Manatee) Lagoons	Recommended principally as critical habit at for American crocodile and breeding birds.
Southwater Cay	Draft management plan completed. Includes marine and terrestrial (sand and mangrove caye) components. Highly divers marine characteristics, including unique features.
Laughing Bird Cay extension	Extension proposed to cover the whole faroe. Recommendation for further extension to include Silk Cayes now withdrawn . Preliminary survey undertaken.
Placencia Peninsula and lagoon	Recommended as an SDA area to assist in controls against over-development Preliminary manatee surveys undertaken.
Port Honduras	Terrestrial and marine. Includes cayes in Port Honduras, estuaries contiguous with Deep River FR and Payne's Creek NP, and adjacent mainland (including Seven hills and Rio Grande area). Part if protected area bloc connecting with Maya Mountains via Bladen NR. REA and detailed baseline studies undertaken. SDA status for whole area suggested.
Sapodilla Cayes	Draft management plan completed.

Sites suitable for immediate designation to protect mangrove habitats

Sites suitable for designation	Action being undertaken in support of the designation	Recommendation of mangrove specialist	Further action required
Burdon Canal extension	Site survey by the Forestry Department	There are considerable grounds for conserving this area for wildlife, eco-tourism, water quality protection and limitation of storm damage. It is therefore recommended that National Land between the Haulover Road/Northern Highway and the Haulover Creek be added to the recently designated Burdon Canal Nature Reserve. This will help mitigate against the impact if the Belana Extension and support the Destination Mangrove initiative.	The Lands Department and Planning Section to Establish land tenure in the area. Prepare boundary description.
Tenash/Sarstoon	Land ownership surveys have been completed through the Forestry Department. Biological have been undertaken by Edinburgh University.	This area merits protection for wildlife, eco-tourism and prevention of cross-border poaching. The most suitable designation is the Wildlife Sanctuary.	Liase with the Toledo Eco-tourism Association and village councils of Barranco and Crique Sarco over involvement in reserve planning and management. Arrange full biodiversity surveys for these areas. Prepare boundary description.
Deep River, Port Honduras, Punto Ycacos, and associated Cayes	Land ownership surveys have been completed through the Forestry Department. Biological, through Edinburgh University.	Designation is justified on wildlife and coast protection grounds. Wildlife sanctuary is considered to be the most appropriate category.	Liase with local people, the Fisheries Department/CZMU and programs for Belize over designation. Prepare boundary description.
Northern and Manatee Lagoon	The Manatee Advisory Team and the Rural Physical Planner are producing a land use plan and development guidelines for the Manatee SDA.	Designation is justified on wildlife and recreation grounds. Manatee Lagoon area should be designated a Wildlife Sanctuary with Northern Lagoon a National Park. Regulations are needed to control all aspects of navigation, and to allow sustainable local use of the area.	Prepare plans and secure funding for a forest station at Gales Point. Consult with MAT and community over local involvement in reserve planning and management. Liaise with CZMU over turtle nesting beach protection. Prepare boundary description.
Placentia	The Land Utilization Authority has recently undertaken site investigations in the area. The Forest Department has also visited the area and local developers to discuss mangrove protection measures.	There are considerable wildlife, recreation and landscape grounds for conserving lagoonal and territorial habitats in this area. Due to the extensive private land holdings in the area, it is suggested that this area be designated an SDA as a matter of Priority.	Liaison with the LUA and the village council to establish an SDA subcommittee. Provisional SDA boundary to be drawn up in consultation with the Rural Physical Planner and Fisheries/CZMU.
Caye Caulker/Chapel	CZMU have undertaken some liaison with the village council over designation.	There are considerable wildlife, eco-tourism, water resource and fishery grounds for designation as a terrestrial and marine reserve. Fisheries and forestry should, in 1993, pursue co-designation as a wildlife sanctuary and marine reserve to ensure maximum protection. In the interim, Caye Caulker should be declared (part of) an SDA as a matter of priority (this should also cover Caye Chapel).	Liaison with the LUA and the village council to establish an SDA subcommittee. Provisional SDA boundary to be drawn up in consultation with the Rural Physical Planner and Fisheries/ CZMU. Liaise with Fisheries over site surveys for their marine contribution.

Source: Constancy Report No. 10. Final report of the Mangrove Specialist. S. Zisman. July 1993.

Appendix 3. Threatened marine species

Crocodiles. After Independence and passage of the Wildlife Protection Act of 1981, with implementation by the Forestry Department, legal hunting of and trade in crocodiles was abolished. The Belizean Morelet (Crocodylus moreletii) population appears to be recovering and may be instrumental in the survival of the species. Currently there are insufficient data to determine if the second Belizean species, Crocodylus acutus, is recovering or declining, although it is clearly the more endangered of the two. Crocodiles play a role in the image of Belize as a tourist destination that is wild and unspoiled, so that in addition to their ecological importance they have a contingent valuation (undetermined) for tourism. The main current threats to the crocodile population are illegal hunting for the international skin trade, opportunistic killing,[8] crocodile meat (the tail is considered a delicacy) and killing for the tourist trade for the teeth, which are turned into necklaces, and for preserving and stuffing of the young as souvenirs. The crocodiles are also suffering habitat loss and disturbance from development and increased human presence, and depletion of food resources from overfishing.

Research on the Belizean population of C. acutus will be given priority in a year-long program, beginning in February 1996, that will lead to a management plan for the species. The Coastal Zone Management Unit (CZMU) of the Fisheries Department has recommended the designation of selected areas with high densities of this species as protected areas, i.e., the Northern Lagoon of the Turneffe Islands and the Northern Cayes of Lighthouse Reef. The CZMU further recommends that any proposed development in areas believed to support C. acutus nesting areas should be subject to an EIA, including a protection plan for such areas. The CZMU is also proposing a crocodile awareness campaign to foster a better understanding of their habits and ecological significance.

Sea Turtles. By the 1960s, it was evident that a century of uncontrolled harvesting of sea turtles had left local populations greatly depleted. Fisheries data indicate that the average weight of turtles landed fell a startling 60% (from 163 to 67 kg.) between 1982 and 1986. Not only are turtles fewer and smaller at sea, but there are many examples of beaches that once supported nesting populations that do so no longer. The main threats to sea turtles in Belize are: beach erosion and natural predators; harvesting for food, much of it illegal; the illegal sale and/or export of hawksbill shell; the capture and drowning of turtles in shrimp trawls, gill nets and long lines; encounters with motor boats, sail boats and other watercraft, such as jet skis; the degradation of foraging grounds by dredging, anchoring, waste disposal and pollution, and marine turtle fibropailloma disease, the cause of which is unknown.

Three species of turtle nest in Belize and are routinely encountered between the coast and the barrier reef: the green turtle (Chelonia mydas), hawksbill (Eretmochelys imbricata), and loggerhead (Caretta caretta). The hawksbill and green turtle are listed as "endangered" and the loggerhead as "vulnerable" on the IUCN Red List. Currently, turtles are protected under the Fisheries Regulations of 1977 and the Fisheries (Amendment) Regulations of 1993. Turtle

[8] Residents of San Pedro and Caye Caulker have requested assistance from the Departments of Forests and Fisheries to eliminate crocodiles from their resort properties, because they are considered a threat to humans, dogs and livestock.

sightings are valued by divers and the existence of turtle nesting areas is an added attraction for tourists who visit Belize as an ecotourism destination.

Manatees. Manatees have been reported along the entire coast of Belize and in one of the offshore atolls (Turneffe) which is separated from the shallow waters of the coast by 8 km. of water. Manatees have also been sighted over 100km. inland in the New River Lagoon and in the Rio Bravo. Manatees are fully protected by the Wildlife Protection Act, which is enforced by the Forest Department, Ministry of Natural Resources. Since manatees are a coastal species, the Forest Department works closely with the Fisheries Department, Ministry of Agriculture and Fisheries, in their protection. In addition to the national legislation, manatees are listed in CITES, which prohibits international trade in manatees.

The main threats to manatees are from illegal hunting for local food consumption and possibly for export; collision with watercraft; entanglement in gill nets; visitor disturbance, sometimes amounting to harassment, by tourists and their guides; industrial, agricultural and domestic pollution that directly or indirectly affects the health of manatees or destroys the vegetation on which they feed; degradation of a naturally excellent habitat by development and pollution; and the danger of entanglement in shrimp trawl nets. A joint manatee research project is underway between Mexican researchers and the Fisheries and Forest Departments in Belize. A recovery plan for manatees will be prepared with support from UNEP.

Birds. Over 540 bird species have been recorded in Belize. Over 80 species are of special conservation concern and include the colony-nesting sea and shore birds, scattered along the coastal zone and cayes. The management of bird populations and the enforcement of the Wildlife Protection Act are the responsibility of the Forest Department. The Act prohibits the hunting of any species listed in the schedule, which covers almost all birds in Belize. Belize's diverse avian population is currently threatened by: destruction of critical nesting habitats, pollution of habitat, introduction of exotic species, disturbances from human visitation and natural disasters, and aerial spraying of pesticides for the control of mosquitoes. The following have been identified as threatened species based on behavioral traits, scarcity of breeding colonies, or their occurrence in restricted or high impact areas: (a) colonial water birds known to nest in only one to three locations in Belize (b) water birds nesting in areas of limited water circulation or limited area and/or few localities in the country (c) secretive marshland and mangrove birds with poorly understood habits (d) resident and migrant landbirds whose critical habitat is in the coastal zone and regional endemics (e) short-legged shorebirds utilizing intertidal habitat, principally for seasonal feeding (f) bird species with demonstrated sensitivity to pesticide and/or other chemical residue.

With suitable habitat in serious decline throughout the region, Belize plays an increasingly important role for survival of neotropical migrants, given the large blocks of contiguous habitat still available. Creation of protected areas with adequate habitat size for maintenance of viable populations is the principal tool for conservation of these birds, but is inadequate for the more wide-ranging and dispersed species. For wetland species, especially, habitat quality is intimately related to upstream activity, such as deforestation and pollution.

Appendix 4. Fisheries and Aquaculture Statistics

Aquaculture data

Shrimp farming acreage in Belize, 1987-94

Year	*Farms in operation*	*Faming area (acres)*	
		existing	*in operation*
1987	4	440	440
1988	5	501	441
1989	6	695	695
1990	2	695	220
1991	4	1008	533
1992	4	1008	673
1993	6	1008	853
1994	6	1173	NA
1995	6	1800	

All data as per 31st of December of each year.
Source: Ministry of Agriculture. and Fisheries, Fisheries Dept., 1995. Myvett, 1991; 1993. Rouse & Duncan, 1994.

Shrimp farms presently in operation

	Operations started	*Previous name*	*Available farming area (acres)*			*Production 1994 (lb.)*	*Exports 1994 (lb.)*
			existing in '94	*planned for '95*[g]	*total by end '95*		
Aqua - Mar[a]	1991		100	110	210	7,300	7,300
Caribbean Shrimp	before 1987		40	10	50	82,102	27,600
Cherax Hatchery[b*]	1994	General Shrimp	200	100	300	91,590	91,590
Laguna Madre[c,d*]	1988		48	262	310	154,032	151,564
Nova Companies[e*]	1989	Maya Mariculture	575	50	625	901,403	793,771
Paradise Farms[f*]	1993	Allen's Farm	210	110	320	75,000	2200
TOTAL			1,173	642		1,311,427	1,074,025

a. Converted in 1994 previous 10-acre intensive system to 100-acre semi-intensive; production figure does not reflect present potential.
b. Also presently culturing tilapia and Australian Red Claw lobster.
c. Presently undergoing conversion from intensive to semi-intensive farming.
d. Only existing commercial hatchery in Belize (from imported Nautili).
e. Is also planning to construct two - five acre ponds for intensive culture.
f. Has started of raceways intended for marine fish culture.
g. A conservative ceiling of 110 acres per year for the new developments as been considered irrespective of the announced plans, mainly on account of the short season during which construction is actually possible (Jan.-May).
* Visited during the field trip.
Source:: Rouse & Duncan, 1994; Myvett, 1991 and 1993: Fisheries Dept., 1995; field data.

Fisheries Statistics

At present, no routine controls on landings are carried out and data on catches and exports are obtained from the fisheries cooperatives or, in the case of farmed shrimp, from the producers. However, it appears that, while the export statistics are sufficiently accurate—at least for the portion of the catches legally exported—due to the necessity of complying with customs requirements, production statistics present inconsistencies and, above all, do not take into account the catches of the independent fishermen who do not deliver their produce to the cooperatives nor the illegal fishing, particularly of finfish, whose catches are roughly estimated in the same range as those officially recorded as exported (G. Myvett, personal communication).

For these reasons, only exports statistics are dealt with in the following tables:

Belize fisheries exports 1984-94, *in tonnage*

Year	*Farmed Shrimp*		*Lobster*		*Conch*		*Finfish**		*Marine Shrimp*		*Other*		*Total*
	lb.	%	lb.	%	lb.	%	lb.	%	lb.	%	lb.	%	
1984			582080	41.0	527709	37.2	304997	21.5			3490	0.2	1418276
1985			694760	49.9	370300	26.6	223560	16.1	100780	7.2	3448	0.2	1392848
1986			489402	36.4	232500	17.3	383436	28.6	235952	17.6	1689	0.1	1342979
1987	22051	1.4	468981	29.4	248980	15.6	652311	40.9	196781	12.3	6550	0.4	1595654
1988	36500	2.2	524650	31.2	302360	18.0	573000	34.1	238805	14.2	4936	0.3	1680251
1989	119470	7.1	602429	35.8	189400	11.3	492820	29.3	271478	16.2	5043	0.3	1680640
1990	217223	12.6	447860	25.9	364600	21.1	493642	28.5	205490	11.9	1300	0.1	1730115
1991	345365	19.0	536069	29.5	392190	21.6	425640	23.4	117725	6.5	350	<0.1	1817339
1992	800568	35.7	523210	23.3	431745	19.2	382382	17.0	104776	4.7	285	0.1	2242966
1993	1,299,053	54.2	429057	17.9	424000	17.7	150116	6.3	90450	3.8	2100	0.1	2394776
1994	1074025	51.1	573787	27.3	327775	15.6	84480	4.0	41655	2.0			2101722
TOTAL	3,914,255	20.2	5872285	30.3	3811559	19.6	4166384	21.5	1603892	8.3	29191	0.2	19397566

* Including sharks.

Source: Statistical Records of the Fisheries Dept., Ministry of Agriculture and Fisheries: Myvett; 1993 & 1991.

Fisheries statistics

Belize fisheries exports 1984-94, *in earnings*

Year	*Farmed Shrimp*		*Lobster*		*Conch*		*Finfish**		*Marine Shrimp*		*Other***		*Total*
	BZ$	%	BZ$	%	BZ$	%	BZ$	%	BZ$	%	BZ$	%	
1984			10128192	76.0	2564666	19.2	595102	4.5			36876	0.3	13324836
1985			11533016	78.2	2036650	13.8	432155	2.9	705460	4.8	44995	0.3	14752276
1986			9372048	65.2	1436850	10.0	1131913	7.9	2359520	16.4	82597	0.6	14382928
1987	209485	1.2	11581224	68.0	1738775	10.2	1429243	8.4	1994982	11.7	74206	0.4	17027914
1988	355875	2.2	10459370	63.3	2241300	13.6	1190691	7.2	2188939	13.3	75127	0.5	16511302
1989	884078	5.0	11603725	65.9	1373250	7.8	971128	5.5	2650989	15.0	137547	0.8	17620717
1990	1795434	9.9	10356821	57.3	2715545	15.0	953591	5.3	2198790	12.2	64925	0.4	18085106
1991	2819788	14.0	12416579	61.5	2797148	13.9	1103798	5.5	957950	4.7	81723	0.4	20176986
1992	6452944	27.9	11641413	50.4	3123978	13.5	880804	3.8	916097	4.0	85945	0.4	23101181
1993	10539168	42.8	9765889	39.7	3026650	12.3	382661	1.6	838900	3.4	76772	0.3	24630040
1994	8733153	33.0	14573130	55.0	2361175	8.9	269797	1.0	456100	1.7	83453	0.3	26476808
TOTAL	31789925	15.4	123431407	59.9	25415987	12.3	9340883	4.5	15267727	7.4	844166	0.4	206090094

* Including sharks

** Including ornamental fish

Source: Statistical Records of the Fisheries Dept., Ministry of Agriculture. and Fisheries: Myvett; 1993 & 1991.

Appendix 5. Cayes Development Policy drafted by the CZMC, December 1995

Belize's barrier reef and atoll system includes about 1,065 cayes which are largely composed of coral sand, mangroves or a combination of both. They vary in size from tiny islets of less than 0.5 acres and spits and shoals of a few square yards that may just be visible at low tide, to large, vegetated islands of several square miles or more. The cayes are regarded as one of Belize's greatest assets. They are sought after by investors, developers, tourists, fisherfolk and people who simply need a place to live, and this increasing demand by both nationals and foreigners has led to 67% of the cayes currently being claimed through lease or ownership.

While this may be seen as necessary from the economic point of view, it is causing developmental pressures that are having an increasingly negative impact on the unique characteristics of the coastal zone. These include:

- uncontrolled solid and liquid waste disposal,
- increasing risk of contamination of freshwater supplies,
- degradation of the seabed through indiscriminate dredging,
- damage to coral reefs through siltation,
- loss of mangrove habitat,
- deterioration of fish habitats,
- and a general diminishing of the aesthetic appeal of one of the country's main tourism and recreational attractions.

Several of the larger cayes and more accessible cayes are already substantially developed, such as Ambergris Caye, Caye Caulker, and St. George's Caye. Many others are now entirely developed for tourism and recreational purposes such as Moho Caye, South Water Caye, and Caye Chapel.

This situation calls for a clearly defined policy on development in the coastal zone to ensure sustainable use and the long-term protection of its natural resources. The policy shall refer to all cayes and the coastal waters.

This policy reflects:

- The Government's stated policy to stimulate and encourage both local and foreign investment: Much of this translates into acquisition or leasing of land on the cayes and the development of these lands for tourism. Such developments should not be a source of conflict between foreign investors and local residents with, in some cases, the loss of traditional land use rights and inappropriate development.
- The need to encourage development without compromising national identity and rights: The cayes and waters have been used by Belizean for hundreds of years. Traditional practices and styles have been developed over the years which have resulted in forms of use that are effectively based on the potentials and constraints of the natural environment and reflects a local culture peculiar to the Belizean cayes.
- The economic and ecological importance of the cayes for tourism, fishing, coastal protection, and as a habitat for both nationally and internationally important wildlife: The

cayes are now known throughout the world for their beauty, their wildlife and the opportunities they offer for recreation, sport and research. Perhaps not so emphasized is their sensitive ecological balance together with their importance as a significant economic factor for fishing and tourism. This policy intends to help establish a sustainable equilibrium between these values and uses.

- The policy of the Ministry of Tourism and the Environment to cultivate "low-impact high-spending tourism" in order to create an up market adventure destination: With a view to establishing a sustainable equilibrium between the often competing uses and habitats on the cayes it is considered necessary to promote a form of tourism that has more chance of complimenting the environment than destabilizing it. Moreover, this new policy will encourage Belizean involvement in the tourism industry in order to help translate lower investment potential into access to high income guests.
- The need to balance development with sound conservation management: The cayes are particularly fragile and vulnerable on account of their (often) small size and characteristic ecology, and there is already evidence of damage at many locations.
- Existing legislation, as well as existing and draft official guidelines, that directly or indirectly governs the use and development of the cayes: Over fifty pieces of primary legislation and many more subsidiary pieces and guidelines govern a wide variety of coastal zone activities. This policy reflects all current and draft legislation, whether in use or not, and makes recommendations on their use, adaptation and implementation.
- Existing Government procedures for receiving and reviewing development proposals: There are several different Government Departments and statutory bodies responsible for implementing the legislation and guidelines. This policy aims to help co-ordinate the roles of these agencies and to facilitate the process for the public.
- The different types of cayes and their individual characteristics that dictate the form of use or development that is appropriate and sustainable: No two cayes are the same: basic factors of ownership, occupation, location, natural features, habitat and history influence their use. This policy reflects such considerations and recognizes that no blanket approach would be suited to the many individual characteristics.

Policy recommendations

The following policy recommendations are set out in consideration of the relevant sectors of interest:

- Caye Ownership
- Protected Areas
- Land Use, Planning and Development Control
- Clearance, Extraction and Infrastructure
- Shipping and the Use of Vessels
- Freshwater, Waste Disposal and Fuel Storage
- Recreation and Tourism
- Fishing and Wildlife Exploitation
- Cultural Heritage
- Commerce and Economic Development

Caye ownership

Many of the cayes belong to the Government of Belize, either as part of the National Estate or as protected areas. The cayes in the National Estate are subject to the provisions of the National Lands Act which stipulates the procedures and conditions under which national lands may be leased, granted or reserved. Protected cayes are governed by the National Parks System Act, through which they are declared either as National Parks, National Monuments or Wildlife Sanctuaries, or the National Lands Act, as reserved land.

The private ownership of cayes is registered in the General Registry unless it falls within an area declared under the Registered Land Act, in which case the title is recorded at the Land Registry in the Ministry of Natural Resources. The subdivision of any private land into lots, and its use and development is covered under the Land Utilization Act; applications are submitted to the Land Utilization Authority for assessment and recommendations are sent to the Minister of Natural Resources for approval. Private land may be compulsory acquired by the Government through the Land Acquisition (Public Purposes) Act or the Land Acquisition (Promoters) Act if a suitable purpose can be proved.

In 1992, all the cayes were declared as a "designated area" under the Aliens Landholding Act. This disallows any foreigner to purchase any land without a license granted by the Minister of Natural Resources; the license registers the intended use and/or means of development of the land Conformity with the conditions of the license, which may include restrictive conditions, is required for its non violence.

Recommendations

All the provisions of the National Land Act, as it relates to the cayes, should be strictly enforced: the Act contains a number of specific provisions concerning appropriate means of occupation and development, as well as sections requiring the avoidance of damage, that should be thoroughly implemented.

Priority should always be given to Belizean in the leasing of any Nationally owned caye, or part of a caye: the general policy of affording maximized advantage to Belizeans in the enjoyment and development of the country's resources should be continued with added emphasis. This should not, however, discourage foreign investment, which should be channeled through Belizean proprietorship whenever possible.

The lease of any Nationally owned caye, or part of a caye in excess of one acre, should include a comprehensive development plan which shall stipulate exactly how the land is to be used. Such a development plan should reflect this Caye Policy, and any deviation and/or non-compliance with the plan should, in the absence of mitigating factors, require the cancellation of the lease: current Lands policy requires that all leases on cayes are accompanied by a comprehensive development plan. This is considered as an optimal means to ensure that nationally owned cayes are used and developed, within the confines of their individual characteristics, to the best advantage of the nation.

All leases of any nationally owned caye, or part of a caye, should be regularly and closely monitored to ensure compliance with comprehensive development plans. Such monitoring may be carried out by any Government department, statutory body or responsible party, notifying the Commissioner of Lands and Surveys: it is considered as integral to the best and appropriate use of the cayes that the review procedure of the occupancy and development of national land is as frequent and as accountable as possible. Moreover, the maximized participation of competent parties in the monitoring processes to be encouraged so as to ensure collective responsibility for the nation's resources.

The Moratorium on the sale of nationally owned cayes should be continued into the foreseeable future: the Lands policy of retaining all nationally owned cayes in the National Estate should be continued. No monetary figure attached to the sale of the cayes could reflect their true value to future generations of Belize. In addition, the retention of cayes in the National Estate will facilitate the control of their development.

The Lands policy requirements concerning squatters on Nationally owned cayes should be enforced, and all disputes and discrepancies over the occupancy of National land resolved, as soon as possible: the rationalization of the occupancy and claims of lands and waters is a pre-requisite for effective and sustainable use and development. Such a process will facilitate the activities of both the public and private sectors.

Applications to sub-divide privately owned cayes should be assessed with specific reference to this policy. Approval and registration of subdivision should be conditional on the attachment of covenants, binding on each sale, requiring conformity with this Policy: collated data on the ownership and marketing of the cayes by foreign interests is lacking; without this information it is difficult to gauge the level of monetary value being attached to these lands in foreign markets. One means of monitoring the market is through Alien's Landholding licenses which are required for the sale of any caye or part of a caye to a foreigner. These licenses can also, through the attachment of conditions, be used to determine how the land is to be developed.

The CZMU should proceed with the completion of the Cayes Database: this database should be maintained to ensure that up-to-date information on the status of each caye is readily available to the public and subscribing private sectors.

Protected areas

A number of nationally owned cayes have been designated, or are proposed for designation, as protected areas under existing legislation for Marine Reserves (Fisheries Act), National Parks, National Monuments, Wildlife Sanctuaries and Natures Reserves (National Parks System Act) and National Land Reserves (National Lands Act). (Privately owned cayes that lie within the overall boundaries of such protected areas are not generally subject to the regulations).

Seven areas on the Belize Barrier Reef have been proposed for designation as part of a multi-cluster World Heritage Site: Hol Chan Marine Reserve, Half Moon Caye Natural Monument, Glovers Reef Marine Reserve, Laughing Bird Caye National Park and its extension,

and the proposed Bacalar Chico National Park and Marine Reserve, Sapodilla Cayes Marine Reserve and South Water Caye Marine Reserve. These areas include a number of cayes. Furthermore, many cayes lie in areas that qualify for listing as Ramsar Sites under the Convention on Wetlands of International Importance.

Recommendations

The proposed protected areas that include cayes with important stands of mangrove should be designated and have their management plans drafted as soon as possible: mangroves have a unique value in their outstanding importance for fisheries and coastal protection. Their very location, between the sea and the land renders them especially susceptible to clearance. Inevitably some stretches shall be cleared yet the areas which have been specially identified as requiring conservation should be afforded meaningful protection before they are destroyed.

Areas with stands of littoral forest which have been identified as having particular habitat value should be assessed for possible protective status as soon as possible: to support littoral forest, land must be relatively high and it is therefore, especially vulnerable to clearance for development. An assessment process will identify such lands that should be protected and those that could accommodate other uses.

The listing of internationally important reefs and wetland sites that include cayes should be pursued through the Ramsar Convention and the World Heritage Convention: Such designations will provide international recognition of the importance of the cayes and will facilitate international assistance in their management.

Proposals for cayes, or parts of cayes, to be designated as protected areas must be undertaken with the provision that there is the potential for effective management and that the designation process includes maximized public and private sector participation: in order for the protected areas program to remain both popular and effective great attention must be paid to systems of designation and management that are based upon consensus, accountability and the comprehensive involvement of the different Government departments and the general public.

Land use, planning and development control

Two pieces of primary legislation have both planning powers, allowing the zonation of particular land uses and use densities, and development control powers: the Housing and Town Planning Act and the Land Utilization Act. A third piece of legislation has comprehensive development control, but no planning powers: the Environmental Protection Act. Each of these are administered by separate authorities.

Through the Central Housing and Planning Authority (CHPA), areas are declared by the Minister responsible for Housing and Planning as subject to Town Planning Regulations under the Housing and Town Planning Regulations under the Housing and Town Planning Act. A number of mainland areas, such as Belize City, have been designated in this way. Two cayes are subject to its planning powers: Ambergris Caye, where planning and development control has been largely delegated to the Ambergris Caye Planning Committee, and St. George's Caye. In

July 1995, CHPA declared "Belize as a Whole" as a planning area, which means that development plans may be prepared for any area.

Under the Land Utilization Ordinance, the Land Utilization Authority (LUA) assesses and regulates the sub-division and general use of private lands. The legislation also allows for the declaration of Special Development Areas (SDAs), within which the type of development that can take place is stipulated. These are declared by the Minister of Natural Resources and implemented through the Lands and Survey Department.

The Environmental Protection Act is administered by the Department of the Environment with the National Environmental Appraisal Committee (NEAC) giving recommendation on the application of the Act to a variety of projects.

Recommendations

The coastal zone of Belize should be divided into planning regions. For each of these regions a planning committee, representative of local occupants and other relevant public and private sector agencies, should be appointed to oversee, authorize and implement a development planning process: there is a compelling need to enable the cayes to have a mechanism whereby development plans can be drawn up to reflect the most effective means by which they are used. In order for a development planning exercise to be successful, the process must be guided and authorized by a fully representative and accountable committee system drawn up facilitate maximized participation. However as the coastal zone covers such a large area it is considered appropriate to divide it into discrete regions each with its own local committee.

Co-ordination between the various authorities and other public bodies that are involved in planning and/or development control on the cayes must be facilitated: in order to maximize efficiency and accountability in the public sector, and the opportunities of the private sector, a system must be established whereby duplication and contradiction is eradicated and the full sustainable potential of the cayes is realized.

The provisions of the Environmental Protection Act should continue to be thoroughly enforced: the environmental screening process must continue to be applied to all developments that are considered as having a possible environmental damage. Should that process reveal a real potential for degradation then the full provisions of the Act should be implemented.

Development of the cayes should be encouraged to be undertaken on high land rather than low land, providing that this does not conflict with the need to protect remnant stands of littoral forest and other native caye vegetation: development on low lands incurs costs to the developer, to the public and to the environment; the developer must pay to have the land filled and otherwise prepared yet the land remains susceptible to flooding and erosion; the public shall have to pay the residual infrastructural and social costs; and the degradation of the environment will eventually heighten those costs.

Any sub-division of land into lots to form some type of settlement, tourist projects or other such scheme should be of a low density and include land uses that are necessary for the health and enjoyment of any occupants or neighbors: the cayes are, essentially, fragile lands

surrounded by a vulnerable sea and can not support the same levels of high density development that the mainland can; as such a standard minimum residential lot size of 700 square meters or 837 square yards should be adopted. This standard, however, would not be specifically applicable to existing communities of San Pedro, Caye Caulker, St. George's Caye, South Water Caye or Tobacco Caye. Furthermore, such projects should include sufficient space for any recreational, utility and amenity uses that may be required.

Buildings on the cayes should be constructed in a manner that complements the prevalent Belizean architectural style and that would not present and overbearing demand on the available resources or constitute an avoidable liability in a natural disaster: the prevalent style of building on the cayes has evolved over many years as an appropriate response to the demands of use and nature. This is reflected in the materials used and the size of building. In view of this, buildings are recommended to be constructed predominantly out of wood products, to have a maximum height of two floors, and a maximum ground coverage of approximately 200 square meters. These standards, however, would not be generally applicable in existing towns or villages.

Clearance, extraction and infrastructure

The clearance and/or use of vegetation is regulated by the Forest Department under the Forest Act and the Protection of Mangroves regulations. The former applies, in the context of the cayes, to the extraction of timber form the littoral forest; the latter to the cutting of mangroves. The National Lands Act also plays a role through its requirement for a shore side reserve along all seafront and lagoon fronts, and the Land Utilization Act through conditions placed on the use and subdivision of private land. The protection of mangroves is further advised through the draft National Mangrove Management Plan.

The Geology and Petroleum Office has responsibility for mineral extraction and dredging, regulated under the Mines and Minerals Act, with its Health, Safety and Environmental regulations; and petroleum prospecting and drilling under the Petroleum Act. Dredging and mining operations require licenses and applications are assessed on their individual merits. Drafts Marine Dredging Guidelines providing recommendations on appropriate means of dredging and monitoring are being submitted for Cabinet approval. Current petroleum policy is that prospecting on the cayes is permitted, with the situation being reviewable should oil be found. Any eventually of an oil spill will be addressed by the Department of the Environment under the National Emergency Preparedness Plan.

Piers, jetties and other coastal structures on the cayes are controlled through the National Lands Act, the sea bed being nationally owned. Applications, to the Commissioner of Lands and Surveys, are considered case by case without reference to any specific policy except the master plan for Ambergris Caye, although advice from the Fisheries Department and Geology and Petroleum Office is usually sought.

Public roads and bridges are authorized and constructed through the Public Roads Act as exercised by the Ministry of Works. Roads and bridges on private lands are only regulated, through the Land Utilization Authority, in cases in which there is sub-division of land; if there is no sub-division, approval is not required.

Recommendations

In areas subject to development, forest clearance should be kept to the minimum necessary to allow for meaningful occupation. In all cases attention must be paid to maximizing retention of forest identified as supporting wildlife: the absolute removal of all vegetation on a caye leads to erosion, accelerated rain run-off, depleted freshwater supply and a loss of wildlife habitat. A general guideline is the retention of approximately 25% of the native vegetation with the increased vulnerability of the remaining trees to high winds being taken into account.

Forested areas which are used by fishermen for timber extraction should be managed on a sustainable basis: certain parts of the cayes are habitually used by fishermen to cut poles for a variety of purposes. This policy seeks to promote means by which this use can be continued on a sustainable basis to the benefit of the users and the environment.

The Protection of Mangroves Regulations should be fully and rigorously implemented: the regulations provide a means by which the removal or retention of mangroves can be rationalized according to developmental or protective needs. Furthermore, the classification of mangrove areas that have been identified as active nesting sites or as resting or breeding areas for colonies or concentrations of birds should commence.

The requirement for a shore side reserve along all water bodies and water courses, as stipulated in the National Lands Act and required by the Land Utilization Authority and other statutory bodies, must be strictly adhered to except where this is considered to be impractical. The appropriate width of such reserves should be determined either by development plans or, in the absence of such plans, by standards applied by the statutory bodies. Furthermore, extended water body and water course reserves should be required in mangrove habitats and areas exposed to possible erosion: the traditional 66 feet reserve is frequently implemented on paper though rarely in practice. Ideally the reserve offers an effective and easily accommodated means to protect both water side vegetation, and thereby the banks or beach and the quality of the water, and public access to water bodies. Certain built up or otherwise constrained areas however, may require a reserve with a minimum width of approximately 20 feet; on the other hand some areas have been identified as requiring the additional protection of an extended reserve of approximately 250 feet, allowing for suitable compensatory measures.

Dredging and sand mining projects should be strictly determined and approved according to the requirements of the Geology and Petroleum Office: dredging and sand mining can have a major impact on the shape, size and stability of cayes by altering water currents and disturbing sediments that may subsequently be deposited in other areas. Sandy beaches and small cayes naturally tend to exist in a dynamic equilibrium, with seasonal changes in erosion and deposition patterns. Dredging and sand mining can disrupt these processes and cause major changes, such as the total erosion of a beach, the silting up of a channel or the degradation of fisheries.

Dredging should not be used to create land that did nor have a previous legal existence except with the permission of, and in accordance with, the relevant authorities: any land created through dredging and/or filling which lies outside of the legal boundary of a private property is national land, due to the national ownership of the seabed, and as such can only be created and dealt with through the appropriate channels.

The draft Marine Dredging Guidelines should be finalized to reflect policies of the Geology and Petroleum Office, and then approved and adopted: these guidelines identify the appropriate equipment and methods to be used in dredging that would minimize environmental damage without unnecessarily impending efficiency. The guidelines also address procedures that should be used to monitor such projects.

Channels and canals should only be dredged after careful assessment according to their projected need and their location: experience and research shows that channels are best dredged on the leeward side of any caye in order to minimize erosion and siltation; however, access is most often demanded form the windward side (the reef side). The proponent of any channel should carefully consider both the level of use and the location before applying to the Geology and Petroleum Office for a license.

The safety and environmental requirements of the Petroleum Act and regulations should be specifically followed in all prospecting and drilling: there would be a considerable risk to the cayes should any accident occur in the exploration, extraction and transportation of oil. Should a cost/benefit analysis of petroleum extraction on any caye or in the waters around the cayes reveal a possibility of general economic and environmental loss through misadventure then closure of any operation under section 25 of the Petroleum Act should be immediately implemented.

Piers should be cited to avoid deposition, erosion and obstruction, and only with permission form the Ministry of Natural Resources. They should be cited at points with ready public access or, where this is not possible, they should be required to allow public use. In cases wherein it can be established, by the relevant Government departments and/or authorized bodies, that there exists ready public access to a pier then no other pier should be constructed: on some of the larger cayes the proliferation of un-planned piers has already caused problems including alteration of beach profiles and channel depths, creation of navigation hazards for boat traffic, and loss of aesthetic appeal, and recreational amenities. Many of these problems could be avoided through limiting the number of piers to approximately one per thousand yards.

There should be no construction of groynes, seawalls, causeways or other solid coastal structures without a full investigation into the environmental consequence and approval from the relevant authorities: such structures cause major changes in the speed and direction of waves and offshore currents, resulting in changes to the coastal morphology which are often damaging to both the natural environment and to development projects.

The use of private vehicles should be discouraged on all cayes, and vehicles such as golf carts should be encouraged provided adequate provision is made for the safe disposal of batteries or fuel: only one caye, Ambergris Caye, has sufficient development and size to warrant the use of conventional vehicles; none of the others have such a need and nor should have. The use of conventional vehicles brings about a series of negative effects on cayes that far out-weigh their positive effects: compaction of the sand/soil, accelerated rain run-off erosion, water and air pollution, congestion, demands on valuable space, hazardous fuel supply and encouragement of over development.

Shipping and the use of vessels

The primary shipping legislation is the Harbors and Merchant Shipping Act, of which the Harbor Regulations have the most relevance in regard to this policy since they provide for various safety and navigation measures. The Port Authority Regulations, of the Belize Port Authority Act, provides more specific requirements for shipping in port areas.

Most of the regulation and guidance for shipping is still in draft form. A draft Environmental Compliance Plan for Cruise Ships has been prepared by the Department of the Environment, the Fisheries Department and the Belize Tourist Board. This is currently being complied with by the cruise ships. A further draft Cruise Ship Policy addresses such issues as anchoring and the disembarkation of large numbers of visitors on small cayes.

A draft compliance plan for small recreational and commercial vessels has been prepared by the Department of Environment which provides guidelines on anchoring, placement of moorings, use of public moorings and vessel speeds etc and regulations for yacht operations have been drafted as an S.I. under the Belize Tourist Board Act. The Department of the Environment is preparing a National Emergency Preparedness Plan for Oil Spills.

Recommendations

The draft Environmental Compliance Plans for Cruise Ships and for Small Recreational and Commercial Vessels, and the draft Cruise Ship Policy should be reviewed by the appropriate agencies with a view to giving them statutory backing: the use of the cayes and the coastal waters by cruise ships and recreational vessels increased enormously in the last few years; yet there is, at present, no statutory means of regulation or control. Such regulations are becoming more pressing considering the large amount of people on board these vessels demanding a high level of refreshment and entertainment and thereby putting a strain on limited facilities and resources.

In the interim period, before the draft Environmental Compliance Plans and Cruise Ship Policy can be reviewed and adopted, they should be used as guidelines: considering the possibility of the protracted length of time the review and adoption of the various recommendations may take, it is urged that they are compiled into a utilisable package and distributed among the operators for both their voluntary use and comments. This process will inform the review and adoption procedure.

Boating speed limits, or "no wake" zones, should be mandated particularly for areas identified as being susceptible to flooding and erosion and also areas having a high presence of manatees and other wildlife susceptible to fast moving boats: speeding boats can have a damaging effect on some cayes and parts of others that are particularly low or have erodible coastlines. Also for some time fatalities and injury to manatees have been reported as having been incurred by speeding boats. Considering the protected status of these mammals, the role they play in the tourism economy and in the national wildlife consciousness, and the needlessness of such accidents, an assessment of particularly dangerous areas should be compiled. Subsequent to this boating speeds should be reduced to a series of practical levels, according to local characteristics, within clearly marked areas.

Fresh water, waste disposal and fuel storage

The Water and Sewerage Authority, the statutory water supplying agency is responsible for regulating and monitoring its own treatment and distribution system, through the Water and Sewerage Act and its subsidiary legislation. The only comprehensive water supply system that it operates on the cayes is in San Pedro, where water is obtained from wells with a reverse osmosis plant as back-up. Elsewhere, rain water and ground water are the primary sources. The Public Health Bureau in the Ministry of Health is responsible for monitoring all drinking water (including samples from WASA) and both soled and liquid waste disposal and issues related to general public health, including the quality of drinking water. The management of water resources is the concern of the National Hydrological Service of the Ministry of Natural Resources, but at present this is not responsible for the enforcement of any legislation. A draft Water Resources Act details matters concerning resource planning and use management.

Primary responsibility for waste disposal and control of pollution lies with the Department of the Environment, through the Environment Protection Act and its regulations. Implementation of the Solid Waste Management Authority Act has not yet taken place; the implementing agency has to be designated, the Authority established and appropriate subsidiary legislation drafted. Solid waste disposal in towns, i.e. San Pedro, is the responsibility of the town board. The Department of the Environment is also developing a National Waste Oil Management Plan. The control of pesticides and herbicides is the responsibility of the Pesticides Control Board, established under the Pesticides Control Act.

Recommendations

Research into as wide a variety of potable water generation systems as possible should be encouraged for all larger developments, in excess of ten beds: the need for good potable water on the a cayes is determining a search for reliable and clean systems.

Rainfall catchment systems should be installed for all developments, whether large or small: these are the preferable freshwater sources in terms of cost, avoidance of environmental damage and, often, taste.

Where wells are to be dug to provide ground water, thorough research and monitoring should be undertaken regarding the annual and seasonal rainfall, the size and quality of the underground water lens and the volume of water likely to be required: little information is available on the size and carrying capacity of the freshwater lenses of the cayes. However, it is known, from cases in other countries, that such ground water supplies can very rapidly become depleted, and subsequently damaged through salt water intrusion, if water is extracted at an unsustainable rate.

Desalination and/or reverse osmosis plants should only be installed if other methods can not provide sufficient water of the required quality: such plants can produce some harmful side effects: consequently this requirement is in view of the need to ensure that any effluent is safely disposed of and that appropriate monitoring methods are established.

For the disposal of solid waste the following methods should be used:

(a) for small cayes (less than 0.50 acres): obligatory removal of all solid waste to a landfill on the mainland, complemented where feasible by individual composting systems in order to reduce the volume of waste: This method could take place weekly in garbage bags by the owner of the caye, by a private company (serving several cayes) or by a body as the Solid Waste Management Authority.

(b) for large cayes (over 0.50 acres): (i) removal as for small cayes; (ii) incineration in an approved incinerator (with obligatory removal in case of breakdown); or (iii) disposal at a sanitary landfill. All three options should be combined with individual composting bins. Incineration will destroy all pathogens, has no visible are pollution and leaves only c. 10% of inert materials as residues (which could be used as fill). Incinerators and sanitary landfills could be operated by caye owners, by a private company (serving several cayes) or by such body as the Solid Waste Management Authority.

Re-cycling of waste materials should be encouraged wherever feasible, and regular beach clean-ups should be organized, involving the tourism industry and voluntary sector: maximum effort should be made to reduce the amount of waste generated on the cayes because of their small size which limits the amount of land available for disposal, their comparative inaccessibility which requires complex and expensive waste transport arrangements to the mainland, their vulnerability to pollution of ground water, and the importance of their aesthetic appeal.

Sewage disposal systems, including septic tanks and composting toilets, should be subject to a comprehensive assessment before installation. The following guidelines should be followed:

(a) Individual houses, small resorts (less than 10 rooms) and low density subdivisions (less than 3 lots per acre) should use individual septic tanks, properly designed and built to ensure that there is no leakage into the water table and into the marine environment: Nutrients form sewage can pollute the fresh water lens, and should they leak through the ground water system to the adjacent marine environment they could damage the coral reef by promoting algal growth.

(b) Larger resorts (over 10 rooms) and other subdivisions (over 5 lots per acre) should use one of the following: (i) any existing municipal sewage system; (ii) a simple but well-established type of package plant (extended aeration, activated sludge, biological contactors, etc.); (iii) stabilization ponds: Package plants should meet the following criteria: pre-treatment (sedimentary) included; 80% removal of BOD5 and SS; if outside the BEL grid, a backup power supply e.g., generator; periodic removal of sludge; trained operator (at technical level) available for at least 2 hours a day; maintenance contract with the supplier of the installation; surety fund to be deposited at the Department of the Environment Encouragement should be given to the establishment of a private company willing to serve caye residents in the periodic removal of sludge to the mainland. Stabilization ponds are proven technology suitable for tropical climates but should also meet certain criteria: minimum retention time of 30 days; a partition to create two separate ponds; a liner of clay, bentonite or membrane should be installed; effluent should be discharged into mangroves if present. Effluent from both package plants and stabilization ponds should be analyzed and laboratory reports monitored twice a year.

The use of composting toilets should be encouraged in appropriate locations and following comprehensive assessment: the compost generated can be used to fertilize cultivated land or can be thinly spread through other vegetation.

The means of storage and disposal of other liquid wastes, including chemicals, hazardous substances, oil and detergents should be carefully assessed and the National Waste Oil Management Plan should be fully complied with once it has been finally approved. In addition grey water treatment plants should be installed wherever feasible: the limited size and the vulnerable ecology of the cayes means that pollution problems on them tend to be far more acute than on the mainland and that the effects can spread rapidly to the marine environment.

The use of fertilizers, pesticides, herbicides and fungicides should be discouraged; if the use of pesticides is unavoidable, the requirements of the Pesticides Control Act should be strictly adhered to: the sandy infertile soil of the cayes and the high insect populations tend to encourage the use of nutrients and chemical that can grossly alter the natural cayes environment. In many cases, alternative approaches are available, such as generally encouraging cleanliness, the removal of rubbish, and sand raking to reduce sand flies.

Recreation and tourism development

Hotel development is regulated by the Hotels Act, through the Belize Tourist Board. The Board also sets tourism policy. The activities of tour guides are regulated under the Belize Tour Guide Board Regulations. The Belize Tourism Industry Association also has a significant input into tourism practices and guidelines.

Recommendations

A system to monitor the use of those cayes subject to visitation should be developed in order to ensure that attention is paid to carrying capacity. Consequent to this, encouragement should be given to tourism developments that are scaled to ensure that the limits of acceptable change are not exceeded: each caye has its own physical and infrastructural potentials and limitations as well as certain levels of tolerance and expectation among its residents. Visitor levels should be tailored to these constraints and opportunities. As a general rule for tourist developments an excess of twenty beds per unit should be discourages, and groups of a maximum size of 50 people only should be allowed to visit small cayes.

Maximized benefits to Belizeans in all levels of the tourism industry, form ownership to service, should be actively promoted: tourism is becoming one of the mainstays of the national economy, yet Belizean ownership in this industry is still relatively small. A concerted program to control exclusive foreign ownership together with incentives to facilitate Belizean ownership and management should be embarked upon. Such a program should also promote the involvement of fishermen who may be able to offer bed and breakfast accommodation.

Cayes which are commonly used by Belizeans for recreation should be retained or acquired for their declaration as reserves,, under the National Lands Act, for recreational purposes: such cayes include Goff's, English, Rendezvous, Sergeant's and Hunting Cayes.

These cayes should be specifically designated as recreation areas with a comprehensive management plan for each. Management should be exercised by bodies with clear accountability, such as the City Council or a town board.

The opportunity for tour guides in the cayes should be promoted, conditional on their being properly registered and trained: the cayes offer a great opportunity for the tour guide industry. Tour guides can act as both hosts and , as it is their interests, as monitors of the state of affairs. Workshops should be provided to furnish the guides with knowledge about the opportunities and constraints of the cayes.

Fishing and wildlife exploitation

Exploitation of fish, turtles and commercially important invertebrates is regulated under the Fisheries Act, and of larger marine animals, including several species found in and around the cayes, under the Wildlife Protection Act.

Recommendations

The provisions of the Fisheries Act should be strictly enforced throughout the cayes and traditional fishing rights should be respected in the waters around the cayes where they do not conflict with this Act: the cayes and their adjacent waters have been the focus of Belizean subsistence and, relatively, small scale commercial fishing for generations. These fishing grounds and their ancillary land uses should be managed for sustainability to ensure long term benefits for those traditionally reliant on their resources.

Recreational, or sport, fishing should be promoted within ecological and economic guidelines: sport fishing is a high revenue generation activity and as such it could bring substantial benefits to those dependent on the cayes for their livelihood. However, the activity should be managed to ensure that it does not compete with other marine uses and has the opportunity for low investment participation.

The full protection afforded by the Wildlife Protection Act should be provided to the native fauna and flora that is unique to the cayes: many of the native species of fauna and flora currently found on the cayes are becoming increasingly rare in the Caribbean region and in the rest of the world. As such the Belizean cayes offer the opportunity to become a treasured repository for these threatened species.

Cultural heritage

Archaeological sites and artifacts, and historical wrecks are protected as past of the national heritage under the Ancient Monuments and Antiquities Ordinance and under the Abandoned Wrecks Act. The cayes have been used by people at least since Mayan times and, as the principal access route to the country prior to the advent of motorable roads and commercial flight, they are of great historical significance having played a major role in the development of the nation. Much of this history is still to be documented and excavated and the potential for discovering historical wrecks is high. However, damage through uncontrolled excavation and salvage should be avoided at all costs.

Recommendations

The provisions of the Ancient Monuments and Antiquities Ordinance, and the Abandoned Wrecks Act should be fully complied with: exploration of possible archaeological sites should be properly controlled to ensure high scientific standards and patrimony of any found objects.

Development proposals should take into account the possible existence, and research undertaken to ascertain the likelihood, of any archaeological sites prior to the commencement of any works: developments can often destroy archaeological sites through insufficient forethought or research. The proponents of any scheme, such as a subdivision or anything requiring the clearance of land, should Liaise with the Archaeology Department prior to work being undertaken.

Commerce and economic development

Commercial development is regulated by the Ministry of Industry and Commerce primarily, for the purposes of this policy document, through the Trade Licensing Act, the Export Processing Act and the Commercial Free Zone Act. In all of these, incentives and controls may be utilized to promote and control industries, warehousing, retail and other commercial enterprises.

The Fiscal Incentives Act is administered by the Ministry of Economic Development. It is used to facilitate the development of diverse enterprises.

Recommendations

Proposals for any Export Processing Zone or Commercial Free Zone on any caye, such as Ambergris Caye, should be subject to rigorous environmental scrutiny. Furthermore, were any such zones to be established they should be geared towards assisting industries and enterprises that are integral to the economy of the cayes, such as fishing and tourism: the cayes, particularly those already developed for tourism, act as employment generators; people are attracted from all over the country by the jobs markets. However, some measures may be appropriate to diversify the economic base through the use of enterprise zones. Should such zones be established, this policy calls for the support of industries and businesses that are part of, or will contribute to, the existing caye economy. They should only offer jobs to local residents and not act as magnates to migrant labor.

The issuing of Trade Licenses and Fiscal Incentives should reflect the need to support both Belizean businesses and businesses that will not detract from the natural attractions and environment of the cayes: the trade licensing and fiscal incentive process is a vital instrument in assuring that business development is commensurate to the recommendations made in this policy. Enterprises, however big or small, should contribute to the cayes, not exploit them.

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Annex IV

BELIZE

Water Resource and Waste Management

May 30, 1996

World Bank
Caribbean Division
Country Department III
Latin America and the Caribbean Region

Contents

Abbreviations

BPH	Bureau of Public Health
CDB	Caribbean Development Bank
CIDA	Canadian International Development Agency
DOE	Department of Environment
GEF	Global Environment Facility
IPTBH	Increased Productivity through Better Health
MARPOL	International Convention for the Prevention of Pollution from Ships
MASICA	Sub-Regional Program on Environment and Health in the Central American Isthmus
MNR	Ministry of Natural Resources
MOH	Ministry of Health
MTE	Ministry of Tourism and the Environment
NARMAP	Natural Resources Management and Protection Project
NGO	Non-Governmental Organization
PAHO	Pan-American Health Organization
RECONDEV	Reconstruction and Redevelopment Corporation
RWS	Rudimentary Water Systems
RWSSU	Rudimentary Water Supply and Sanitation Unit
UNEP	United Nations Environment Programme
UNICEF	United Nations International Childrens' Educational Fund
UNIDO	United Nations Industrial Development Organization
USAID	United Nations Agency for International Development
VIPs	Ventilated Improved Pit Latrines
WASA	Water and Sewerage Authority
WCISW	Wider Caribbean Initiative for Ship-Generated Waste
WHO	World Health Organization

1 Introduction

Belize is very rich in surface- and ground-water resources. However, lack of sanitation facilities in rural areas, the discharge of untreated household and industrial sewage, and agricultural run off to surface water are leading to severe local surface- and ground-water contamination. This results in health problems such as gastroenteritis and contamination of rivers and the coastal zone, which could also have a negative impact on the coral reefs. Another area of concern is solid waste collection and disposal. The lack of collection facilities and improper disposal are leading to local contamination of ground- and surface-water. The problem also results in unsightly waste disposal, mainly on the cayes, which might negatively affect the tourism industry.

This report analyzes water resource and waste management in Belize and their present and potential impacts on the environment. Section II addresses aspects of water resource management, and Section III addresses aspects of waste management.

2 Water resources management

Legal and institutional framework

Various Government ministries and departments share the responsibility for management and provision of water and sanitation services: the Ministry of Natural Resources, the Ministry of Health, and the Ministry of Tourism and the Environment.

However, there are many areas where responsibilities are not clearly defined, resulting in duplications and deficiencies. Legislation will be required to provide a clear statutory framework to define the issues of water resource ownership, rights of use, and overall management. This is particularly important for the protection of groundwater sources where no regulation exists to control over-extraction and non-point contamination.

At the district level no institutions, independent from the central administration, perform water management functions. In the villages Rudimentary Water Systems (RWS) are managed by community boards which are officially recognized by the Central Government. Only recently, after the enactment of an amendment to the Water Sewerage Act, have they achieved legal status.

Diagnosis

Water resources

Surface Water. Sixteen major catchments in Belize drain the waters from the Maya Mountain Range which forms the topographic and geological backbone of the country. The largest rivers discharging to the ocean are the Rio Hondo, New River, Belize River, North Stann Creek and Monkey River. Their catchment areas constitute about 80% of the total area of the country. In addition to these major catchments, there are 15 smaller catchments which are difficult to categorize due to the low-lying nature of the landscape and to the presence of

multiple channels, creeks, swamps and lagoons located in these catchments (NARMAP, 1995). Estimates from mission calculate the total discharge into the ocean of these catchment areas at about 9,000 million m^3/year.

Ground Water. The region consists of large areas of limestone aquifers, so ground-water resources are abundant. One noticeable exception is the area of the Maya Mountains, including its eastern foothills, where the metamorphic rocks do not allow for the formation of aquifers. The existing aquifers and their annual recharge rate have not been quantified.

Water use

Water is mainly used in industrial processes and for human consumption (see Table 1). The total water consumption of 95 mio m^3/year is only 1% of the estimated flow of surface water at about 9,000 mio m^3/year. Thus, in general, Belize has enough water resources to meet the population's present and future water needs. Domestic water consumption per capita is about 240 to 280 liters per day in urban areas and about 160 liters per day in rural areas (WASA, 1995). This is about equal to the amount consumed in industrialized countries.

Seventy percent of the total water used in urban areas is surface water. Ground water is also used as a source of drinking water in the cities of the Corozal, Orange Walk, Cayo and Toledo Districts and in some rural areas of Toledo and Cayo. Data on water sources used by industry are not available. However, it is assumed that surface water is also the main water source. The amount of water used for irrigation is estimated to be less than one percent of total water consumption.

Table 1. Water Uses in Belize

Water Use	*mio m^3/year*	*%*	*Surface Water mio m^3/year (%)*	*Groundwater mio m^3/year (%)*
Industry[a]	84	88	no data	no data
Domestic use[b]	11	12	6.6 -7.7 (60 to 70%)	3.3 - 4.4 (30-40%)
Agriculture[c]	0.15	0.2	no data	no data
Total	**95**	**100**		

a. Miller and Miller, 1994.
b. WASA, PAHO, 1995.
c. NRI, 1993.

Water supply and sanitation

Access to safe[1] water in Belize has improved significantly in recent years. In urban areas the coverage increased from 95% in 1990 to 100% in 1995; in rural areas coverage increased from 51% to 75% (Table 2). In contrast, the situation with respect to sanitation has remained constant. Mostly in the rural areas of Cayo, Stann Creek and Toledo, sanitation coverage still remains below 30%.

The overall picture with regard to water supply service coverage is encouraging in comparison with other countries in the region. The figures on rural sanitation, however, are particularly poor and demonstrate a significant deficiency in this sector. The implications of

[1] "Safe" is understood as access to a protected well with a handpump or piped system, WASA, 1995.

this do not relate to sanitation alone because the benefits of an adequate supply of potable water are not met while sanitation facilities remain inadequate (Table 3).

Table 2. Percentages of Coverage of Water Supply and Sanitation

DISTRICT	WATER SUPPLY				SANITATION			
	Urban		Rural		Urban		Rural	
	1990[a]	1994[b]	1990[a]	1995[b]	1990[a]	1994[b]	1990[a]	1995[b]
Corozal	100	100	58	82	31	53	31	37
O. Walk	94	100	50	71	24	28	27	38
Belize	100	100	32	73	87	81	22	53
Cayo	87	100	36	82	34	43	24	27
Stann Creek	100	100	63	66	15	18	18	35
Toledo	42	100	27	75	16	33	24	28
Total	**95**	**100**	**51**	**75**	**59**	**59**	**25**	**35**

a. UNICEF, 1995.
b. WASA, PAHO, 1995.
Total urban and rural water supply coverage: 1990: 75%, 1994: 85%.
Total urban and rural sanitation coverage: 1990: 41%, 1994: 39%.

Table 3. Comparative Data for Water Supply and Sanitation Coverage, 1988-1993

Country	% Adequate Water Supply		Adequate Sanitation	
	Urban	Rural	Urban	Rural
Belize[a] (1995)	100	75	59	35
Costa Rica	100	84	100	93
Dominican Republic	75	37	77	36
El Salvador	76	10	86	39
Guatemala	78	42	72	48
Honduras	89	60	88	44
Nicaragua	78	19	32	?
Panama	100	66	100	68
Trinidad and Tobago	100	87	100	97

Source: World Bank, 1995.
a. PAHO, WASA.

Water supply. Approximately 85% of the population is currently served by a safe[2] and adequate supply of potable water. In urban areas this figure is about 100 percent while in rural areas it is between 65 and 80% (see Table 2). A comparison with the coverage data from 1990 shows a significant improvement in the water supply system, especially in the districts of Belize and Cayo. All the water systems in nine urban centers and in 19 villages are operated by WASA. The systems used in urban centers use pumping systems because of the flat terrain. In rural areas the increased coverage is a result of the project Increased Productivity Through Better Health carried out by USAID, CARE, UNHCR and UNICEF. About 53% of the population is served by 58 rudimentary water systems (RWS) and 16% by handpumps (715). RWS are generally located in villages with more than 250 inhabitants. They usually consist of a well with an electric submersible pump that discharges into an elevated tank and a pipe distribution network.

Water quality. Water quality in urban areas is good and is constantly monitored, but in rural areas the water quality, mainly in the districts of Toledo, Stann Creek and Cayo, is not satisfactory. All urban water systems are monitored daily by WASA and have 24-hour service. The water is purified with chlorine up to concentrations between 0.4 to 0.6 mgl/l. In rural areas

[2] "Safe" is understood as access to a protected well with a handpump or piped system, WASA, 1995.

full water purification takes place only in the RWSs that are connected to urban WASA systems (about 30%). Some villages have started purification on their own, but results are not satisfactory. About 58% of the water supplied by RWSs, the water extracted from wells, and collected rainwater is not treated. In 1995 the BPH found that 20% of the water in wells was contaminated by fecal coliforms as a result of sanitation facilities leaking into the aquifer (see Annex V - Health and the Environment). Due to the hardness of ground-water supplies from limestone aquifers, collected rainwater is preferred as a drinking-water source. However, rainwater systems are often unsanitary: oil-based, leaded paint is used on the roofs; water is collected from thatch "unimproved" roofs; and tanks are unscreened and dirty, leading to cross-contamination. A selective survey by the BPH in 1993 found that 30% of the rainwater was contaminated.

San Pedro, the most heavily populated of the cayes, is particularly problematic because of its shallow ground-water table, small and shallow fresh water lenses, and proximity to the fragile ecosystem of the barrier reef. In San Pedro drinking-water comes from ground water and water recovered through desalination.

Sanitation. Analysis of sanitation data is particularly complicated due to the difficulty of distinguishing a "sanitary" pit latrine from an "unsanitary" one. It is estimated that approximately 39% of the population is served with adequate[3] sanitation or wastewater collection and disposal facilities. In urban areas it is estimated to be 59% and in rural areas about 35% (see Table 2). A comparison to 1990 figures suggests that the sanitation sector has been neglected during recent years. The best served areas are large urban centers such a Belize and Belmopan. In the rural areas improvements have been made mostly in the District of Belize. The smallest number of sanitation facilities are found in the districts of Toledo, Stann Creek and Cayo, where less than 30% of the population is served. Of the population served, 18% are served by sewer systems, 15% have on-plot septic tanks and soakaways, and 15% are provided with Ventilated Improved Pit Latrines (VIPs).[4] The remainder rely either on unimproved, non-water-sealed pit latrines, or have no sanitation facilities at all. In addition, there are a few remaining bucket latrines in Belize City.

Sewer systems and sewerage treatment. Only two municipalities in the country have sewer systems: Belize and Belmopan. A sewer system is under construction for San Pedro. The Belize City sewer system only serves about 60% of the city, of which only 65% (16,000 people) are connected to the system. It consists of 15 sewer zones, each with its own pumping station. The sewerage is pumped to two facultative lagoons in the south of the city. The treated effluent is discharged into canals that cut through a mangrove wetland and flow into the Sibun Bight. The lagoons are in good condition and provide removal of BOD of 80 - 85%. The major problem is that the sewers are located below the ground-water table, thereby allowing infiltration into the ground water. The 40% of the population that is not served discharge their gray water into drainage canals and creeks while using septic tanks for fecal waste. However, in some areas the soil permeability characteristics and high water tables make soakage of septic tank wastes difficult, resulting in ground-water contamination, the back up of wastewater into homes, and the discharge of faecally contaminated waste into drainage canals. In addition, a few bucket latrines

[3] "Adequate" is understood as access to VIP latrine, septic tank or sewage system, WASA, 1995.
[4] See population census, 1991.

remain in Belize City. Faecal wastes from these latrines are frequently discharged into drainage canals and creeks

In Belmopan the sewer system consists of two pumping stations that pump the water into a treatment plant. The treatment plant is not functional, and 95% of the raw sewage from about 4,000 people is discharged into the Belize River. In San Pedro a project is being carried out to treat the sewage from households and hotels in treatment ponds before discharging it into the ocean. However, about 40% of the population (1,280 people) are not connected to the sewer system and have insufficient sanitation facilities (WASA, 1996).

In the other urban centers people use septic tanks, the construction of which is the responsibility of each household. The BPH of the Ministry of Health, the Ministry of Housing and Urban Development and WASA each has its own standards for the design of septic tanks. None of these entities monitors or controls the construction and maintenance of septic tanks. As a result, the quality of the septic tanks tends to be low, and infiltration of waste water into ground-water tables and discharges into drainage systems is very common.

Water contamination - surface water

Contamination of surface water originates mainly from four sources: agricultural run-off, domestic wastewater and waste, industrial wastewater and waste, and transboundary pollution from Guatemala and Mexico. Each catchment area and district is affected by different sources of contamination. Thus, within each district and catchment area, different priorities have to be set to control surface-water contamination.

Agriculture. Agriculture affects surface water through the run-off of pesticides and fertilizers. The NARMAP program "Sustainable Agriculture" analyzed the impact on the coastal zone of pesticides, fungicides and fertilizers in citrus and banana plantations in the District of Stann Creek. The analysis concludes that the present run-off of fertilizers and pesticides is already affecting and will further affect the coastal zone in a negative way.

Table 4. Estimates of Nitrate and Phosphate Loads into Surface Water by Banana and Citrus Production in the District of Stanu Creek

Agricultural Production	*Area ha*	*Phosphates Loads (tP/year)*	*Phosphates Loads (%)*	*Nitrate Loads (tN/year)*	*Nitrate Loads (%)*
Banana [a]	1960	64	65	520	48
Citrus [b]	6975	35	35	488	52
Total	8935	99	100	1008	100

a. Usher, et al., 1994.
b. Hall, 1994.

Fertilizers, particularly phosphates and nitrates, are causing euthrophication of the coastal zone[5] and estuaries. In the coastal zones and estuaries an abundance of phosphates is causing algae bloom. Phosphates are absorbed into soil clay particles and are transported by sediment movement and/or erosion. Nitrates are transported by leaching processes. They are not absorbed into soil particles and thus infiltrate the groundwater or run off to the surface water.

[5] Usher, et al., 1994.

Banana plantations, although they constitute only 22% of the citrus and banana area, produce about 65% of the phosphate and 48% of the nitrate fluxes.

The run-off of fertilizers and pesticides from mechanized crops and sugar cannot be estimated. However, given that these crops cover large agricultural areas, about 20,000 ha for sugar and 17,000 ha for mechanized crops, and assuming that the chemical input is similar to that of export crops, their contribution to the phosphate and nitrate loads might be at least as large as that of export crops. In the areas where sugar is grown, contamination of ground water sources with nitrates has been observed (BPH, 1995).

Pollution by the pesticides Diuron and Ethion is affecting the coastal zone.[6] Most of the pesticides are absorbed into soil particles upon contact and move with soil sediments. Air-spraying of pesticides, as practiced in the banana plantations, affects not only the water bodies but also the health of the workers and farmers living in these areas.

Another reason for increased agricultural run-off is the clearing of mangroves to the edge of the rivers and coast. Clearing takes place despite regulations that protect mangroves within 66 feet from the edge of rivers and coast. This increases soil erosion and the run-off of soil particles. In addition to retaining agricultural run-off, mangroves have the ability to absorb nutrients.

Domestic waste water. Domestic waste water contaminates surface water in the following ways: (i) non-functioning sewage treatment plants where the sewage is discharged directly into the river, (ii) emptying of bucket latrines into the river, and (iii) effluent from septic tanks.

Untreated domestic waste water causes health problems such as gastroenteritis and cholera[7] especially where the drinking water source is located downstream from a sewage discharge. Additionally, the discharge of untreated sewage from coastal urban centers leads to high nutrient loads because of the high nutrient content of feces. The nutrient loads can induce increased algae growth, depending on the depth of the ocean, the velocity of the water in the ocean and the proximity of the discharge to the cayes.

Industry. Industries are point sources of pollution. Water contamination caused by industry is due to industrial effluents and to the leaching of industrial waste. The effluents from the sugar industry constitute about 99% of the total nutrient flux of industries.[8] The effluent quantity and the nutrients flux of the other industries such as citrus, brewery, rum, poultry and shrimp industries are less than one percent of the total nutrients flux.

The impact of the sugar processing industries is significant with respect to the contamination of rivers and the coastal zone by nutrients. The loads from the other industries directly affect the receiving water body such as small creeks. The leaching originating from the disposal of orange rinds from the citrus industry also has a localized pollution effect due to high concentrations of BOD (Biological Oxygen Demand) and citric acid.

[6] Hall, 1994.
[7] UNICEF, 1995.
[8] Miller and Miller, 1994.

A short overview of the most important industries is provided below and includes an analysis of their liquid and solid waste management and the respective environmental impacts.

(i) *Sugar industries.* There are two main sugar refineries: Tower Hill and Libertad, both located in the District of Corozal on the New River. Tower Hill processes about 3.5 tons of cane per day. The waste water of this process is treated in an aeration pond prior to being discharged into the river. The industry also produces wastes: about 300,000 tons/year of bagasse, 2/3 of which is used for energy generation and 1/3 of which is either incinerated or discarded; and filter mud, which is rich in nutrients and can be used as fertilizer. The filter mud (25,000 to 30,000 tons/year) is disposed on a dump site of about 40 acres. It has free access, and some farmers use the mud as fertilizer. The main reason that the mud is not further processed and sold as fertilizer is the lack of demand and the existence of less expensive inorganic fertilizers. The run-off and infiltration from these disposed filter muds contain a high nutrient load and lead to contamination of surface- and ground-water sources. Libertad processes about 1.8 tons of cane per day to molasses. The waste water is discharged into the river without any treatment. The bagasse produced during this process is used entirely for energy production. It can be assumed that Libertad produces an amount of filter mud equivalent to that of Tower Hill (10 to 15,000 tons/year).

(ii) *Citrus industries.* There are two main citrus processing industries in the District of Stann Creek: Citrus Company of Belize and Food of Belize, LTD. Together they processed about 150,000 tons of oranges and grapefruit to 3.25 mio gallons of concentrate and 200 tons/year of oil in 1996. They generated about 72,400 tons of solid waste and about 80,000 tons/year of liquid waste. The solid waste, in the form of orange rinds, is dumped, and high BOD concentrations in the leaching have been measured.

Commercial waste water. Commercial waste water has a similar composition to domestic waste water. Hotels are the main producers of commercial waste water. Thus, the main polluting fluxes are generated in urban areas on the coastal side and on the cayes. Tourists staying on the coastal zone produce nutrient fluxes that are comparable to the fluxes produced by the inhabitants of San Pedro.

Transboundary pollution. Transboundary pollution originates from contamination of the rivers in Mexico and Guatemala. About 30% of the catchment areas for the following rivers lies in Guatemala: Rio Hondo, Belize River, Moho River and Temash River. About 91% of the catchment area of the Sarstoon River is in Guatemala. Fifty percent of the catchment area of the Rio Hondo is located in Mexico. The convention of 1859 between the United Kingdom and Guatemala set the boundary of Belize and Guatemala at the median line of the Sartoon River, while under the 1983 treaty between the United Kingdom and Mexico, the boundary follows the deepest channel of the Hondo River. Neither of these agreements, which both remain in force, governs water use or pollution control. In the case of Belize and Guatemala, there has been little communication concerning the upstream use of shared waterways and possible downstream impacts on the receiving country (see also Annex III).

In 1991 the Government of Belize exchanged notes with Mexico for cooperation on the use of international rivers and border environmental conditions, and an agreement was signed for the protection and improvement of the environment and the conservation of natural resources of

the border zone (GOB, NARMAP, 1995). However, the information exchange to which both countries agreed has not taken place.

Summary. The surface-water pollution sources differ significantly within the different districts. In all the districts except Toledo, the flows are of the same order of magnitude. In Corozal the main pollution source is industrial effluents, while in Belize the load produced by agricultural run-off is about the same as that stemming from urban areas. In Stann Creek agriculture is the largest pollution source (Table 5).

Table 5. Estimates of Pollution with Nutrients from Industry, Agriculture and Urban Areas in tP/year and tN/year

	PHOSPHATES IN tP/YEAR			*NITRATES IN tN/YEAR*		
District	*Urban regions* [a]	*Industrial effluent* [b]	*Agriculture* [c]	*Urban regions* [d]	*Industrial effluent* [e]	*Agriculture* [e]
Corozal	5	300	no data	30	1850	no data
Belize*	40	2	9	190	<1	90
Stann Creek	5	<1	90	24	<1	900
Toledo	3	--	no data	13	no data	no data

a. Phosphate output in feces according to the human physiology, contents in detergents and detergents consumption: range from study in Tunja, Colombia (Binder, 1996).
b. Miller and Miller, 1994.
c. Only citrus and banana.
d. Nitrogen content in feces according to human physiology (Baccini and Bader, 1996).
e. Including San Pedro and tourism.

Pressures causing surface water pollution. This section analyzes the impact of agricultural expansion and urban growth along the coastal zone on surface water pollution.

The largest increase in water pollution from nutrients will be caused by agricultural run-off. The increase will be due to (i) agricultural expansion and (ii) increasing use of chemical inputs. According to land allocation studies,[9] agricultural expansion will be localized in the south due to the construction of the Southern Highway. The new areas will be located mainly in the catchment area of the Deep River and are likely to be used for citrus production. Because the discharge of the Deep River is very close to the coral reefs, the risk that the reefs will be affected by the agricultural development is larger than in the agricultural areas further north. In the Stann Creek Valley, agricultural expansion is likely to take place on steep hills which are very sensitive to soil erosion. Thus, run-off of sediments and nutrients will increase more rapidly.

During recent years imports of fertilizers have increased significantly from 6,000 tons in 1985 to 32,000 tons in 1994. The total amount of fertilizer used per acre has increased from 170 kg/acre in 1987 to 270 kg/acre in 1994. According to NARMAP, it is probable that small farmers will increasingly use more chemical inputs which will cause the nutrients flux to increase further.

Given population growth trends in urban centers (2% per annum), a doubling of the urban population within the next 30 to 40 years is expected. Consequently, the flux of nutrients from the urban areas to the ocean may double if no sewage treatment measures are taken. WASA plans to improve the sanitation and sewage treatment facilities, especially in Belize City and San Pedro. Although there are no data available regarding the capacity of nutrient retention of the present and planned sewage treatment facilities, it can be assumed that even with these

[9] See Annex I on Land Use and Land Allocation.

improved facilities, the nutrient flux of urban centers will at best stay constant. One major reason for this is that most of the poor residents are not being hooked onto the sewerage system, and they will continue to dispose of their sewage directly into the ocean as in San Pedro. The main reason the poor are not sufficiently served by an adequate sanitation system is that they cannot afford to pay for the marginal cost for the service.

Water contamination - ground water

Ground-water contamination affects the quality of the drinking water. The main contamination sources are domestic waste water and infiltration of nitrates from agriculture. Health problems arising from infiltration of domestic waste water into the aquifer occur mainly in rural areas. This problem is most apparent in the District of Toledo and in settlements near the Western Highway where the aquifer is located just below the soil. It has been found that wells are located too close to pit latrines which leads to contamination of the groundwater sources (see Annex V).

The contamination resulting from agriculture is mostly related to the use of fertilizers, where nitrates leach through the soil into the aquifer. The chemical analysis of handpumps shows maximum nitrate concentrations between 8 and 10 mg/l (BPH, 1996) for the districts of Corozal, Orange Walk and Cayo. The highest concentrations are found in Corozal and Cayo. The limits for drinking water quality set by the WHO are 10 mg/l. The data thus indicate that contamination of ground water due to infiltration of fertilizer is taking place. Even though the nitrate levels have not yet exceeded regulations, it is likely to happen in the near future, particularly as agriculture intensifies. In the coastal areas and cayes leaching from the improper disposal of solid waste can also lead to severe point contamination of the aquifer which is located 1 to 5 m below the soil.

Monitoring

Monitoring is mainly carried out by five governmental organizations: the BPH under the MOH; WASA under the MNR; the Department of Hydrology under the Ministry of Energy, Science, Technology and Transport; the DOE under the Ministry of Tourism and the Environment; and the Department of Fisheries under the Ministry of Agriculture and Fisheries. However, no coordinated plan for the monitoring of water resources exists.

The main responsibility of the BPH lies in monitoring the drinking water quality. In urban areas they cross-check the monitoring carried out by WASA. In rural areas, they monitor the Rudimentary Water Supply Systems (RWSS) and the handpumps and make spot checks of the river water used for drinking purposes. About 15% of RWSS and 40% of the handpumps are monitored. The lowest coverage is in the District of Toledo (8%).[10]

WASA monitors the amount and the quality of the water it provides. The monitoring is carried out in urban areas and in rural communities whose water supply system was installed by WASA. WASA also monitors the water quality of the effluents of the sewage treatment plants in Belize City and Belmopan.

[10] See also Annex V Health and the Environment.

The DOE surveys and monitors the quality of some of the rivers in the country. In a project developed together with the University of Delaware, the DOE is analyzing the quality of the Belize River and of the harbor area around Belize City to ascertain the level of heavy metals pollution caused by the battery and plating factories and to determine the direction of further studies. The Department of Fisheries monitors the water quality in the coastal areas.

Pollution control

Pollution control is regulated by the Environmental Protection Act of 1992 (see Annex V).[11] The DOE is responsible for the implementation of the Environmental Protection Act and the regulations made under it. In 1995 new pollution control measures were promulgated. The effluent regulations for industries and commerce (hotels), which were developed with collaboration of the EPA (USA), were implemented in 1996.

Current policies

Tariff structures and user fees

The fees, terms and conditions for the supply of water and for sewerage disposal are determined by the Government. The current fees are enough to meet the recurrent expenditures of WASA. However, they are not sufficient for expanding and upgrading the water and sewer system without Government or external subsidy. Since 1986 the fees for water and sanitation in urban communities are the following:

(a)	≤ 1000 gallons	BZ$9.90 (minimal fee)
(b)	next 1000 gallons	BZ$0.01320 per gallon
(c)	next 4000 gallons	BZ$0.01452 per gallon
(d)	next 4000 gallons	BZ$0.01586 per gallon
(e)	for each gallon above 10000	BZ$0.01716 per gallon
(f)	Connection fee (water)	BZ$50
(g)	Reconnection fee (water)	BZ$10
(h)	Connection fee (sewer)	BZ$50

The minimum fee for the first 1000 gallons of water consumed is intended to cover the fixed commercial and administrative costs of providing the service, to provide households with enough water, and to maintain minimum health and sanitary conditions. The fee structure is intended to discourage excessive use of water. Sewer fees are currently billed at 20% of the water rate for Belize City and Belmopan although the Water and Sewerage Act has been amended for sewer rates to be increased to 30%.

Unaccounted for water[12] at WASA was officially recorded at 45% in 1991. Current figures show an increase to 57%. Twenty percent of the unaccounted for water is a result of the large number of domestic water meters that measure quantities in imperial gallons instead of US

[11] Legal and Institutional Framework.

[12] Unaccounted for water is defined as the difference between the recorded production and consumption (billed for) water.

gallons. The amount of unaccounted for water due to losses and/or illegal connections has not been quantified.

In rural areas each RWSS is managed by a Board of Management that has been chosen by the Minister of Natural Resources. The Boards are empowered to make rules regarding the operation and maintenance of the systems and the water rates. The rules state that the fees charged to the villagers should cover the price of water, the cost of operation and maintenance, and the salaries of the staff. The fees range from BZ$5 to BZ$18 per month. The funds collected are deposited into bank accounts which are kept in the name of the Board. In some villages the surplus of the Boards has been used to improve other village infrastructure.

Currently, each industry and commercial establishment has to obtain a license for the discharge of their effluents. One remaining problem, however, is the fact that the fees are not yet linked to the amount of pollution produced by each industry. It is recommended that fees be linked to pollution levels.

Effluent charges

The problem of industrial and commercial effluents is being addressed by the Government. According to the effluent regulation which was implemented in the beginning of 1996, each industry and commercial institution (i) has to pay for a license for the discharge of its effluent, (ii) has to monitor its effluent, and (iii) has to establish together with the DOE yearly improvement goals. Because the effluent regulations were prepared in a consultative process with industry, they are widely supported by the private sector. Since January 1996 about 33 licenses were issued at a cost of BZ$300 each, including the largest and most polluting industries. The main polluting industries, sugar and citrus, are monitoring their effluents and have set their pollution reduction goals. However, participation of the commercial sector and small companies has not yet been very high (Mendoza, 1996). Nevertheless, involving the private sector by giving them the responsibility for their own environmental improvement seems to be a promising approach. One remaining problem, however, is the fact that the fees are not yet linked to the amount of pollution produced by each industry. This issue is under consideration by the Government and should be the next step for the control of point pollution.

Expenditures by the government and donor agencies

Despite the growth of GDP over the last five years, the recurrent public expenditures on water and sanitation have been reduced from BZ$13.3 million in 1989 to BZ$2.9 million in 1994. Sanitation in rural areas has been particularly neglected. No investments were made in 1995 to improve the quality of the rural sector. In terms of capital expenditures, the main recent project is the San Pedro Water Supply and Sewerage Project (loan from CDB) that amounts to about BZ$26. About 40% of the population in the San Pedro area are not scheduled to be hooked to the system. These households have been excluded because of their inability to pay the fees.

An additional problem is the sharp decrease in external funding. Traditionally, the water and sanitation sectors have been donor-led. During the 1980s the Canadian International Development Agency (CIDA), the United States Agency for International Development (USAID), CARE International, UNICEF, and the United Nations High Commission for Refugees (UNHCR) gave significant support to the water and sanitation sectors. Between 1978

and 1984 WASA received a grant of approximately BZ$80 million from CIDA for the development of the urban water supply and sanitation systems. Presently, only two donors, UNICEF and UNHCR, continue to provide grants to the sector. A possible financing source for rural water and sanitation improvement is the Social Investment Fund (SIF). This fund is estimated at approximately BZ$22 million, consisting of BZ$14 million in World Bank loan and BZ$8 million in grants from other agencies and the Government's contribution.

Ongoing projects and project proposals

There are two main projects being carried out in the water and sanitation sectors. The first is the Belize infrastructure project. Its aim is to improve Belize City's storm drainage network in order to improve the quality of the overall water and sewerage services for the city. This project started in 1992 and will continue through 1997. It is financed with a loan of BZ$40 million from the International Bank for Reconstruction and Development (IBRD) and counterpart funds of BZ$16 million. The second project is the construction of a new integrated water supply and sewerage system in San Pedro at a total cost of BZ$16.8 million, which is financed by the Caribbean Development Bank (CDB).

In the Belize Water and Sanitation Sector Analysis five projects were proposed to improve the overall situation of water and sanitation in the country. One of this proposals aims to develop policies and criteria to involve NGOs and to strengthen local communities in the operation and management of water supply and sanitation facilities. Funding will be sought from UNICEF, PAHO and Ruta Social for about BZ$108,000. A second project relates to rural water supply and sanitation. The objective is to supply 85% of the population with safe water and 75% with adequate sanitation facilities by the year 2000. Total investments amount to BZ$20 million; BZ$5.6 million from the GOB, BZ$1.7 million from WASA, BZ$9.5 million from the rural communities themselves, and BZ$3.7 million from external sources.

Another proposal aims to increase the appropriate disposal of domestic excreta in urban communities by ensuring that 80% of urban households are connected to an appropriate waste water disposal system. The total costs are estimated to be BZ$1.3 million. Additionally, a project to reduce unaccounted for water as well as a reform of the water sector are proposed. The reform project aims at increasing the coordination between the ministries and departments within the water sector, thereby reducing existing overlaps and filling gaps in the management of water resources.

Even though several attempts have been made to monitor water resources, there has been no coordinated water management program so far. A first proposal for coordinated monitoring was made in 1995. The Environmental Water Quality Monitoring Program was developed by the Escuela Agricola Panamericana (Honduras) and the Colorado State University (USA) and was financed by NARMAP. This program established the relationship between land use and potential water contamination, indicated the rivers with high contamination risk, and identified the main monitoring points which are necessary for the evaluation of water quality. Additionally, the DOE, the Department of Hydrology, and the University of Delaware are developing a monitoring project for the next three years. It will focus on the quantification of pollution in the coastal area due to suds and their associated pollutants. In addition, this project

seeks to support local institutions in order to help them improve their monitoring systems. Funding is currently being sought.

No projects to reduce agricultural pollution have been developed so far. Within the "sustainable agriculture" project NARMAP proposed several measures to mitigate the effect of agriculture on the rivers.

Conclusions and recommendations

1. Implement feasibility and cost/benefit analyses for potential sanitation investment in the rural areas of Toledo, Cayo and Stann Creek:

In rural areas less than 30% of the population has access to adequate sanitation facilities. The access to sanitation is particularly low in the Districts of Toledo, Cayo and Stann Creek. The lack of sanitation has been leading to increasing health problems such as gastroenteritis and hepatitis A as well as to the contamination of groundwater sources. Currently, as a result of the Belize Water and Sanitation Sector Analysis, some preliminary proposals to analyze the feasibility of various rural projects are being considered with the support of UNICEF, PAHO and Ruta Social. The proposals emphasize NGO and community involvement. In addition, the SIF is likely to provide funding for some of the rural infrastructure investments. It is recommended to evaluate and further develop these proposals, emphasizing NGOs and community involvement in the operation and maintenance of sanitation infrastructure and education.

2. Start pollution prevention of surface water and the coastal zone:

The largest sources for contamination of surface water and the coastal zone are the effluents form agroindustries, the agricultural run-off, including fertilizers and pesticides, and the untreated or insufficiently treated sewage of urban centers located on the coast and on the cayes. The most polluting effluents from agroindustries are the effluents from two sugar and two citrus processing plants. A cost-efficient strategy should be developed to reduce the nutrient loads in the effluents of these plants. Contamination of agricultural run-off is likely to increase within the next 20 years due to agricultural expansion and increased fertilizer use if no mitigation measures are taken. It would be useful to develop guidelines for the use of fertilizers in large and small farming according to soil and crop type. Additionally, simple measures should be taken to reduce the agricultural run-off. Enforcement of the regulations that protect mangroves within 66 feet of the coastline and river reserves would significantly reduce the agricultural run-off. NGOs should implement and monitor the enforcement of such legislation.

3. Incorporate the poor in the sewage collection services:

In urban areas and the cayes new systems for sewage collection and treatment are being installed. However, most of the poor residents are not being hooked onto the sewerage system, and they will continue to dispose their sewage directly into the ocean (e.g., San Pedro). The main reason for not covering the poor with an adequate sanitation system is their inability to pay the marginal costs for the service. The connection fees for water supply and sanitation appear to be too high for the poorest households. It is recommended that the structure of the fees have some flexibility to allow for subsidizing the poorest neighborhoods so that they can also have

access to sanitation facilities according to their capacity to pay. The aim should be that more than 80% of the urban population is covered with adequate sanitation by the year 2000.

4. Establish a system of licenses for water abstraction:

Most industries and new developments obtain their water from rivers and groundwater sources without paying any fees. No legislation exists to regulate the abstractions of water or its use for irrigation. The issuing of licenses for water abstraction could provide part of the financing for future investments in the sector, considering that industrial water consumption comprises about 80% of total water consumption and that the water needs of new urban developments and irrigation are likely to increase. It is therefore recommended that legislation be developed for the issuing of licenses for the abstraction of water and irrigation. These licenses should be issued according to the water consumption of industries and agriculture, and appropriate fees should be charged.

5. Apply the polluters-pay principle to industrial and commercial establishments:

Since January 1996 each industry and commercial establishment has to obtain a license for the discharge of their effluents. One remaining problem, however, is the fact that the fees are not yet linked to the amount of pollution produced by each industry. It is recommended that fees be appropriately linked to pollution levels.

6. Develop a monitoring program for surface waste:

A monitoring program for surface water should be developed by the Department of Environment and the Department of Hydrology. Technical assistance will be provided by the University of Delaware. They should focus on monitoring the loads of mud from the rivers into the coastal zone. The monitoring of the loads of mud should be a priority because phosphates, pesticides, and heavy metals are absorbed into the mud and are transported with it to the coastal areas.

3 *Solid waste management*

Legal and institutional framework

Responsibility for solid waste management (collection, treatment and disposal) currently rests with local governments at the city, town and village level: the Belize City Government for Belize City, the Reconstruction and Redevelopment Corporation (RECONDEV) for Belmopan, the respective town bodies for each district town, and the village councils in rural areas. Funding for the service is taken from a combination of local revenues and central government subventions through the Ministry of Local Government (MLG). The responsibility for monitoring and controlling solid waste collection and disposal lies with the Bureau of Public Health (BPH) under the Ministry of Health (MOH), which has a single public health field officer covering each district. For this district public health officer, monitoring of solid waste management is only one of his many responsibilities. The Solid Waste Management Act of 1991 establishes an independent national Solid Waste Management Authority, a semi-statutory body with broad powers to

provide for the collection and disposal of solid waste in accordance with the regulations established by the Ministries (see Annex VII - Legal and Institutional Framework). In May 1996 the littering and pollution regulations were implemented. The DOE has drafted a regulation regarding hazardous waste management, but this has yet to be adopted and implemented.

Diagnosis

Waste generation

Solid waste is a growing problem in Belize. Improper solid waste disposal adversely affects the tourist industry, contaminates surface groundwater and the ocean, and creates health problems. The main problems are caused by industrial and municipal waste in urban centers and in the cayes. Rural areas are less affected by improper solid waste disposal due to the relatively low population density and smaller consumption per capita.

Industrial Solid Waste, mainly caused by the citrus and sugar industries, represents the largest share (63%) of the total waste produced in Belize (see Table 6) and is localized in the Districts of Stann Creek (orange rinds) and Orange Walk (sugar bagasse and filter mud). The citrus industries produce about 72,000 tons of orange rinds per year. The principal waste products of the sugar industries are bagasse and filter mud which account for about 40,000 tons per year. The banana industry also produces some waste which consist mostly of plastic bags.

Table 6: Estimates of the Amount of Waste Produced in Belize

Waste Type	*Production in tons/year*	*%*
Municipal Solid Waste [a]	63,000	36
Industrial Waste	110,000	63
Sugar [b]	40,000	21
Citrus [c]	72,000	42
Hazardous Waste	no data	<1
Waste Generated by Tourists [d]	3,000	1
Ship-Generated Waste [e]	700	<1
Total	**166,700**	**100**

a. Estimation of average production per capita of 0.8 kg/cap.year (PAHO, 1993).
b. Gillet, 1996.
c. Hanskoning, 1993.
d. Estimate of waste production per tourist; 2 kg/cap. day (PAHO, 1993).
e. Estimates according to DOE.

Municipal solid waste makes up about 37% of the total waste produced in Belize. It is estimated that each resident produces about 0.8 kg/cap. day (PAHO, 1993). The waste produced by tourists is about 2 kg/cap.day. The total amount of municipal waste produced in the country is estimated to be about 66,000 tons/year.

Hazardous waste consists of infectious waste from hospitals and some industrial waste. Infectious wastes from hospitals are incinerated in Belize, Belmopan and Corozal. The amount of hazardous waste produced has not been determined.

Construction wastes consist of lumber, soils and stones. With the exception of lumber, construction wastes are composed of inert materials, which have no major impact on the environment. Lumber is biodegradable and poses no major problems. Scrap metals consist mainly of derelict motor vehicles and electrical appliances. They account for 5-10% of total residential waste. With increasing consumption their total amount in residential waste is likely to increase about ten-fold within the next 20 to 30 years.

Solid waste collection and disposal

Industrial waste. The citrus industries do not dispose their waste properly. The leaching of their waste causes water contamination, increases the levels of BOD (Biological Oxygen Demand) and lowers the pH. A project to process the orange rinds into pellets for use as cattle food or fertilizer was found to be economically unfeasible. Bagasse from the sugar industry which is not used for energy production is either incinerated or dumped and burned. The filter mud, which has the quality of manure, is disposed in an area of about 40 acres at some distance from the factory. It is picked up and used by several farmers; however, it is not used in a coordinated way. The plastic bags of the banana industry are dumped and sometimes burned.

Municipal waste. About 70% of the total urban population is served by regular collection service. The collection systems are generally operated by the respective local governments. In Belize City and Belmopan the collection systems have been privatized. The frequency of collection is twice to six times a week in areas where tourism is important (San Pedro). In rural areas and in the remaining urban areas, households dispose of their own solid waste as they see fit. Presently, there is no properly managed sanitary landfill. Therefore, solid waste is not covered daily and is often burned at the site. In the areas of Placencia and Belize City, waste is often used as filling material in low areas such as mangroves and swamps, or it is dumped into the ocean.

Recycling

No national plan exists for recycling in Belize. For municipal solid waste there have been some small initiatives such as the collection of used batteries in San Pedro for recycling or disposal on the main land and the collection of scrap metals and their export for recycling to Mexico. However, it is estimated that the economic feasibility of a national recycling project for municipal solid waste is quite low, because (i) there are no manufacturing industries for paper, plastic or metals and thus the recycled goods would have to be exported (ii) the total amount of waste produced is relatively small and is dispersed over the whole country, increasing the costs of transportation to a central place.

In terms of industrial waste, feasibility studies have been carried out for (i) the processing of orange rinds into cattle food, (ii) the use of bagasse and filter mud as fertilizer, and (iii) the recycling of plastic bags for the transport of bananas. However, none of these projects has been carried out yet.

Incineration

Incineration is not considered to be an appropriate technology for treating municipal waste in Belize due to (i) the relatively small amount of waste produced in Belize, (ii) the inappropriate waste composition with about 50% organic components,[13] and (iii) the high costs associated with the installation of "clean" technology. In industrialized countries the costs for incineration are a minimum of US$300 per ton. Additionally, the costs for the transportation of waste to a central place must be taken into account.

[13] In poor urban and in rural areas, the proportion of organic matter is probably larger than 60%.

Problems of improper solid waste management

Inappropriate municipal solid waste management can lead to short, medium and long-term problems. Short-term problems include health problems, odor, surface-water contamination, damage to mangroves and reefs, and damage to urban infrastructure. Health problems develop because dumping sites are rat-breeding sites, they encourage growth of mosquitoes which transmit filariasis, and they degrade water quality as a result of run-off. With regard to city infrastructure, problems arise because trash discharges into the streets can be carried into the drainage system, clogging pipes and ditches. As a consequence, water floods the streets and stagnates in the flat areas. Run-off from industrial waste (mainly orange rinds) is affecting the quality of surface water by decreasing the pH (due to dilution of citric acid) and increasing the organic loads in the rivers.

Regarding the medium term, the emission of gases is of major importance. According to Belevi and Baccini, 1989 and Baccini et al., 1987, gas production (mainly methane) is heaviest during the first 10 years and decreases afterwards. Methane is not a problem if the gas is collected and burned. However, the construction of housing above solid waste dumps or landfills without proper management could lead to gas leaks into houses, thereby creating the possibility of small fires or explosions.

Regarding groundwater contamination, the problems are medium- and long-term. As for gases, the largest contaminating flows are expected during the first 10 years. Emissions will decrease after that time by about one order of magnitude. However, leachates cease to be environmentally problematic only after 100 to 500 years (Belevi and Baccini, 1989). Thus, if a dumping site or landfill is located in an area where leaching can infiltrate ground-water sources, they will be contaminated for several decades.

Monitoring

To monitor the amount of waste produced in Belize and the amount of waste entering the country, the DOE recently established a register of waste and emissions. This register, which will result in a waste and pollution database, is the first step for developing a national plan for waste management and pollution control. Similar to the implementation of the effluent regulations, the registration of waste waste and emission flows from the private sector will be carried out on the basis of compliance.

Current policies and fees

Only Belize City, Belmopan and San Pedro charge fees for waste collection and disposal. The charges for households range from BZ$5 to BZ$8 per month. In Belmopan charges for the collection of commercial waste are BZ$10; in San Pedro the charges range from BZ$25/month to BZ$150/month. Municipalities do not have a special account for solid waste management. They receive most of their financial resources in the form of grants from the Government. Small amounts of funds are also collected through local taxes (property and fire taxes). The funds available are often not sufficient to provide adequate collection and disposal of waste.

Estimates of the costs of proper solid waste collection and disposal made for San Pedro show that in order to achieve cost recovery, the fees will have to be increased to at least BZ$15 per month. This fee is quite large, especially for the poor households in urban regions.

Ongoing projects and proposals to address these problems

At the moment, the Government is not carrying out any projects to address the problem of solid waste disposal. However, several feasibility studies have been conducted for the collection and disposal of solid waste. It is likely that the UNDP, the IDB and the EC will provide funds for the institutionalization of the SWMA and for the elaboration of a SWM site which should serve as a case study for proper solid waste management. While the IDB and the EC emphasize the urban areas and cayes, the UNDP will concentrate on the rural areas.

Recommendations

1. Institutionalize the Solid Waste Management Authority (SWMA):

Due to the urgent need to develop a coordinated national policy for solid waste management, it is recommended that the Government institutionalize the Solid Waste Management Authority.

2. Develop a national policy for solid waste management:

The SWMA should develop a coordinated national policy for waste management. The plan should focus first on the major problem areas such as industrial wastes and waste of urban centers and the cayes. With regard to industries, regulations, such as effluent regulations for the disposal of industrial waste, should be developed and implemented.

3. Evaluate municipal solid waste projects:

Several potential projects are under consideration. Cost-benefit analyses should be undertaken in order to determine whether or not these projects are economically and socially feasible. In addition, low-cost waste management strategies, such as community-based collection and disposal should be considered. Funding could be provided by the UNDP, the IDB and the EC.

4. Develop of a new fee structure:

The fee for solid waste collection and disposal should be increased to achieve cost recovery, while at the same time, the rate structure should be made flexible, to allow poor households in very poor districts to access the solid waste services.

5. Implement a disposal fee for durables (including cars):

A disposal fee for durables should be implemented in order to ensure appropriate disposal of the goods after use. This fee would be paid at the time of the acquisition of the goods and would guarantee that the distributor of the disposes of them properly. Additionally, a national plan should be developed for the disposal or recycling of these goods.

6. Provide incentives to increase recycling:

The largest waste flux is the organic waste generated by industries. Given the possibility of its reuse as cattle food and fertilizer, it is recommended that the Government provide incentives to encourage recycling activities in this respect.

7. Implement hazardous waste regulations:

The draft of the hazardous waste regulations should be adopted and implemented. This is important because the Government ratified the five annexes of the Marpol Convention, allowing ship-generated waste to be disposed of in Belize. Thus, a clear framework is needed to prevent uncontrolled importing of hazardous waste into the country.

8. Increase public awareness:

A public awareness campaign should be developed to improve solid waste management at a household level. This campaign should be coordinated with sanitation education programs (see Annex V) in order to maximize the use of financial and human resources. In addition to a public awareness campaign, workshops could be conducted to increase awareness in the private sector. Increased awareness within the private sector is likely to increase compliance for improving the reuse and treatment of waste.

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Annex V

BELIZE

Health and the Environment

May 30, 1996

World Bank
Caribbean Division
Country Operations III
Latin America and the Caribbean Region

Contents

Abbreviations

BPH	Bureau of Public Health
CIDA	Canadian Institute-Development Agency
FAO	Food & Agriculture Organization
GIS	Geographic Information System
GOB	Government of Belize
IEC	Information, Education and Communication Campaign
MOF	Ministry of Finance
MOH	Ministry of Health
NGO	Non-Governmental Organization
PAHO	Pan-American Health Organization
RWSS	Rural Water Supply and Sanitation System
SIF	Social Investment Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WASA	Water and Sewerage Authority
WASH	Water and Sanitation for Health Project

Summary

Environmental health issues are at the forefront of concerns for the Ministry of Health (MOH) in Belize. The incidence of environment-related diseases is increasing, especially gastroenteritis, hepatitis A, malaria, and tuberculosis, in the southern and western areas of the country. In aggregate, the economic losses due to these diseases have increased from BZ$0.9 million in 1992 to BZ$1.7 million in 1995. Yet the MOH allocated only 7% (1992) of its recurrent budget to control these diseases.

The purpose of this report is to analyze environmental health issues at the household level in Belize. The report is divided into five sections. The first section reviews the incidence of environment-related diseases. The second section assesses the economic cost of the diseases. The third section describes the present government infrastructure and donor support for the different programs. The fourth section provides the conclusions, and the last section provides recommendations to the government.

1 *Incidence of environment-related diseases*

Infectious diseases[1] associated with deficiencies in access to potable water and sanitation are high in Belize, especially in the southern areas of the country. Two serious epidemic outbreaks of gastroenteritis and cholera occurred during 1992 and 1993, along with a widespread prevalence of hepatitis A. The cases have been significantly reduced as a result of an educational and water purification campaign made by the Bureau of Public Health (BPH). The environment in which people live has a significant influence on their health. For poor people in poor districts, it is the household environment that poses the greatest risk to health.

Diseases transmitted by insect vectors[2] such as malaria are increasing dramatically, i.e., cases have quadrupled from 1986 to 1995. Dengue reappeared with 14 cases in 1994, increasing to 107 suspected cases in 1995, after being controlled between 1991 and 1993. The incidence of other vector-borne diseases, such as filariasis and leptospirosis, is believed to be increasing, though not well documented.

Finally, there has been an increase in air-borne infections like tuberculosis which are associated with poor housing conditions or crowding. In Belize City, many people live in deteriorating shanties. Poor housing leads to greater exposure to heat, noise, dust, rain, disease carrying insects, and rodents.

Water-borne diseases

Diarrhea: Gastroenteritis and Cholera. Diarrhea due to gastroenteritis and cholera is a major public health problem in Belize. Outbreaks of gastroenteritis were identified in Corozal, Belize City, Cayo, and Toledo during recent years. According to Krieg and others (1992), the pattern of gastroenteritis shows increased incidence during October and November, the rainy season, which suggests that the mode of transmission is fecal-oral. In addition, as a result of the 1990 Peru-born epidemic, a cholera outbreak took place in 1992 and 1993. There were 296 confirmed cases with a 3% mortality rate. Most of the cholera

Table 1: Incidence of major environment-related diseases

Year	*Malaria*	*TB*	*Cholera*[a]	*Gastroenteritis*[b]
1986	2,779	23	0	n/a
1987	3,258	41	0	n/a
1988	2,725	28	0	n/a
1989	3,285	30	0	n/a
1990	3,033	34	0	n/a
1991	3,706	89	0	1,623
1992	5,275	65	151	1,818
1993	7,879	70	135	n/a
1994	10,415	41	6	456[c]
1995	9,417	68	18	925

Source: MOH.

a. First case of cholera epidemic was detected in 1992. Just 156 cases confirmed by laboratory analysis of stool samples and about 681 just diagnosed cases.

b. Gastroenteritis outbreak reported in 1991.

c. Only population <4 years.

NOTES: Confirmed case of cholera is one that has been proven by the laboratory. Suspected case is one with the clinical symptoms and has some relationship with a confirmed case, or live in an area or community, where the presence of Vibrio Cholera has been established.

[1] Such diseases include: selected fecal-oral diseases: cholera, diarrhea diseases, gastroenteritis, infectious hepatitis, leptospirosis, poliomyelitis, typhoid; water washed diseases due to poor hygiene: skin and eye infections, trachoma, leprosy, typhus fever; water-based diseases, spread by contact of pathogens which spend their life in an aquatic animal: schistosomiasis; and diseases transmitted by insect vectors which breed in water: Dengue, encephalitis, filariases, malaria, onchocerciasis, yellow fever.

[2] A vehicle of transmission of a disease which is an integral part of the life-cycle of the diseases, e.g., the mosquito is a vector for malaria.

cases were detected in Toledo and Cayo, where sanitary and socio-economic conditions are poor. People become infected with cholera by drinking water or eating food that contains the bacteria or through physical contact with somebody with traces of fecal matter or contaminated water.

Of the 1,025 cases of gastroenteritis reported in 1995, 78% of the cases were in infants and children under the age of four. Dehydration due to diarrhea was the second leading cause of child deaths in 1991. The 1991 Belize Family Health Survey found that nearly 11% of children less than five years of age had experienced a case of diarrhea during the two weeks prior to the survey date. In all categories, except 6-11 months, the prevalence is lowest for children whose mother has the highest educational attainment. In terms of ethnicity, Mayan and Mestizo children are most prone to diarrhea, again reflecting poor living conditions and sanitation practices.[3]

Table 2: Selected socio-demographic indicators and incidence diseases, 1991-92

Indicators	*Districts*						*Country*
	Belize City	*Cayo*	*Corozal*	*O. Walk*	*S. Creek*	*Toledo*	
Socio-demographic							
Share population	29%	20%	15%	17%	9%	9%	100%
Main ethnic group	Creole	Mestizo	Mestizo	Mestizo	Garifuna	Maya	Mestizo
Safe water	90%	74%	75%	71%	80%	79%	80%
Sanitary system	73%	36%	31%	27%	18%	26%	43%
Population per sq. mile	42	18	19	34	19	11	27
Some primary educ.	82%	72%	76%	74%	76%	64%	75%
Income BZ$ (empl.)	7,800	6,010	5,127	5,420	5,545	4,709	6,077
Health-environment *(per 10,000)*							
Gastroenteritis	85	99	91	1	34	275	86
Cholera	0	9	0	0	1	69	8
Malaria	37	599	167	263	486	435	283
Tuberculosis	6	2	1	2	3	2	3

Source: Demographics from Population Census 1991; data on income from population survey 1991; data on diseases are from MOH Statistics Office; Data on cholera includes confirmed and suspected cases 1992; data on population access to safe water from CARE-UNICEF.

The transmission of water-borne diseases is due to: (a) the contamination of surface water by the discharge of untreated sewage into rivers; (b) the contamination of groundwater sources caused by constructing latrines too near to wells; (c) poor maintenance of water supply and sanitation systems; (d) the lack of basic hygiene education which is reflected in the misuse of latrines and lack of hand washing practices.

Hepatitis A. A cross-sectional study conducted by Hoffman and others (1992) found widespread exposure to hepatitis at banana plantation sites in 1991. Of those tested, 98% had been exposed to hepatitis A, two out of 509 people tested were infected (39 per 10,000). The mode of transmission for hepatitis A is fecal-oral, and its prevention depends on a safe water supply, good personal hygiene and proper disposal of human waste.

[3] UNICEF, 1995.

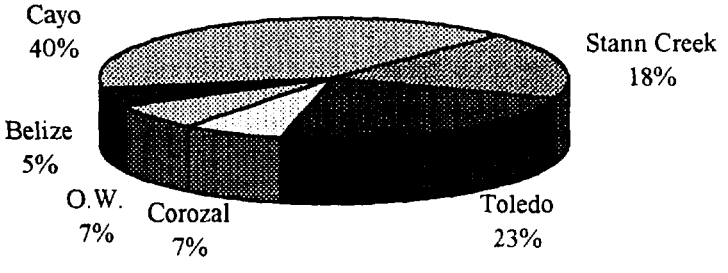
Vector-transmitted diseases: malaria

Malaria is a tropical disease transmitted by the mosquito anopheles. This mosquito type breeds preferentially in clean, standing waters in tropical climates about one to two miles away from human settlements. In addition, it has also been found to breed in standing water around water supply tanks. In Central America, the predominant vector is *P. Vivax*. This vector is not very powerful, and malaria will not lead directly to mortality as it has in Africa. The main symptom of malaria is periodic bouts of fever. A person who goes untreated or incompletely treated will suffer several relapses. Malaria often results in severe anemia as a consequence of more complex mechanisms. The risk of severe malaria is limited almost exclusively to non-immune populations in areas where appropriate and timely diagnosis and treatment are unavailable.

Malaria seemed to be under control in Belize during the 1960s and 1970s; however, the incidence of the disease rose in the 1980s and the early 1990s. The number of cases increased from 2,779 in 1986 to 9,417 cases in 1995 (Table 1). The cases of malaria have mostly occurred in the western district, Cayo, and in both southern districts, Stann Creek and Toledo. In 1995, the Cayo district reported the highest number of cases, with 40% of the total (see Figure 1), followed by Stann Creek (18%) and Toledo (23%).

The transmission of malaria is increased by crowded and poor housing conditions, which provide little protection from mosquitoes and increase the probability of transmission. Also, malaria can spread to other regions by migration of infected people from endemic to non-endemic regions.

Figure 1. Distribution of Malaria cases by district, 1995. Total cases 9,417



Crowded and poor housing conditions are mainly found in the agricultural belt and in refugee settlements where migrant agricultural laborers have settled. The workers generally live in crowded, unsanitary camps where mosquitoes abound and precarious shelters offer little protection. In addition, the non-immune and the infected live side by side, and this leads to a high rate of transmission. The refugee camps also suffer from overburdened health services, which may result in untreated cases of malaria. Many of the migrants are vulnerable because they have moved from neighboring urban areas with low malaria endemicity into newly settled parts of the jungle. Many of these people thus have little or no acquired immunity and suffer severely from malaria when exposed to a jungle environment.

Cayo, Stan Creek, and Toledo account for 71% of all cases in Belize. These areas have an important risk factor in common: migratory movements, including movements of laborers and refugees from both endemic and non-endemic areas. In response to the need for temporary planting and harvesting labor, laborers move constantly from bordering Guatemala and El Salvador in the West to the citrus and banana plantations in the southern area of Belize (agriculture belt).

Table 3: Malaria incidence in selected countries 1991

Country	*Malaria cases per 10,000 population*
Belize (1995)	474
Mexico	1
El Salvador	5
Guatemala	21
Costa Rica	14
Nicaragua	97
Honduras	95
Haiti	33

Source: World Health Organization 1995

The age group that is most affected by malaria is from 15 to 44 years old, the economically active portion of the population. Incidence is evenly distributed among men and women. Malaria incidence is extremely high in Belize compared to neighboring countries (Table 3). Najera and others (1992) affirm that malaria has also increased in the bordering countries of Guatemala and Mexico, though not to the extent that it has in Belize. The three countries share one or more of the following characteristics: recent efforts to increase the exploitation of natural resources through agricultural colonization of jungle areas and large movements of refugees or migrant workers.

Air-borne diseases: tuberculosis

The incidence of tuberculosis (TB) has been increasing in Belize City. TB mainly affects the economically active population (15-59 years of age) and is associated with crowded living conditions, under-nutrition, and an increase in the number of HIV and AIDS cases.

2 *Economic costs of environment-related diseases*

The direct and indirect losses caused by environment-related diseases have increased from BZ$0.9 million in 1992 to BZ$1.7 million in 1995 (see Table 4). The direct costs of the disease include the cost of medical care and hospitalization; the indirect costs include the lost days of work and the losses in the tourism industry. However, the focus on days of work lost or foregone output underestimate the real costs because they exclude women's economic contribution via household work, children's contributions, and travel time expended in seeking treatment.

Direct costs

Direct costs are those incurred by households, individuals or the public sector (where "free" or subsidized care is provided, including hospitalization and medicines).[4] Hospitalization costs vary according to the number of people hospitalized, the length of stay and the severity of the disease.[5] Malaria and TB account each for about half of the estimated hospitalization costs.

[4] This report will include only hospitalization costs.

[5] Twenty percent of diarrhea cases, 5% of malaria cases and 50% of TB cases require hospitalization. Average days of hospitalization for diarrhea are 3 days, malaria 10 days, and TB 30 days.

Table 4: Estimated costs of selected diseases, 1991 and 1995 (in BZ$ 1991)

Problems	*Diseases*[a]	*Total Cases* 1991	*Total Cases* 1995	*Direct Hosp. Cost*[b] 1991	*Indirect Labor Cost*[c] 1991	*TOTAL* 1991	*TOTAL*[d] 1995
Water & Sanit.	Gastroenteritis	1,623	925	0	39,276	39,276	22,400
Water & Sanit.	Cholera	156	18	8,424	22,297	30,721	2,600
Vector	Malaria	3,706	9417	166,770	451,920	618,690	1,570,000
Crowding	TB	89	68	120,150	42,840	162,990	125,000
TOTAL		**5,574**	**10428**	**295,344**	**556,333**	**556,333**	**1,720,000**

Source: Data on cases from MOH's statistics section.
NOTES:
a. All data from 1991 except cholera from 1992.
b. Hospitalization cost equal US$45 daily from Levine (1991).
c. Daily labor cost equal US$12, from 1991 Population Census.
d. Estimations based on labor costs and hospital costs of 1991.

Indirect costs

The indirect costs are measured according to the number of lost days of work. A common method of assessing economic losses caused by disease has been days of work lost to disability per episode. The work loss per case of malaria is estimated to be ten days, tuberculosis, 30 days, and cholera, 7 days. The average labor cost is US$12, which is the legal minimum wage and it is assumed that 50% of the cases pertain to the labor force. Further, some cases result in death; thus, it has been assumed that each death of a worker corresponds to 150 lost days of work.[6] In 1991 and 1995, Malaria resulted in the most significant loss because it affected the economically active population. From 1991 to 1995 the share of malaria of the total costs increased from 73% to 89%. Thus, malaria imposes the largest costs on society.

3 *Institutional infrastructure*

Overview

All health care facilities in Belize are operated by the Government.[7] The MOH has its headquarters in Belmopan, where the Minister of Health and his Permanent Secretary work. However, the MOH is managed out of Belize City, where the Director of Health Services, four Chief Medical Officers, and the BPH staff are based.

The National Health Plan 1996-2000 presents a new approach to health development: a "move from a disease-focused plan (1990 to 1994) to a people-focused plan and from a centralized and vertical medical culture to a decentralized and participatory one."[8] The Plan's Health Policy Reform Programme is concentrated on four main areas: (a) Financing of the health sector -

[6] It is estimated that gastroenteritis results in one day of work lost per disease along with 5 deaths, that cholera causes 7 days of work lost and 12 deaths, Hepatitis A causes 12 days of work lost and no deaths, malaria causes 10 days of work lost and 2 deaths, and TB causes 30 days of work lot and 3 deaths.

[7] The public health infrastructure includes a general hospital, Belize City Hospital (BCH), 6 district hospitals, 10 outpatient clinics, 34 health centers and 33 health posts. Each district has a government hospital staffed by doctors and professional nurses and an urban health center managed by a public health nurse. Each district also has a number of rural health centers staffed by a rural health nurse.

[8] Ministry of Health and Sports, 1995/96).

developing a strategy for financing health services with a focus on long-term sustainability; (b) Allocation of health sector resources - improving the use of financial, human and material resources; (c) Defining public and private sector roles in the health system - assessing the respective roles the public and private sector play; and (d) Improving the quality and equity of health services - removing current inequities and improving the quality of all services provided.

Within this plan, ten different problem areas will be addressed, the most important of which are to: develop a waste management plan for liquid, solid and gaseous wastes; increase the access of the population to waste and sanitation services; reduce malaria morbidity from 50/1000 in 1995 to 4/1000 in 2000; and reduce the incidence of diarrhea by 30%.

Table 5 shows the MOH's annual expenditures on controlling major diseases such as diarrhea, cholera, gastroenteritis, and malaria. The MOH's total recurrent budget is about BZ$22 million for fiscal year 1994-95. Environment-related programs account for just 7% of the recurrent budget, excluding tuberculosis which is integrated with the AIDS program.

Table 5: MOH expenditure on environmental programs
(BZ$ thousands, prices of 1986)

	Water and Sanitation-related	*Malaria-related*
Year	*Environ.Health*	*Vector Control*
1986	372	595
1987	308	561
1988	330	574
1989	335	485
1990	303	519
1991	341	688
1992	308	598
1993	320	606
1994	420	922
1995	430	850

Source: GOB 1986-1992 Estimates of Revenue and Expenditures.

The Ministry receives funding or technical assistance from USAID, PAHO, UNICEF, CIDA, NORAD and FAO. USAID, PAHO, and UNICEF have been involved in water sanitation and health projects. In addition, USAID has been funding a community-based health project: Increased Productivity Through Better Health. CIDA and NORAD have been funding PAHO on Environment and Health in Central America (MASICA). MASICA is providing assistance to BPH on strengthening the environmental management capacity of the Bureau, improving laboratory analysis, and developing an information system. Canadian assistance was phased out in 1992. Although USAID is being phased out this year, funding for sanitary education will continue to be provided by UNICEF. In addition, the Social Investment Fund (SIF) will be allocating funds to the improvement of sanitary infrastructure in the rural areas.

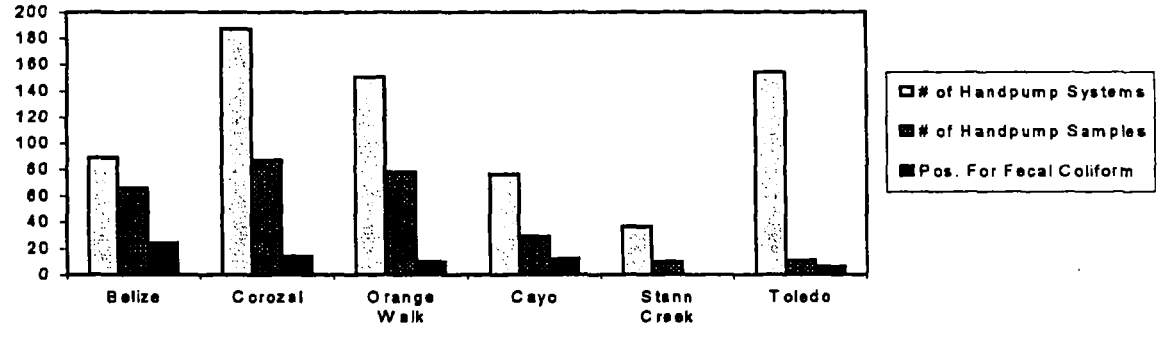
The new Health Plan should include a new financial system that decreases dependency on donor financing in the health sector. The following strategies are being discussed: (a) the implementation of a partial cost recovery strategy for hospital laboratories and drugs (using a modified rate structure); (b) the modification of law No. 31 of 1967 which establishes fees by income category; (c) the proper application of the sliding fee scale mechanisms and application of the previous policy for indigents (20%); and (d) the proper billing and fee collection system.

Programs regarding gastroenteritis and drinking water quality

Monitoring fecal contamination. The BPH has a water quality program that analyzes the quality of the water supply systems in rural areas. The program includes some spot checks of the water quality in urban areas, and testing of the quality of bottled water. The frequency of the monitoring in rural areas is at least once a year for microbiological testing (fecal coliforms) and once a year for chemical evaluation. The target is to cover 80% of the whole supply system in each district. This target was achieved in 1994, however, in 1995, due to infrastructure and financial problems, only about 40% of the hand-pump systems and 15% of the RWSS were tested.

Figure 2 shows the number of hand-pump systems per district, the number of samples taken and the number of hand-pumps that were found to be contaminated. The worst testing coverage (8%) is found for the district of Toledo. In addition, 55% of the total number of systems tested in this district were found positive for fecal coliforms. The other districts have a coverage rate of between 30 to 75% (Belize), and the percentage of fecal contaminated wells is around 25%.

Figure 2. Number of hand-pump systems, tested systems and systems found positive for fecal coliforms



Of the ten RWSS systems tested (16% of the total), five were found contaminated. The contamination level was low, meaning about 1-10 cols/100ml.

In Belize a total of five bottled water plants are in operation. Four do not do any testing of their water quality. Problems affecting the water quality were found in three plants. About 25% of the bottled water was found to be contaminated with fecal coliforms (BPH, 1996).

Monitoring of vibrio cholera. The monitoring program of vibrio cholera started in 1992 when Belize confirmed its first case of cholera. The number of confirmed cases decreased from 159 in 1992 to 18 in 1995, with the majority of these occurring in the Stann Creek district. None of the samples collected in the district of Stann Creek and Orange Walk in 1995 was found positive.

Malaria program

The malaria program uses about 5% of MOH resources. The program has spent almost the same amount from 1986 to 1992, and it increased its budget slightly from 1992 to 1995. However, the number of houses sprayed decreased by 35% from 1986 to 1992 and to 0% from 1992 to 1995.

Consequently, malaria cases have almost quadrupled from 1986 to 1995. The share of expenditures for materials and insecticides has been decreasing, from 29% in 1986 to 5% in 1995, and the remaining resources have been allocated to personnel expenses.

The vector control program in Belize is responsible for control and prevention of both malaria and dengue.[9] The most common anti-malarial measures are case detection, treatment of cases of fever with anti-malarial drugs, education and chemical control. Dengue control is done by outdoor spraying.

Case detection is done through the collection of blood samples from every fever case detected. In the 1950s, when eradication efforts started, the blood sample system was conceived to confirm the disappearance of malaria. However, today when cases are increasing, and the goal is to control malaria, collecting blood samples—currently about 25,000 per year—is not worthwhile if it takes months to obtain results. It would be more useful to use the microscope network for immediate testing of suspected severe cases of malaria.

Table 6: Unit costs and effect of various insecticides

Insecticides	*BZ$ 1992*	*Effect on Environment*	*Toxicity on Human*
DDT 100%	2	Non-biodegradable	Sometimes
DDT 75%	5	25% Biodegradable	Sometimes
Deltamethrin	19	Biodegradable	Sometimes
Fenitrothion	44	Biodegradable	Sometimes
Propoxur	75	Biodegradable	Sometimes

Source: MOH vector control program; data on effects on environment and humans from interviewed with Bernhard H. Liese.

Treatment of fever cases is done through anti-malarial drugs. The vector control program relies on volunteers who have been trained to provide treatment (chloroquine and primaquine) and to take blood samples.

Chemical control was done through residual intradomiciliary spraying with DDT or other insecticides in rural areas. Until 1994 the program used DDT to control malaria. Due to the pressure of environmental groups, the Pesticide Control Board of Belize banned DDT in 1994. The insecticide used instead was Deltamethrin which is about four times as expensive as DDT. The decrease in funds for malaria prevention led to a decrease in indoor spraying between 1993 and 1994, from 24,000 to 8,000 houses. Only the most seriously affected regions were sprayed. In 1995 no indoor spraying was conducted.

As noted earlier, the number of malaria cases has been increasing while the number of sprayed houses has been falling. It is estimated that spraying four extra houses will avert one case of malaria.[10] Even if the more expensive insecticide Deltamethrin is used, the cost of preventing one

[9] Dengue is under control and it is not the focus of our analysis.

[10] The following equation was estimated to measure elasticity of malaria cases over houses sprayed. ln MAL = 8.21 - 1.05 * ln HOU. The estimated -1.05 was significant at 5%. If the vector program expands the spraying in 2,352 houses (10 percent) the number of malaria cases may drop by 572 (11%).

case (spraying of four extra houses) is about half of the indirect and direct costs that result from a case of malaria.[11] In comparison, the cost-effectiveness of the banned DDT was higher, BZ$8 for preventing one case (see Table 7). Currently, due to the cost-effectiveness of DDT the Pesticide Board is revising a possible controlled use of DDT for indoor spraying.

Table 7: Cost-effectiveness of malaria interventions
(1992 BZ Dollars)

Intervention	*Cost per Case Prevented*	*Approximate Cases*
Insecticide Deltamethrin Established areas	BZ$76	3,000
Insecticide DDT Refugee camps	BZ$8	2,000

Source: Table 6 and Figure 1.

Additionally, Uniformed Services University in joint collaboration with the Epidemiological Research Center of Belize, and the vector program have been using remote sensing capacities, satellite data, and cartographic data to study wetland and malaria-vector ecology in Belize since 1990.

4 *Recommendations on environmental health issues*

Discussions with program managers and health and environment authorities in Belize led to the identification of the following priority areas for further attention within the next five years.

Cholera and gastroenteritis

Health education. Within the next year, Belize should strengthen health education. Family members, especially women who are the main caretakers, should be taught simple precautions when preparing food, such as washing hands, boiling rain water, quarantining sick family members when appropriate, and disposing of waste hygienically. These precautionary measures could be taught through the use of videos shown on television as well as at schools and community meetings. Coordination with UNICEF and WASA could be beneficial.

Water quality - testing. Within the next two years, the MOH should improve the systematic testing of drinking water quality at the source in order to achieve their goal of 80% coverage. The focus should be particularly in rural areas like southern Toledo where most water-related diseases are concentrated.

Water and sanitation extension. The Government should carry out a cost/benefit analysis for potential sanitation investment in the rural areas of Toledo, Cayo and Stann Creek. Currently, in rural areas less than 30% of the population has access to adequate sanitation facilities. The access to sanitation is particularly low in the districts of Toledo, Cayo and Stann Creek. The lack of sanitation has led to increasing health problems such as gastroenteritis and hepatitis A as well as to the

[11] Spraying activities including just insecticides.

contamination of groundwater sources. As a result of the Belize Water and Sanitation Sector Analysis, some preliminary proposals to analyze the feasibility of various rural projects are being considered with the support of UNICEF, PAHO and Ruta Social. It is recommended that these proposals be evaluated and further developed with an emphasis on NGOs and community involvement in the operation and maintenance of sanitation infrastructure and education.

Malaria

House spraying. Given that malaria is geographically focused and is associated with socio-environmental variables, program managers should distinguish between new areas, established areas, and difficult-access areas. Within the next year the priority of the malaria control program should be to increase house spraying with insecticides in new settlement areas, such as refugee camps, where about one-third of the cases are concentrated. Afterwards, the use of Deltamethrin in established areas and aerial spraying in areas of difficult access should be evaluated. Deltamethrin is clean when used on walls, biodegradable, and eliminates a wide variety of insects. Finally, in difficult-access areas such as labor camps, aerial spraying should be considered. Financing of spraying activities could be obtained from the SIF project where a financing schedule with a declining basis is being proposed.

Information, Education and Communication Campaign (IEC). The MOH should increase information, education and communication on protective measures to reduce the risk of infection. For example, the cutting of bushes near streams can reduce the breeding of mosquitoes. The MOH budget for education activities should be made available on a matching basis, with communities and district health committees raising the other half of the funds. At least 10% of the budget for malaria vector control should be dedicated to IEC activities.

Bed nets subsidy. The Government should subsidize the purchase of insecticide-impregnated bed nets for people who live in camps where houses are flimsy and do not protect them from environmental hazards. Bed nets are considered to be old fashioned and tend to be used only by older members of the community. The IEC campaign should encourage their widespread use.

Malaria operation research. Given that malaria is very geographically focused and is associated with socio-environmental conditions, program managers should concentrate on acquiring better environmental and socio-economic knowledge through state-of-the-art technology. Use of satellite data and field surveillance would provide the necessary input to develop a geographic information system (GIS). The GIS would help map high-risk areas of malaria at the village level and would help determine the appropriate seasons and areas for Deltamethrin spraying. The definition of high-risk areas should include environmental variables, as developed by the Uniformed Services University initiative, as well as socio-economic variables. Village mapping should include the following information: (a) environmental variables: patterns of drainage, rainfall, temperature, and humidity as well as geographic features such as swampy areas, elevation, rivers, and streams; (b) sanitation variables: extent and quality of the water supply system and garbage disposal, and the existence of mosquito breeding sites; (c) socio-economic variables: areas of new colonization, migrant agriculture workers, and refugees; (d) location of houses, roads, community centers, health service centers. Finally, the MOH should request the assistance of the Uniformed Services University and multilaterals to initiate operations research activities.

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Annex VI

BELIZE

Tourism

May 30, 1996

World Bank
Caribbean Division
Country Operations III
Latin America and the Caribbean Region

Contents

Abbreviations

BHA	Belize Hotel Association
BTB	Belize Tourist Board
BTIA	Belize Tourism Industry Association
CBB	Central Bank of Belize
CTO	Caribbean Tourism Organization
CZM	Coastal Zone Management
EIU	Economist Intelligence Unit
GEF	Global Environmental Facility
GOB	Government of Belize
HIID	Harvard Institute of International Development
IDB	InterAmerican Development Bank
MTE	Ministry of Tourism and Environment
NGO	Non Governmental Organization
PACT	Protected Areas Conservation Trust
SDA	Special Development Areas
USAID	United States Agency for International Development
WWF	World Wildlife Fund

1 Overview

Belize is frequently described as "an eco-tourism destination" and yet much of its tourism is resort based. Nearly 80% of hotels, condominiums, and guest houses are located on the coast. The attraction for these visitors is the barrier reef—the second longest in the world, one of the Seven Underwater Wonders of the World and a potential World Heritage Site—and the diving, snorkeling, boating and fishing opportunities the reef offers. Many of these tourists, unlike the typical "sun, sea and sand" tourists traveling to other Caribbean destinations, also visit at least one protected area, marine reserve or archaeological site while in Belize. An unquantified, though lesser, number of tourists visit Belize exclusively for its nature and/or archaeological assets and may or may not visit a coastal resort area.

Tourism is essentially a private sector activity that requires public sector support to be successful. Tourists evaluate not just the accommodation in which they have stayed, the restaurants in which they have eaten, the activities, such as diving and tours, they have undertaken, and the goods offered for their purchase, all of which are created by private sector investments, but also their total vacation experience. This broader evaluation includes: accessibility to and from the port of entry, efficiency and comfort of internal travel, availability of potable water, electricity, sanitation and health facilities, the cleanliness of the tourist destination, attitudes of local people with whom the tourist comes in contact, personal safety, and the quality of the main attraction that has brought the tourist to the destination. The public sector is consequently responsible for many of the peripheral aspects of the tourism product, which are outside the control of the private sector. The public sector is also responsible for negotiating transport access with the markets that actually or potentially supply tourists and, often through a statutory body, for promoting the country or a destination within that country (as opposed to individual hotel) in tourist supplier countries. The Government is also expected to create an investment climate that will attract private sector funds—foreign or local—to the accommodation and related service sectors.

In CARICOM and Mexican terms, the Government and people of Belize have a relatively short history with tourism institutions and management of the sector. The Ministry of Tourism was created only in 1984. In the following year a cross section of private sector tourism interests established the Belize Tourism Industry Association (BTIA), which includes the Belize Hotel Association (BHA). The Belize Tourist Board (BTB) became a Statutory Board only in 1990.

Fear of the social and environmental consequences of mass tourism occurring elsewhere in the Wider Caribbean delayed public support for tourism in Belize and is still evident in Ministerial statements. Declining international sugar prices and concerns about the future of Belize's protected markets for agricultural products in the USA and the European Union stimulated the Government of Belize to diversify the country's economic activities into light manufacturing and tourism in the 1980s. Both activities have been relatively successful. The Government obtained financing for a new airport outside Belize City and for road improvements that have attracted new airline services, new hotel construction and new facilities, all of which have helped to expand the tourism sector. The Government most

recently has borrowed to finance the Southern Highway, which should increase demand for tourist facilities in the south.

The current Prime Minister in the foreword to the "Belize Investment Guide", which describes the incentives provided for foreign investment under the Fiscal Incentives Act (Chapter 45 of the Laws of Belize), identifies tourism as one of the four areas of "tremendous growth potential". Today, the Government, private sector and the people of Belize continue to eschew mass tourism but are clearly comfortable projecting an image of their country as a nature lover's paradise, and, to that end, tend to refer to their entire tourism product as "eco-tourism." The populace in Belize is generally friendly to its visitors (which is not the case in all countries) and surveys of local people conducted in areas that attract tourists suggest that they regard tourism as generally beneficial to their welfare.

The term "tourist" will be used in this report to describe foreign visitors to Belize who visit the country for the purpose of recreation and/or in pursuit of an interest or hobby (diving, snorkeling, bird watching, fishing, archaeology, environment/nature etc.). Unless otherwise specified, no distinction is made in this report between "resort" tourists and "eco" tourists, since the main reason for visiting Belize is its natural and cultural resources, whether marine or terrestrial.

2 *The Market*

Belize's share of the tourism market

Belize receives less than 1% of the tourists to CARICOM countries, which, as a whole, accounts for only 20% of total tourism to the Caribbean. Tourists to Belize numbered just over 133,000 in 1995, a growth of 10.9% compared with a growth of 15.9% in 1994. The exact number of visitors to the coastal areas are not known, but with nearly 80% of the tourist accommodation on the coast, the reef and its related activities are the main draw for foreign tourists. The Hol Chan Marine Reserve received over 50,000 visitors in 1995/96 (see Appendix: Table 1). Five CARICOM countries each attract considerably more tourists than Belize; in descending order these are: Jamaica (with over one million), Barbados, Trinidad, Antigua and St. Lucia, which has nearly twice the number of tourists visiting Belize. As discussed below, Belize is competing for resort tourists in a generally high-cost Caribbean market, where many islands are conscious of the need to improve the quality of their product.

The nature tourism for which Belize is famous is rivaled in CARICOM only by Guyana, where eco-tourism and its infrastructure are still in their infancy, and to a lesser extent by Dominica, which receives some 47,000 visitors annually. However, neither country has good beaches or as significant cultural assets as Belize. Within Central America, Costa Rica attracted some 275,000 foreign visitors to its National Parks in 1991, compared with a total of 10,826 foreigners and 5132 Belizeans visiting the National Parks managed by the Belize Audubon Society (BAS) in the same year. In 1995, these numbers grew to 12,697 foreigners and 4,085 Belizeans, but, in fact, have declined from the high of 19,010 in 1993 (see Appendix Table 2). Partly explaining the decline is a number of attacks on visitors in the protected areas, that led to the temporary closure of some parks in 1995.

The archaeological sites in Belize, mainly Maya ruins, have been poorly protected until recently but attracted nearly 43,000 visitors in 1995—undifferentiated between local and foreign, compared with nearly 24,000 in 1992 (see Appendix: Table 3). Sixteen sites are open to the public under the management of the Department of Archaeology, of which ten are Maya sites. Here, Belize both competes with and complements Mexico and other Central American countries, since Belize is part of a five-nation public and private sector marketing effort to stimulate tourists to visit village communities and archaeological sites that form part of "El Mundo Maya" (on the Ruta Maya).

In his budget statement in March 1996, the Prime Minister noted that the devaluation of the Mexican peso had drawn tourists away from Belize. The relative cheapness of Mexico in the currencies of most developed countries may have attracted a cross-section of tourists who would otherwise have visited Belize in 1995. Because Belize's assets are so outstanding and varied, any shift in demand is likely to be temporary. As a caveat, shifts in demand might occur, despite the quality of the assets, if the personal safety of the tourist is not assured in his or her preferred holiday destination.

Given its relatively small share of all three segments of the resort, nature and cultural markets in which Belize competes, there would appear to be considerable room for expansion of the tourism sector, provided the expansion can be accomplished without damage to the fragile natural resources on which the tourism is based. Unfortunately, indications of stress, such as pollution and degradation of the reef (as discussed in Annex III: Coastal Zone Management), suggest that mitigation measures should include a diversion of new investment for tourism facilities from traditional to newer areas. Given the size and variety of Belize's tourism assets, the main constraint on this strategy of dispersion will be the availability of investment capital and trained human resources to develop new areas and the willingness of investors to risk capital in areas that have not yet been marketed internationally. In any such strategy for the tourism sector, the impact on the financial health of existing coastal destinations, particularly on the coast, must be assessed and to the extent possible addressed. In case of conflict, considerations about the environmental health of the asset should outweigh the shorter-term considerations about the impact on tourism revenues, since these would not be sustainable anyway if degradation of the asset continues unchecked.

3 *The economic and financial costs and benefits*

Recently, the Central Bank estimated that tourism contributes some 15% of GDP and 25% of foreign exchange earnings. Tourism is then the single largest source of foreign exchange, though second to all agricultural commodities combined. Tourist expenditures in Belize are estimated at $138 million in 1993, up from $74 million in 1988. The justification for tourism in Belize and elsewhere is that it attracts private sector investment (foreign and local) for tourist accommodation, generates foreign exchange, creates income and employment among less skilled workers (who are often women) and, in the specific case of nature and cultural tourism, spawns funds to help conserve the asset.

Tourism is relatively labor intensive and (according to BTB estimates) the hotel sector generated a total of 1816 jobs in 1995, with 1008 of those going to females and 92% going to Belizean nationals. On average, one room in tourist accommodation creates 0.5 jobs. This relatively low ratio for resort tourism reflects the mix of accommodation in Belize and the large number of owner-managed small hotels. There is no information about the seasonality of employment, i.e., whether the numbers are higher in the peak winter season and from where this seasonal labor is drawn. Jobs created in the accommodation sub-sector always generate a substantial number of jobs in related service sub-sectors—the factor depends on a number of variables (including, importantly, seasonality). Such a calculation should take into account that the increased service activity will only be induced by new or additional investments in those service sub-sectors, unless these are operating below optimum capacity. Nevertheless, the official estimates of employment generated by hotels considerably underestimate the employment (whether full or partial) generated by the tourism sector as a whole.

The extent of the linkages between tourism and production sectors cannot be quantified, but, with restrictions on imports, is likely to be strong to agriculture and even to light manufacturing, and, of course has provided considerable stimulus to the construction sector. At a time when diversification of production in the agricultural sector is a recurring theme, the Ministry of Agriculture would do well to survey the needs of the hotel sector as a primary market for its production.[1] While the Government of Belize should not be telling farmers what to grow, the Ministries of Agriculture and Fisheries and Tourism could combine efforts with the private sector to determine the needs of producers and consumers and whether there can be closer vertical integration.

A senior official of the Ministry of Finance expressed disappointment with the financial benefits from tourism in Belize: "which mostly seem to stay in the country of tourist origin." Empirical evidence suggests that this is more true of the pre-paid package tours arranged for groups and, particularly, large charters where tour operators abroad can obtain bargain prices from hotels, especially when occupancy rates are low. In a happy coincidence of economic and environmental objectives, such mass tourism is not environmentally appropriate for Belize's fragile assets or for the room capacity of typical Belizean hotels, so it should be discouraged. On the wider issue that the official's comment raises, i.e., about the leakage factor in tourism revenues (from the import content of the tourist dollar) only comparative studies can be cited and these are not recent, which suggest that a range of between 50-65% of the tourist dollar stays in the tourist destination. The leakage will be less where the linkages between tourism and other sectors of the economy are strong and will vary over time as economic conditions in the country change. Furthermore, leakage estimates for tourism should be placed in context: every economic activity in CARICOM countries (e.g., bauxite, petroleum, manufacturing) has a significant import content, but the leakages are not generally calculated for sectors other than tourism.

The costs of tourism to Belize include investments in transport and other infrastructure that exclusively or partially benefit the tourism sector, and the revenues foregone under the

[1] In the former Yugoslavia, the first accommodation investments on the Croatian coast were financed by the Agriculture Bank of Yugoslavia in Serbia, which identified hotels as a large potential consumer of agricultural produce.

Fiscal Incentives Act (Chapter 45 of the Laws of Belize, Revised Edition 1980-90) which grants tax holidays and import duty waivers for hotels and related enterprises. Fiscal incentives have been approved for projects mainly on the basis of the capital provided. The Government is granting fiscal incentives now on a case by case basis and is more aware of the need to assess the costs of the incentives and not just the benefits they provide.

Revenues raised by tourism

The Government has increasingly recognized the potential for raising funds for general revenues, for management of protected areas and for conservation from tourism. No estimate of total revenues raised is available. The following paragraphs attempt to identify the several taxes and fees applied to tourists, resource users, and commercial beneficiaries.

A 7% hotel tax is levied on all hotel bills, and revenues collected amounted to $2.4 million[2] in 1995, up from. $1.7 million in 1993. All hotel taxes are earmarked for the Belize Tourist Board (BTB), which is responsible for promotion of Belize as a tourism destination. The BTB also collects US$20 per head for each cruise passenger visiting Belize; a departure tax is not levied on these passengers. All travelers leaving Belize pay a $2.50 tax for airport security and $20 as a departure tax. (The security tax covers the costs of security alone and, therefore, is excluded from this calculation.) In 1995, the departure tax must have raised approximately $2.7 million, assuming that all the 133,097 visitors to Belize paid their departure tax.

Since March 1990, the Ministry of Agriculture and Fisheries has charged $3 as an entrance fee to all foreign visitors to the Hol Chan Marine Reserve. In 1994/95 some 37,825 tourists visited the reserve—providing an estimated $113,500. These funds have not been available for management activities and Hol Chan depends on budgetary allocations from the Government of Belize (GOB) and on donor support. All boating and diving operators using Hol Chan also pay an annual fee of $15, the revenues from which are very small.

On April 1, 1996, fees to visit archaeological sites were raised from $3 to $5 per person and to $10 for visitors to Cahal Pech. These entrance fees are collected under the Ancient Monuments and Antiquities Act and enter the GOB's general revenues.

User fees (e.g., for overnight accommodation) but not entrance fees have in the past been collected by the Belize Audubon Society (BAS) from visitors to protected areas. Attractions such as Crooked Tree Wildlife Sanctuary, the Blue Hole National Park, the Cockscomb Basin Wildlife Sanctuary, and the Guanacaste National Park were the subject of entrance fees ($15) for the first time in 1995. The entrance fees are low and estimates by Lindberg and Enriquez (WWF, 1995) for Cockscomb and Hol Chan indicate that only at

[2] All $ are Belizean dollars; US dollars are specified as US$.

approximately twice the current level could entrance fees cover 100% of eco-tourism costs[3] and generate revenues to cover a significant percentage of traditional management costs.[4]

The Belize Zoo and Tropical Education Center increased their entrance fee for foreign visitors from $10.00 to $13.00 on February 13, 1996. These funds are used to finance the Zoo's operating costs, since it does not receive any financial assistance from Government. The Zoo received 39,086 visitors (undifferentiated between local and foreign) in 1995, compared with a peak of 46,579 in 1993.

The Protected Areas Conservation Trust legislation (see Annex II: Forests and Protected Areas) imposes a levy of $7.50 on the departing traveler as a conservation fee, which should bring in an additional $1.0 million from foreign visitors based on the 1995 level of tourists. Work done by the Harvard Institute for International Development (HIID Nov. 1995), and discussed in the Annex III: Coastal Zone Management (CZM), identifies the potential for increasing revenues from diving/ sport fishing licenses to between $1.3-$2.04 million per year, earmarked for CZM and a marine park system.[5]

In April 1996, the GOB introduced a value added tax (VAT) of 15% on all transactions, except essential foodstuffs and medicines. The actual tax that will be applied to accommodation services has not yet been determined, i.e., whether the existing 7% hotel tax will be absorbed into the 15% VAT, or whether the VAT will be additional. Without a final decision on the application of the VAT to hotel bills and the future of the existing hotel tax, no estimate is feasible on the additional revenues that the GOB is poised to raise. In addition to the above direct taxes, the GOB gains revenues from the taxes paid on wages earned in the tourist sector and from taxes on the profits of those hotels that are not covered by tax holiday incentives.

Competitiveness of the tourism product

In land area, Belize is the size of Massachusetts in the USA, so that its varied tourist attractions can be sampled by all tourists whatever their principal reason for visiting—although road access to more remote areas may be difficult, as is currently the case in the south. Visitor surveys indicate that the quality of Belize's marine assets are considered superior to those of most of its neighbors. The surveys indicate a high-level of satisfaction with and repeat tourism to Belize, with the lowest "good value for money" rankings going to the quality of souvenirs, followed by the international flight, hotels and domestic transportation. Concern about crime and urban blight is expressed by many visitors to Belize City. Protected areas rank high in visitor satisfaction, at 81%, compared with 72% for cultural sites. Overall, 97% of visitors in

[3] The authors define eco-tourism costs as: "requiring eco-tourism to pay for itself so that the protected areas would not need to reduce its traditional management activities to provide the eco-tourism opportunity."

[4] Entrance fees to national parks world-wide are often fixed at a level too low to cover operating costs. Even in nearby Costa Rica, entrance fees were set at US$0.75 until they were recently raised to a uniform US$15 for every park in the country.

[5] The consultants also proposed fees from non-tourism based revenues from marine dredging royalties, pesticide charges and a product charge on non-biodegradable goods. The additional $2.7 million would be allocated to the general revenues of the Ministries concerned and the central budget.

one sample survey said they would recommend Belize to family and friends and 78% said they planned to return.[6]

Given the proposals to increase taxes on all transactions in Belize (through the VAT), to raise entrance fees to reserves and protected areas, and to increase direct taxes on tourists (through the new conservation tax at departure and the proposed diving and sports fishing permits), the tourist industry is concerned that Belize is not, or will not be in future, price competitive. Furthermore, the current tariff protections and quantitative restrictions on trade raise the prices of some inputs used by the accommodation sector. One example is the protection given to domestic production of furniture, which hotels complain make the products expensive and inappropriate to their needs. The price of energy in Belize is said to be the highest in the Caribbean. Lack of adequate transport infrastructure south of Dangriga has limited access to the southern reef and coastal areas to air and boat travelers, raising the cost of them in the vacation package.

Addressing these concerns, the HIID (Nov. 95) states: "Although Belize may not be the least expensive place in Central America, it is price competitive with Caribbean and North American destinations. Based on survey results, Belize does not appear to be in direct competition with other Central American countries. In response to questions asking which other vacation destinations visitors considered, only 14 % cited either Guatemala, Honduras, Costa Rica, Mexico or El Salvador, while 43% indicated that Belize was their only destination. Reasons frequently cited for the choice of Belize were the beauty of the coral reef, the pristine environment, the protected rainforest, and the absence of commercialization and overdevelopment. Survey results indicate that there is no perfect substitute for Belize because it alone possesses a unique combination of environmental and cultural attractions that are not found elsewhere in the world. The survey indicates that people are not attracted to Belize for a cheap vacation, but rather for the environmental amenities."

To further test their hypothesis that additional user fees could be levied on tourists in Belize for conservation purposes, HIID used price elasticities of demand for international travel and determined that the impact on tourism numbers of additional user charges for tourist amenities was negligible. The HIID also designed a contingent valuation sample survey of 305 departing tourists, from which they determined that tourists would be willing, and even wish, to support Belizean conservation efforts financially. Respondents, however, expressed a strong preference ranging up to a condition *sine qua non* that such funds be earmarked for conservation purposes. The HIID also noted that with increasing world population, rising per capita incomes, and increased environmental awareness, combined with resource depletion and degradation, the value of relatively pristine assets, such as those in Belize, increases and that value is reflected in a higher willingness by tourists to pay for access and use. Similarly, the study analyzed the impact on tourism numbers of reef degradation, with and without mitigation, and forecast a substantial decline in demand even with the mitigation.

[6] A strong incentive to ensure that the tourist's visit is sufficiently satisfying to induce him or her to return is that the visit also generates word of mouth recommendations to friends and relatives. This is the cheapest and most effective form of promotion available in a highly competitive market.

In summary, the conclusions of the HIID analysis are that: i) the success of the tourism sector in Belize is directly related to the lack of degradation of its natural assets and particularly its marine assets; ii) the price of accommodation—within certain limits—is less important to tourists than the quality of the natural assets that they have come to visit; and iii) the "willingness to pay" for conservation is contingent on the fees being earmarked for conservation purposes.

Given the current and potential value of tourism to Belize, the operational conclusions that follow logically from the above analysis are that: (i) given its own budgetary difficulties, the GOB should proceed to raise funds from tourists for conservation, but should earmark these revenues for conservation of the specific assets for which the funds are raised; (ii) mitigation measures for the coastal zone, in particular, since this is Belize's main tourist/conservation attraction, but also for the major areas of tourist destination, must begin at once (as discussed in the Annexes on CZM, Forestry and Waste Management); and (iii) the private sector should not obtain rents from the tourists' tolerance of excessive prices for inferior accommodation and services. Consequently, measures must be taken to ensure that managers and owners of the accommodation and related tourist services improve the quality and efficiency of the products they offer.

4 *The characteristics of demand and supply*

The results of visitor surveys

Visitor surveys have been conducted, often with assistance from the Caribbean Tourism Organization (CTO), by the Central Bank of Belize (CBB) alone or with the BTB. Separate visitor surveys have also been conducted for special studies. Unfortunately, the data obtained are not strictly comparable given different methods employed, and the sample size may be too small to allow for generalizations about national groups, with the possible exception of US travelers. The 1994 Survey, which is still in "draft" was the first to make the important distinction between "winter" and "summer" visitors, whose presumed different characteristics were confirmed. A weakness of the surveys is that they include travelers whose purpose for the visit to Belize is: business, vacation/business, visit friends/relatives, other. In both the winter and summer surveys in 1994, these groups comprised some 28% of those surveyed, with 10% in the combined vacation/business category. Arguably, this latter category should remain in the survey, particularly since over 55% are repeat visitors and may have established a pattern of travel to Belize.

In order to reduce costs, the 1994 survey was conducted exclusively at the Phillip Goldson International Airport outside Belize City, which receives about 66% of all tourists arriving in Belize. This is likely to skew the survey towards higher income tourists, since many of the tourists arriving by road are believed to be back-packers. Cruise travelers have always been excluded from the surveys, which is acceptable since they generally sleep and eat on board, and often bring few financial benefits to the countries they visit.

Possibly the most important information from the surveys, which is also supported by the survey done by the HIID, is the predominance of marine-related interests (variously described as: water sports, diving and snorkeling, the coral reef, fishing) as the principal reason for visiting Belize. The 1994 survey of both winter and summer visitors, in which multiple responses were allowed are shown in Table 1.

Table 1: Visitor activities

Activities during Stay	*Overall Winter* %	*Overall Summer* %
Water sports	63	68
Fishing	20	18
Jungle Tours	31	26
Mayan Ruin Tours	42	34
Other	22	23

These surveys support the assumptions made in a study prepared for the InterAmerican Development Bank (IDB) (DHV, 1994) that 88% of tourists visit at least one protected area (marine, archaeological, or nature reserve) during their stay in Belize. These consultants base their revenue projections for protected areas on the assumption that 50% of tourists will visit at least one protected area, that 33% will visit 2 protected areas, and 10% will visit 5 protected areas—presumably the remaining 7% will visit none.

A distinction should be made in the "sun, sea and sand" category of tourists between beach addicts and the many divers and sports fishermen who travel to Belize. Though principally interested in marine activities, they are perhaps more active (and available data implies that they may also be younger) than those traveling to the traditional resorts and beaches on the Caribbean islands. The perception that traditional resort tourists are not interested in moving off the beach may arise from the absence of opportunities in other resort destinations for tourists to vary their activities. This is evident from the popularity of day trips "to the rainforest" in St. Kitts, for example, which since the opening of the southern peninsula is an expanding resort destination.

Average length of stay and average expenditure

The sample surveys have produced inconsistent information about the average length of stay of visitors to Belize. The CBB 1993 survey determined that the average length of stay was 10.51 nights, which was consistent with the 1992 survey (10.65 nights) and the 1986 survey (10.63 nights). The 1994 survey was the first to differentiate between winter and summer visitors and concluded that an average of 9 nights were spent by winter visitors and an average of 8 nights by summer visitors. The survey also differentiated between "visitors" and "vacationers"—the latter, according to the survey, spent an average of 8 nights in winter and 7 nights in summer. The sample survey used by the HIID lists the average number of days in Belize at 13.4. This wide range of estimates, from a low of 7 in summer to 13.4 nights, prevents good analysis of occupancy and expenditure levels and hampers planning for future tourism development. If the immigration forms were computerized, Belize would have a good source for average length of stay data. Given the many other demands on Belize's limited resources, such computerization should only be done in the short-term if the data on such forms is already being collected for another purpose.

Expenditure estimates were published in the 1993 CBB survey but not in 1994. According to the 1993 survey, average daily expenditure increased from US$65 in 1986 to

US$84 in 1992, but dropped to US$80 in 1993. The highest average daily expenditure was recorded by US visitors. The 1993 survey notes that there was a considerable increase in "other" expenditure between 1986 and 1993, which was attributed to the significant increase in dives and tours. From comments in other surveys, visitor expenditure could be further increased if Belize could provide interesting souvenirs for sale to its visitors. The importance of the "other expenditures" is that tours can extend the length of the visitor's stay and, with souvenirs, induce expenditures that would not otherwise occur.

5 *Demand: tourist numbers, countries of origin, seasonality*

The tourists

The statistics produced by the BTB follow Caribbean Tourism Organization (CTO) guidelines, but are subject to the usual problems in capturing the true number of tourists in a country with air, road and extensive sea access. Furthermore, Belize faces the typical difficulty of distinguishing genuine tourists from business visitors, returning Belizeans now holding other passports, and official visitors. To that end, the immigration forms are designed to elicit the purpose of the traveler's visit. The most accurate statistics are those collected at the main air terminal in Belize city and BTB has calculated that the ratio of these air arrivals to total tourist arrivals is between 0.728 and 0.796, with an average ratio of 0.762. Table 2 shows tourist arrivals by country of origin from 1991 to 1995, with annual growth rates for total numbers.

Table 2: Tourist arrivals by country of origin

Country of Origin	*1991*	*1992*	*1993*	*1994*	*1995(est.)*
USA	46,372	58,705	61,384	71,588	79,356
Canada	4729	6366	7242	9216	10,216
UK	7287	9390	8774	8010	8879
Europe	9341	15422	16,353	20508	22,733
Others	9813	9425	9856	10747	11,913
Total	77,542	99,308	103,609	120,069	133,097
Percent annual increase		28.1	4.3	15.9	10.9

Source: 1995 Belize Tourism Statistics, Belize Tourism Board.

Belize shares proximity with the rest of the Caribbean and Mexico to the USA, the largest tourist supplier country in the world, and is as close as a two-hour flight to Houston and Miami. The reverse climate makes travel to Belize from January to mid-April appealing for many US and Canadian visitors. Belize has a competitive edge over its Central American neighbors and Mexico because it is English speaking. Furthermore, for Canadians and the UK, Belize is a fellow member of the Commonwealth, with close political ties to other CARICOM countries. Hence the dominance of travelers from the USA (60%) and Canada (8%). The UK has retained a steady level of tourists though a declining share, from a peak of 9.5% in 1992 to 6.7% in 1995.[7] The flow of other Europeans, mainly Germans, Italians and French, has

[7] The drop in the number of visitors from the UK in 1994 was probably related to the departure of the British Force from Belize in that year, but has since recovered.

increased steadily to 17% of all tourists in 1995. The introduction in September 1995 of a direct flight to and from London, combined with marketing assistance to the Government from the European Union, should increase the numbers of European tourists in future. The growing number of "others" in the total, currently some 9% of the total, mainly comprise Central and South Americans and Mexicans, together with a steady trickle of Taiwanese who are attracted by the sale of Belizean nationality.

Because of the small size of most hotels in Belize (see below), the country does not attract many large groups or charters. Charters are confined mainly to Belize City, where the largest hotels are located and have been initiated mainly by Canadian tour operators. In addition, Belize is on the itinerary of multi-destination travel packages, mainly related to archaeology in Central America and Mexico, which tend to be smaller than the traditional charters for resort tourism and tend to attract relatively high-income visitors.

Seasonality

The BTB provides only annual totals for "tourists" and does not show either the monthly breakdown or their distribution by internal destination, so that conclusions about seasonality can only be inferred. Most tourism destinations world-wide struggle with attempts to attract tourists outside the main season, which in the case of Belize, is January to mid-April. While the "winter" months are the clear peak tourist period, Belize uses price incentives to attract tourists in summer—average room rates in 1995 were at a peak of $130.69 in February and at an average low of $93.96 in September—and appears to be somewhat successful. Both the occupancy rates discussed below and the steady flow of "tourists, business and official visitors" arriving throughout the year suggest that Belize has less of a seasonality problem than most exclusively resort tourism destinations. European visitors are said to travel in the summer, as do the Canadian package tours. Conferences, which can help to level out the troughs, are held in Belize City rather than at resort areas, again because of the presence there of large hotels and their related conference facilities. Although seasonality is largely determined by events in the tourist supplier markets (e.g., school holidays) over which the country of destination has no control, there has long been a presumption that "ecotourists" are less bound by such constraints and, therefore, a country that attracts "ecotourists" is likely to have a better distribution of tourists year-round. Nevertheless, climate in Belize, i.e., temperature and rainfall, make the "winter" months a preferred time of year for most tourists.

6 *Supply: tourist accommodation, its distribution and occupancy rates*

The number of hotels and their distribution throughout Belize are shown in the Appendix: Table 4, and the number and distribution of rooms are shown in Table 5. The BTB describes all accommodation under the generic term "hotel" simply as a convenient short-hand for all tourist accommodation, including apartments, guest houses, cottages and self-service accommodation. For ease of use of BTB's statistics, the term hotel will be used in the statistical tables in this report. Table 3 shows the total number of hotels in 1988 and 1995, the

average number of rooms per hotel in 1988 and in 1995, and the rate of growth in numbers of hotels and rooms over the same period, by district.

Table 3: Hotels in Belize

District	*Number of Hotels*		*Rooms per Hotel*		*Beds per Hotel*		*% increase 88-95*	
	1988	*1995*	*1988*	*1995*	*1988*	*1995*	*Hotels*	*Rooms*
Belize	47	60	12	14	17	22	28	55
Amber	37	52	11	14	21	25	40	76
Caye C.	16	33	10	10	15	15	106	98
Cayo	24	67	10	9	18	16	179	158
Corozal	8	12	15	12	26	19	50	22
Orange	7	10	12	11	21	17	43	29
Stann C	14	38	8	8	11	14	171	202
Placenc	10	31	6	6	10	10	210	219
Toledo	10	34	6	7	9	11	240	335
Other	10	25	9	9	20	15	150	167
Total	**183**	**362**	**10**	**10**	**17**	**17**	**98**	**100**

Source: Derived from Belize Tourism Statistics, BTB 1994 and 1995.

The most striking feature of tourist accommodation in Belize is its small size, as the above analysis shows. Despite the doubling in accommodation between 1988 and 1995, the average size of the units has remained exactly the same. Only Ambergris and Belize District have increased the size of their hotels. At the same time, there has been an expansion in the number of small hotels. Data published for the first time by the BTB in 1995 shows hotel size by location (see Appendix: Table 6). Only Belize District and Ambergris each have three hotels with over 40 rooms, the largest in the country. For the rest, 69.3% of all hotels have between 1-10 rooms, 22.6% have 11-20 rooms, and 6.4% have 20-40 rooms. This goes against the trend to bigger and bigger hotels throughout CARICOM and other resort destinations. In 1992, only four countries in CARICOM (Belize, Dominica, Montserrat and St. Vincent) were without a hotel of 100 rooms, while in St. Lucia some 60-69% of all hotels had 100 rooms or more. Dominica markets itself, like Belize, as a nature tourism destination, while St. Lucia is very successful in attracting resort tourism on a large scale.

The BTB does not rank tourist accommodation by category (apartment, hotel, boarding house, etc.), nor does it classify tourist accommodation by price, quality or amenities. Because of the small average size of the accommodation unit, the above breakdown suggests that much tourist accommodation is in private homes or rental units attached to private accommodation, or in small hotels and lodges that are likely to be owner-managed. Within this overall picture there will be some larger professionally-managed hotels and lodges throughout Belize, with most such in Belize City and in Ambergris, the two established tourist destinations.

Distribution of accommodations. Table 4 shows the percentage distribution of hotels and rooms by district in 1988 and 1995.

Table 4: Distribution of hotels and rooms by district, 1988 and 1995

District	*% Distribution of Rooms*		*% Distribution of Hotels*		
	1988	*1995*	*1988*	*1995*	*Average Room Rate BZ$ 1995*
Belize District	29	23	26	17	104.51
Ambergris	22	20	20	14	183.50
Caye Caulker	9	9	9	9	39.55
Cayo	13	16	13	19	89.27
Corozal	7	4	4	3	66.90
Orange Walk	5	3	4	3	103.56
Stann Creek	6	9	8	10	75.11
Placencia	3	5	5	9	117.31
Toledo	3	6	5	9	40.41
Other Islands	5	6	5	7	100.48
Belize	100	100	100	100	115.48

Source: Derived from Belize Tourism Statistics, BTB 1994 and 1995.

The number of hotels and rooms each doubled between 1988 and 1995, with most of that increase occurring in the coastal areas, though a considerable increase also took place in Cayo where a number of nature reserves and archaeological sites are located. While the categories by district are too broad to differentiate between coastal and non-coastal areas, informed estimates place the percentage of tourist accommodation in coastal areas at nearly 80%. That estimate would seem to include the hotels in Belize City. The above table illustrates the gradual emergence of the newer tourist areas further south along the reef. Placencia is currently connected by plane to Belize City and will be more easily accessible by road once the Southern Highway is completed. Other growth areas are in the cayes and islands near Stann Creek, e.g., Glover's Reef Atoll and Laughingbird Caye National Park.

Belize's top resort in terms of price is Ambergris, followed by Placencia, Belize District, Orange Walk (the only non-coastal member of the group, but it includes the capital, Belmopan) and Other Islands. A review of the above accommodation prices suggests, from empirical observation internationally, that Belize should be competitive as a resort destination within the Wider Caribbean, not because of a low-cost structure but because Belize is operating against high-cost competitors. The Economist Intelligence Unit (EIU, 1993) concluded in a competitiveness assessment within the Wider Caribbean, that a visit to the Caribbean is expensive and hotel profitability is low by international standards. Nevertheless, visitor surveys indicate that nearly one-third of visitors do not find hotels "good value for money," suggesting that there is room for improvement in the management and services provided by a number of hotels.

Occupancy Rates. The occupancy rates for tourist accommodation in Belize, published by BTB, are so dire that they suggest that the accommodation sector is unprofitable throughout the country. Those occupancy rates for 1995, 1994 and 1993 are shown in the Appendix: Table 7. The average occupancy rate for all Belize in 1995 was 29%; worse still, the reported occupancy rates in the peak months from January to March were only 35%, 40%

and 41% respectively, with a high of 51%, 58% and 62% reported by Ambergris. (In other destinations, hotels count on making their profits in these peak months, even if they merely break-even the rest of the year.) In both September and October—the troughs—the average occupancy rate is 21% for all Belize.

The average occupancy rates for each district in 1995 range from 39% in Ambergris, 34% in both Belize District and Placencia, and 30% in Other Islands, to 13% in Toledo and 17% in Stan Creek and Corozal. By comparison, the average annual room occupancy rates available for a few CARICOM countries from CTO publications and the Caribbean Tourism Statistical Report 1992 were as follows in 1992, in percent: Barbados (46.3), Grenada (61.8), Jamaica (60.1), St. Lucia (73.5), Trinidad (53.6). Anecdotal information supports the presumption that tourist accommodation in Barbados was in financial trouble in 1992, given also that the occupancy rate had fallen from a peak of 64.3% in 1989. All of these islands have a much larger accommodation stock than Belize and, while a break even occupancy rate can only be estimated for an individual hotel, average rates tend to measure the overall health of the accommodation sub-sector.

There are several reasons why accommodation managers in Belize may be able to operate with relatively low occupancy rates. In some cases—perhaps in many—the accommodation will be in private homes, where rental income represents a windfall gain, or in investment properties where tourist income is a return to equity investment. In the first case, and in many small owner-managed hotels, true cost accounting is not used; the time of the manager and perhaps of family members is not valued as wage labor; fruits and vegetables grown on the land or fish caught are also not valued at market rates. The viability of the operation is not subjected to classical accounting norms.

A different reason explains the continued operation of larger hotels. The investment incentives—the grant of which is now being discouraged by Government—include providing hotels with customs duty exemptions on capital goods and equipment during construction and tax holidays ranging up to 25 years, as well as other incentives. Informed observers suggest that hotels in Belize City, where over building is generally admitted to have taken place since 1990, would be in serious financial difficulties were it not for their tax holidays. (By the same token, the investment incentives may have induced the over-building). Cited as an example of the hotel's plight was their willingness to take low-cost package tours from Canada which provide only low margins to the hoteliers, as well as only limited benefits to the Belizean economy.

The presumption that there is considerable under-reporting of income in tourist accommodation, however, is inescapable. In small owner-managed hotels, the demands on the time of the limited staff, particularly in the peak season, are very great and paper work seldom ranks high on the list of priorities. The temptation to avoid reporting a transaction with a temporary foreign visitor will be high and very hard to trace. The assumption that the occupancy rates understate the true use of accommodation in Belize was tested in a simple calculation. The bednights available in Belize in 1995 were 2.2 million (6137 beds x 365 days); a conservative assumption is that only 80% of the total number of tourists, i.e., 106,500, stayed in commercial accommodation and their average length of stay was 8 nights, i.e., 852,000 bednights This calculation yields an average bed occupancy rate for all Belize of

about 40%—the room occupancy rate will be higher. If the accommodation sector is indeed more profitable than would appear from the occupancy rates, a strategy of dispersing growth in tourism facilities away from the currently established resort areas becomes more feasible.

Compatibility of tourism characteristics with the natural resource base. The characteristics of Belize's tourism: lack of mass tourism and charters, small hotels, two peaks in demand in winter and summer, significant troughs for only two months, and a variety of dispersed nature and cultural attractions, is well suited to the fragile natural assets on which the country's tourism is based. Given that Belize is competitive in price with the rest of the Caribbean, that its marine and nature assets are superior to and more diversified than its competitors, there is clearly room for further expansion of tourism accommodation in Belize. This assumption is supported by the small size of the sector relative to its coastal assets and the variety of its natural and cultural assets. The issue is where that expansion should take place. Although little work has been done on the subject in Belize (or elsewhere), each tourist asset has a—generally unquantified—carrying capacity that should not be exceeded if degradation of the asset is to be avoided. In the absence of quantification, a conservative approach to intensity of use is advisable. The final section of this report proposes a conservation strategy for tourism.

7 *Management of the sector*

Although tourism is essentially a private sector activity, the government normally works as a partner to further the interests of this sector when it is, as in Belize, critical to the economy. In Belize this partnership is facilitated by the small size of the population and the universal acceptance of the type of tourism that Belize should market, i.e., eco-tourism. This harmony and common purpose has not been the norm throughout CARICOM, where the tourism sector first regarded the environmental movement as a threat to its continued expansion. In Belize there is agreement at all levels: the Government, private sector, NGOs and communities, that natural resources must be conserved in the wider interest, but also as the base for tourism.

The Ministry of Tourism and the Belize Tourist Board

The Ministry of Tourism and the Environment has suffered the effects of the retrenchment that all Government Departments have experienced as a result of fiscal constraints. Its budget and staff remain small, but the Minister, Permanent Secretary and staff are strongly supportive of the sector. The BTB, which has been a statutory body since 1990, is responsible for representing the interests of the tourism industry, appropriate marketing of the country, the issuance of hotel licenses, collection of hotel taxes, and the provision of training and other support services to the industry. The BTB provides an information service in Belize City for visitors, as well as elsewhere, and publishes a series of guides to Belize or to specific aspects of the country and its people that are striking and informative. The BTB has undertaken relatively successful marketing strategies recently that include the European market with assistance from the European Union. The BTB has also organized trade shows to exploit the potential linkages between the production sectors and tourism.

The BTB is currently concerned about setting standards for the various components of the sector. Although the Tourism Act, discusses "minimum standards" these, in fact, have never been defined, and the BTB intends to begin a ranking of the accommodation sector for quality control reasons. The BTB has received guidelines on the standards used by St. Lucia and is studying these. Similarly, Tourist Guide Regulations were passed in 1992 requiring that all guides be registered and meet standard levels of professional training and certification. The registration requirement was implemented in 1995, including a $50 licensing fee which is collected by the BTB. The BTB defined the priorities for the tourism sector as: education and training and enforcement of environmental laws.

The BTB is the main source of statistical information on tourist arrivals, the accommodation sector and visitors to reserves. These statistics are compiled from a variety of sources and published annually. For the first time the 1995 statistics provide a breakdown of the number of hotels by number of rooms and the BTB plans further refinement of the data, such as a breakdown by type of accommodation.

The Belize Tourism Industry Association (BTIA)

The BTIA gives as its mission statement: to promote the development of eco-cultural tourism for the benefit of Belize. The BTIA was formed in 1985 to bring together "tourism and tourism-related interests." The Association was incorporated under the laws of Belize in 1989, and with over 380 members from Belize's six districts and all major sectors of industry, is one of Belize's largest non-profit organizations. The BTIA is an umbrella organization for three special interest groups: the Belize Hotel Association (BHA), the Tour Operators Association (TOA) and the Belize Eco-Tourism Association (BETA). One-third of its own members represent tourist accommodation entities. BTIA is an active member of the Belize Audubon Society, the Belize Center for Environmental Studies, the Belize Historical Society and the Belize Chamber of Commerce and Industry. The BTIA is a member of a number of professional organizations that serve the Caribbean, Central America and the USA.

The BTIA's main functions are to lobby for the interests of the tourism industry in Belize, to provide assistance to its members and also networking and promotional opportunities for them. The BTIA is concerned about increasing the environmental awareness of its members and distributes information provided by the environmental wing of the Caribbean Hotel Association and promotes publications of The Eco-tourism Society, which is based in Vermont and which has issued useful guidelines on a series of eco-tourism management issues. The BTIA is also running training courses for guides to enable them to meet the new licensing requirements of the BTB. The BTIA considers that a hotel training school is the main priority need for Belize, given the large number of hotels in the country. The BTIA is responsible for renewing the licenses of hotels annually.

The BTIA is an active organization with the capacity to mobilize support within its own membership for policies and programs that would benefit the sector. It's current leadership is receptive to advice and technical assistance and has helped accommodation managers to become more aware of the potential for recycling and for using recycled products in hotel construction and more aware of the impact of tourism on the environment.

The NGOs

The remarkable story of the work of Belizean NGOs in management of protected areas (both marine and terrestrial) and in conservation generally has been told publicly, particularly in World Wildlife Fund (WWF) publications. Suffice it to say that the Belizean NGOs are essential to the continued functioning of protected areas. The Government must also be applauded for its continuing decision to delegate management of critical natural resources to NGOs. The GOB's fiscal crisis is unlikely to be resolved soon, so it will be the NGOs who raise funds from international donors to sustain Belize's protected areas and who will provide the training and technical assistance to manage their charges wisely. The BAS is currently attempting to establish an endowment to stabilize its funding and to that end has established a 501(3)c account in the USA. The recently promulgated PACT legislation will provide NGOs with earmarked funds to manage the reserves for the first time, raised from entrance fees.

8 Tourism impacts

The main negative environmental impacts of tourism can be identified for each segment of the tourism sector in qualitative terms.

Coastal zone:

- construction of accommodation too close to the high-water mark on the shore.
- clearance of mangroves for construction.
- pollution of coastal areas with untreated sewage; leakage from poorly functioning sewage treatment package plants; and inappropriate disposal of treated sewage.
- dumping of solid waste on land and sea.
- excessive exploitation of groundwater resources.
- beach sand mining to provide aggregate for construction.
- over-fishing to supply tourist accommodation with local species.
- impact on land prices and the consequent use of land for tourist accommodation that might have a higher and best use in another activity.
- dredging of sea channels for cruise ships.
- blasting of the reef for a boat channel.
- dropping of anchors on the coral by dive boats and recreational vessels.
- removal of coral by divers and snorkelers.

While all of the above have occurred in Belize, the current state of environmental awareness and the considerable body of legislation that has either been drawn up or the existence of which has recently been publicized, are helping to prevent future occurrences. The CZM Unit of the Fisheries Department, supported by the UNDP/GEF funded CZM Project, is dedicated to the sustainable management of the coastal zone and is addressing several of these issues as discussed in the Annex III on CZM.

The Department of the Environment, Ministry of Tourism and Environment, commissioned a "Guide for Developers" in June 1995, which was compiled and reproduced

with the assistance of the Natural Resource Management and Protection Project (NARMAP), a project of the GOB, with financial assistance from USAID. The general provisions of the laws it contains, as well as the specific guidance provided for developers of tourism accommodation, should ensure that environmental impacts of accommodation construction are minimized. Other relevent policy statements and guidelines, as discussed in Annex III, are the "Cayes Development Policy" and the "Guidelines for Development in the Turneffe Islands."

Nature tourism impacts[8]

An analysis of the impacts from nature tourism, together with mitigation recommendations, is provided in a study prepared with IDB funding in 1994/95 (DHV 1995). Protected area status is determined by the primacy of the biodiversity and the natural heritage in the area, but most protected areas reserve ("sacrifice") a small section (10-20%) for non-consumptive demands such as tourism, recreation, research and education. Non-consumptive uses are not necessarily in conflict with conservation objectives, provided they are well managed and that disturbances are minimized and concentrated. National Parks in the USA host up to 5 million visitors per year (compared with less than 20,000 in Belize), with only localized negative effects. Visitors are concentrated in relatively small areas ("honey pots"), while most of the wilderness areas are barely visited, but the visitation creates nation-wide support for those areas. These visitation sites should absorb all the potential visitor pressures by providing: adequate access, parking space, toilets, look outs, picnic areas, visitor centers and catering, as well as interpretation trails, maps, signposts and a few visible guides/park rangers. While the current level of funding for protected areas in Belize is inadequate to finance these visitor facilities, the principles of concentrating visitors in a small area of the reserve remains.

Development impacts on archaeological sites

There are approximately 214 archaeological sites in the coastal zone, ranging from Mayan trading posts and settlements to relics and historical monuments of the colonial era. These sites are threatened by all the pressures that challenge the integrity of the coastal zone. In other areas of Belize, archaeological sites are threatened by housing developments and road construction, land clearing, and looting and improper excavations. While much damage has already been done to Belize's archaeological treasures, there is higher awareness today of their cultural significance through the "Mundo Maya" tourism promotions and, consequently, of their income-generating value. Again, the aforementioned Guide for Developers provides useful guidelines to developers on the laws that protect ancient monuments, essentially under the provisions of the Ancient Monuments and Antiquities Ordinance and the Abandoned Wrecks Act. Such assets have been the focus of several community-based tourism initiatives, thus combining income generation with preservation.

[8] More significant impacts from non-tourism sources are discussed in the Forestry section of this report.

9 Conclusions and recommendations - a development and conservation strategy for tourism

For an expansion of tourism, which already contributes 15% of GDP, to be sustainable, the Government needs to work with the private sector, including the many NGOs involved in management of natural assets, to formulate a development strategy for tourism. Belize should attempt to continue to attract tourists interested in pristine natural assets, whether for diving, snorkeling, sport fishing, or sailing and other relatively benign recreational uses of the coastal zone, and tourists interested in nature and archaeology. Belize should continue to build relatively small hotels and avoid the environmental and often, financial, pitfalls of mass tourism. Hotel owners must be assisted to become more environmentally conscious about construction materials, recycled products and waste practices. (The models for such developments are the two hotels designed and built by Mr. Stanley Selengut in St. John, US Virgin Islands, which are also, according to Mr. Selengut, unusually profitable.) These hotels and their related tourist services must be made more efficient to ensure visitor satisfaction and to allow for a reasonable profit for owners, as well as conservation taxes and tax revenues for the Government. Current efforts by the BTB to introduce hotel standards and categories will promote this objective. The BTIA should also continue to provide technical assistance to its members on successful environmental practices elsewhere, as, for example, promoted by the Eco-tourism Society in the U.S.A.

To date most tourism investments have been attracted to Belize's "jewel in the crown", the San Pedro area of Ambergris Caye. Given current concerns about the health of the reef in areas where it is most under stress, a development and environmental strategy for tourism should be designed to alleviate those pressures. More targeted measures will be required to ensure that the carrying capacity of existing tourist assets is not exceeded. Fiscal incentives, which are currently granted indiscriminately, could be targeted only for the new areas to be developed. Infrastructure investments in existing tourist areas should be limited to mitigation, e.g., solid waste management and sewerage systems where relevant, while infrastructure that would facilitate access to tourism areas should be limited to new areas. To assist existing hotels in improving quality, i.e., to refurbish, modernize and introduce environmentally benign waste practices, the Government should attempt to obtain financing for soft loans for the hotel sector. The objective is to enhance existing tourist areas and limit further expansion to prevent further damage to natural resources, but also to enable hotels to raise prices to cover costs and to finance conservation.

In the newer areas, a more diversified tourism product that appeals to a wider income range can be constructed. As discussed below, limited community tourism can help to diversify the tourism product and, consequently, the range of tourists who will visit Belize. Nevertheless, the majority of tourists visiting Belize will be willing to pay relatively high prices for the use of the country's pristine natural assets and Belize would do well to target that market.

The Government has expressed concern about the need to distribute the benefits of tourism and to this end has promoted community-based tourism. Another means of ensuring that the benefits are better distributed is to upgrade the quality of life for local people in tourist

areas. This can be achieved by extending sewerage connections, potable water, electricity and telephone connections to all the residents, not just the hotels. The cost of such services could be covered by a differential pricing system, whereby the hotels pay higher prices than individuals. Care must, of course, be taken not to price the hotels out of the market, but many tourists will be concerned at the poor living conditions of the local people.[9] Tourism cannot flourish in areas where there are serious health problems and some of the proposed sanitation investments would help to mitigate these problems. Such investments also help to prevent pollution of coastal areas.

Coastal zone. On the precautionary assumption that stresses to the reef indicate that the carrying capacity of certain sections is being exceeded, most of the expansion in accommodation should take place in lower density tourist areas, provided that their natural resources are still pristine. Fiscal incentives could be targeted only for the new areas. To ensure that the assets are developed sustainably, these locations should be protected by zoning and enforceable management plans and by land-use planning. Current tools are the Cayes Development Policy of December 1995, produced by the CZM Committee, which sets out a policy on development of the coastal zone to ensure sustainable use and the long-term protection of the natural resources of the cayes. The Turneffe Islands Development Guidelines, also produced by the CZM Project, constitute a development plan for the Turneffe island atoll, a discrete group of cayes within its own reef. As recommended in Annex III, Belize urgently requires assistance to continue and expand these land-use planning initiatives.

The CZM Unit is responsible for evaluating development proposals in coastal areas, in conjunction with other departments of Government. Continued support to this unit from external donors and from conservation revenues within Belize is critical to the future of the coastal zone and, consequently, to tourism. For this reason, Annex III proposes the creation of a Barrier Reef Foundation to combine international and national efforts to conserve the reef which is a global resource.

Any proposals for tourism development, whether or not they are to receive fiscal incentives and whether in the coastal zone or elsewhere, should always involve the BTB, whose technical advice is an essential input in the decision-making process. Continued emphasis must be placed on the requirement that construction on the coast be no closer than 66 feet from the high-water mark and in many cases even farther back. Such setback provisions, as with the provisions for protection of mangroves, need to be constantly brought to the attention of developers and investors.

The requirement that development projects should include an environmental impact assessment (EIA) under the provisions of the Environmental Protection Act (EPA) of 1992, should ensure that tourism-related development conforms strictly to the laws that protect the environment. Furthermore, the proposal to establish more marine protected areas (discussed in Annex III) and to strengthen the management and financing of Protected Areas (discussed in

[9] While the negative social and cultural impacts of tourism are not the subject of discussion in this report, the remedies that are suggested for the environmental impacts are, without exception, also important in mitigating negative social and cultural impacts.

9 *Conclusions and recommendations - a development and conservation strategy for tourism*

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Annex II) should achieve environmental objectives of conservation, as well as protect the resource for sustainable tourism development.

The recent declaration of a number of "Special Development Areas" (SDAs) under the provisions of the Land Utilization Act is intended to limit development in these areas to specific activities. Such regulation should ensure that tourism does not encroach on land that has a highest and best use in another activity and vice-versa, and is also intended to limit the density of developments in the SDAs.

Nature tourism. Major work has been done by the Ministry of Natural Resources and NGOs in developing a strategy for Protected Areas recently, as discussed in Annex II. Whatever measures are taken to conserve Belize's considerable forest and wildlife assets will increase tourist numbers and their average length of stay. Such efforts will be for naught, however, if the safety of tourists while in the reserves cannot be assured. Recent measures to increase entrance fees should be earmarked for better park management, including improved protection for visitors.

Archaeology. Although considerable work has been done in recent years to conserve and protect access to Belize's archaeological treasures, tourists in a recent survey gave relatively low "value for money" ratings to their visit to Mayan sites. Financial constraints undoubtedly hamper the management of these cultural heritage sites, but the Department of Archaeology is urged to pursue donor agencies who might be able to provide funding and technical assistance to ensure the conservation of these assets. Again, additional visitor fees should be earmarked for preservation and for instructional materials. Well-briefed guides, who are trained and licensed, and the availability of appropriate souvenirs could enhance the visitor experience.

Revenues for conservation and the quality of the tourism product

Tourists are attracted to Belize because of their belief in the pristine state of the coastal zone, the forests and the archaeological sites. Price is of less concern to these tourists than the world-class quality and pristine state of the natural attractions they are visiting. The Government is thus provided with an opportunity to transfer conservation costs to the tourists and those entrepreneurs who benefit from the existence of the natural asset. Demand for tourism to Belize, however, is not inelastic and competing destinations are in close proximity, even though with generally inferior coastal and nature assets. Visitor surveys indicate that satisfaction with the natural assets considerably exceeds their satisfaction with the supporting infrastructure of hotels, domestic transport, availability of souvenirs and even the cultural sites. Inefficiencies in the hotel and related service sectors must be addressed immediately, to ensure that conservation, rather than private sector interests becomes the beneficiary of the rents available from the tourists' relative indifference to price. The work of the BTB in classifying hotels by category and that of the BTIA in promoting environmental awareness by hotel owners, will help to increase the efficiency of the hotel sector.

Tourist accommodation

Information about the true financial health of the accommodation sector is needed before any planning can take place for its future expansion. Access to this information is hampered by the large number of very small hotels in Belize. Such small hotels reflect the lack of investment capital and perhaps managerial capacity in Belize, but are also well suited to Belize's resource base. In order to raise occupancy rates—if indeed they are as low as reported—a marketing and promotion campaign will need to be undertaken—always based on the above conservation strategy for tourism. For such a campaign to be successful, the BTB, with assistance from the BTIA, needs to: i) develop a classification of tourist accommodation into hotels, apartments and cottages, and guest houses in each district, but, as a start, in those destinations that most attract tourists or have greatest tourism potential; ii) develop a system of categories for the different types of accommodation, so that the country is better able to market itself and tourists are better able to judge the amenities of the hotels where they will be staying and whether the price is related to the quality of the accommodation. The additional element of periodic inspection of the properties would ensure quality control; and iii) obtain better information about the finances of the accommodation sector, possibly through a confidential survey done by the BTIA or the Hotel Association, after which the GOB will need to provide inducements to report income and penalties for non-reporting of income.

The lack of availability of credit lines for hotel construction, improvement and refurbishing constrain attempts to improve the quality of the accommodation sector. Those donors that provide financing for tourism should consider providing a line of credit for improvement of tourist accommodation—as has been done elsewhere in CARICOM. This operation would require that accommodation owners submit a full disclosure of their operation's finances (possibly combined with an amnesty for past transgressions) which would enable the Government to obtain a better understanding of the sector's finances as suggested above.

Both the BTB and the BTIA noted the need for a hotel training school in Belize. The most practical solution would be to begin an apprentice program in existing hotels, rather than undertake the considerable investment in equipment and human resources that a full training school requires. Existing larger hotels could rotate this service, or provide it in return for a fee. Ideally, a number of well managed hotels throughout the country could participate in such an apprenticeship/training program.

Souvenirs

An economic objective of tourism is to induce tourists to spend as much as possible (but always for "good value") during their stay. Quite apart from the immediate monetary gain, the souvenir provides a recurring reminder about the holiday experience and becomes a promotional tool when given to friends and relatives. Visitor surveys give "souvenirs" available in Belize their lowest ranking for "good value for money." The development of souvenirs (whether handicrafts, garments, jewelry, local toiletries, or even a Duty Free center—all of which are done in CARICOM countries) generally requires technical assistance from people knowledgeable about how to transform local products and talents into desirable tourist purchases. While this is a medium-term objective given the investments and training

required, this report recommends that the Government of Belize seek funding for this activity or that an NGO coordinate the effort with technical assistance provided from an external source. Nearby Mexico provides an outstanding case study of a country rich in "souvenirs," as do, to a lesser extent, other CARICOM countries such as Jamaica.

Community-based tourism

The SDAs, which require extensive consultation with local people, can well be combined with ongoing initiatives for community based tourism that tend to assure vigilant monitoring of the local resource by those who benefit from it. In 1994, some 26 communities had plans to establish facilities or activities for receiving visitors in their communities. In a report on these activities (Sproule, 1994), the reasons for GOB support for community-based tourism initiatives were set out. It allows for a broader distribution of the financial benefits from tourism, it generates income in otherwise depressed rural areas, the activity is not gender specific and community tourism diversifies the national tourism product. To that end, over 100 people attended the Community-Based tourism gathering in 1994, representing a broad cross-section of interests, that was financed by the Ministry of Tourism and the Environment (MTE) and organized by an NGO, the Belize Enterprise for Sustained Technology (BEST).

Certain similarities were identified among successful community initiatives that have benefited from some level of outside funding: i) in the early stages of their development, many of the initiatives have been assisted by persons originally from cultures outside of the local community; ii) as community-based tourism initiatives appear to be developing primarily in rural, rather poor areas, quite small amounts of income can make the difference between "not worthwhile" and viability for the beneficiary population. They are not, however, a panacea. For most, tourism was simply a welcome source of additional cash; iii) the most successful ventures started out small and gradually expanded; iv) the communities need assistance with marketing of their product to enhance the visibility of their activities and to increase the number of visitors being received; v) protected areas with community-based tourism initiatives have developed into research sites as well. This symbiotic interaction between community and researchers has enhanced local knowledge about the protected areas and increased the community's appreciation of and pride in their local natural resources; and vi) as the tourism product develops, so has the community's interest in protecting local natural areas

Community-based tourism in Belize would appear to have potential for growth but it will appeal only to a small segment of tourists to Belize. The conservation benefits and the social and economic benefits to the local community are potentially high, therefore to ensure the success of these ventures, they too should meet minimum standards and should be marketed as part of the total Belizean tourism product. The BTB and the BTIA, with assistance from local NGOs, could continue to assist with these developments.

Appendix

Table 1: Visitors to Hol Chan Marine Reserve

	1990/91	*1991/92*	*1992/93*	*1993/94*	*1994/95*	*1995/96*
MAR	3,852	4,205	4,251	4,284	4,442	6,143
APR	2,838	2,663	3,098	3,585	3,102	4,555
MAY	2,467	2,965	2,693	2,646	2,167	3,619
JUN.	1,844	2,233	2,163	1,890	2,157	3,629
JUL.	2,571	2,762	2,555	3,473	2,859	4,037
AUG.	3,613	3,674	3,703	3,692	3,462	4,960
SEP.	1,795	1,232	1,876	1,637	1,951	2,610
OCT.	1,971	1,647	1,664	2,107	2,135	2,956
NOV.	2,752	2,261	2,571	3,024	3,215	3,825
DEC	3,491	3,212	3,791	3,335	4,351	4,659
JAN	3,241	3,392	3,910	3,823	4,184	4554
FEB.	3,234	3,384	4,250	3,916	3,800	4,864
TOTAL	**33,669**	**33,630**	**36,525**	**37,412**	**37,825**	**50411**

months are arranged according to the reporting year for the Reserve.

Table 2: Visitors to protected areas-National Parks managed by the Belize Audobon Society

		1991	*1992*	*1993*	*1994*	*1995*
Guanacaste National Park	GNP	5,650	5,313	5,139	4353	2,479
Blue Hole National Park (Inland)	BHNP	4,634	6,276	7,459	6,930	7,930
Cockscomb Basin Wildlife Sant.	CBWS	4,053	3,801	4,038	4,858	4,760
Crooked Tree Wildlife Sanct.	CTWS	1,621	2,269	2,374	2,346	1,613
TOTAL		**15,958**	**17,659**	**19,010**	**18,487**	**16,782**

Table 3: Visitors to Maya Ruins: 1992-1995

	1992	*1993*	*1994*	*1995*
Altun Ha	6,930	9,196	9,860	9,794
Cahal Pech	6,243	6,437	8,920	10,377
Lamanai	3,464	6,968	7,936	9,508
Xunantunich	7,361	8,781	12,613	13123
TOTAL	**23,998**	**31,382**	**39,329**	**42802**
Percent change		30.8%	25.3%	8.8%

Table 4: Belize Tourist Accommodations: number of hotels

	1988	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Belize Dist.	47	45	44	51	53	57	59	60
Ambergris	37	37	39	50	51	47	50	52
Caye Caulker	16	21	23	25	24	29	30	33
Cayo	24	31	38	44	52	55	60	67
Corozal	8	8	9	9	9	9	10	12
Orange Walk	7	10	11	12	12	9	10	10
Stann Creek	14	16	10	10	14	25	32	38
Placenia	10	11	15	18	20	22	25	31
Toledo	10	10	12	17	21	26	29	34
Other Islands	10	12	9	12	15	24	23	25
TOTAL	**183**	**201**	**210**	**248**	**271**	**303**	**328**	**362**

Table 5: Belize Tourist Accommodations: number of rooms

	1988	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Belize Dist.	541	573	532	813	831	881	859	837
Ambergris	413	517	497	716	719	665	709	728
Caye Caulker	159	193	198	229	232	293	291	316
Cayo	232	304	322	381	416	497	545	599
Corozal	122	124	137	134	134	142	143	149
Orange Walk	85	92	110	115	110	93	108	110
Stann Creek	105	131	88	100	133	233	267	318
Placenia	58	66	80	92	101	129	151	185
Toledo	55	71	86	121	146	188	211	239
Other Islands	85	97	65	83	91	204	203	227
TOTAL	**1855**	**2168**	**2115**	**2784**	**2913**	**3325**	**3487**	**3708**

Table 6: Belize Tourist Accommodations: hotels by size and district

	1-10	*11-20*	*20-40*	*40+*	*TOTAL*
Belize District	17	7	1	3	28
Ambergris	36	15	4	3	58
Caye Caulker	24	6	3	0	33
Cayo	30	13	6	0	49
Corozal	48	14	5	0	67
Orange Walk	6	3	2	0	11
Stann Creek	6	3	1	0	10
Placenia	27	9	1	0	37
Toledo	27	4	0	0	31
Other Islands	27	7	0	0	34
TOTAL	**248**	**81**	**23**	**6**	**358**
Percent	69.3%	22.6%	6.4%	1.7%	100%

Table 7: Occupancy rates by area: 1995

	JAN	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*
Belize Dist.	34	43	42	36	35	34	33	28	34	27	30	29
Ambergris	51	58	62	47	30	34	27	33	19	25	39	42
Caye Caulker	33	36	31	30	20	15	19	25	11	12	18	23
Cayo	32	38	44	30	25	22	27	22	17	21	23	28
Corozal	15	20	15	15	15	23	27	20	22	12	14	12
Orange Walk	30	35	33	28	20	24	28	24	21	28	37	32
Stann Creek	19	19	26	23	18	15	14	12	12	11	17	17
Placenia	48	54	46	41	28	26	19	24	14	23	28	39
Toledo	16	21	12	16	11	14	12	10	8	10	8	10
Other Islands	32	36	43	62	26	17	19	26	11	24	27	28
TOTAL	**310**	**360**	**354**	**328**	**228**	**224**	**225**	**224**	**169**	**193**	**241**	**260**

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Annex VII

BELIZE

Legal and Institutional Framework

May 30, 1996

World Bank
Caribbean Division
Country Department III
Latin America and the Caribbean Region

Contents

Abbreviations

BAS	Belize Audubon Society
CEDS	Conservation and Environmental Data System
CHPA	Central Housing and Planning Authority
CITES	Convention on International Trade in Endangered Species
CZMTC	Coastal Zone Management Technical Committee
DOE	Department of Environment
EIA	Environmental Impact Assessment
FAO	United Nations Food and Agriculture Organization
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information System
LUA	Land Subdivision and Utilization Authority
MARPOL	International Convention for the Prevention of Pollution from Ships
NARMAP	Natural Resource Management and Protection Project
NEAC	National Environmental Appraisal Committee
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
ODA	Overseas Development Authority
PCB	Pesticides Control Board
PPSC	Physical Planning Sub-Committee
RWSSP	Rural Water Supply and Sanitation Programme
SDA	Special Development Area
SWMA	Solid Waste Management Authority
USAID	U.S. Agency for International Development
WASA	Water and Sewerage Authority

1 Legal/regulatory framework

Overview

Belize has developed a substantial body of laws and implementing regulations addressing specific aspects of environmental protection and natural resources management (see Table 1.1). However, much of this legislation is now dated and does not reflect the most recent advances in environmental legislation in terms of resources management concepts, economic incentives, regulatory controls, and enforcement tools. Moreover, in many cases, the necessary implementing legislation and regulations have not been established, thus hampering effective implementation and enforcement of the laws. For example, the basic forestry and fisheries legislation dates from before Belize's independence. Additionally, the Public Health Act provisions applicable to pollution control were enacted in 1983, yet no implementing regulations have ever been adopted.

Recently, however, the legal/regulatory framework for environmental management in Belize has been undergoing significant change. A new comprehensive environmental protection law, the Environmental Protection Act of 1992, went into effect at the beginning of 1993, and the implementing regulations for certain provisions of the law have been developed. In addition, a number of the existing natural resources management laws and regulations have undergone extensive review and important revisions have been prepared. These laws and regulations, which are aimed at modernization of the legal/regulatory framework for environmental management in Belize, are evidence of the Government's renewed commitment to ensuring sustainable management of natural resources and environmental protection for the country.

Section I of this paper analyzes the major environmental protection, natural resources management, and land-use planning laws of Belize. This analysis assesses the various strengths and weaknesses of the legislation and implementing regulations, and recommends specific measures for consideration by Government in completing the legal/regulatory framework. Section II evaluates the implementation and enforcement of this legislation in the context of the analysis of the institutional arrangements for environmental management in Belize.

Environmental protection laws

Until enactment of the Environmental Protection Act in 1992, Belize had no comprehensive environmental protection legislation. Authority to prevent and control environmental pollution was contained in provisions of the Public Health Act, the Pesticides Control Act, and the older Dumping at Sea and Water and Sewerage Acts. However, these Acts were never effectively used to provide environmental protection because implementing regulations, e.g., establishing environmental quality criteria and pollution control standards, were never put in place and, therefore, could not be enforced.

For this reason, the most significant advance in the environmental laws of Belize is the enactment in 1992 of the Environmental Protection Act. This basic enabling legislation provides the Government for the first time with the comprehensive environmental protection authority it needs to address modern environmental pollution problems. The Act establishes the Department of Environment (DOE) and grants it broad regulatory and enforcement authority for prevention and control of environmental pollution, conservation and management of natural resources, and

environmental impact assessment (EIA). The Act took effect in January 1993, since that time the Department of Environment has undertaken the measures necessary to ensure its effective implementation, including preparation of necessary implementing regulations, recruitment and training of additional environmental officers and inspectors, and establishment of essential administrative procedures.

The first implementing regulations prepared under this Act by the Department of Environment were the Procedures for the Preparation of an Environmental Impact Assessment (June 1994) and the Environmental Impact Assessment Regulations (1995), prescribing the types of projects, programs, and activities for which an EIA is required, the contents of an EIA, and the procedures, including public participation, for EIA preparation, review, and approval. The procedures specify that the EIA requirements apply 'both to private sector as well as to Government and non-governmental agencies." The regulations establish a National Environmental Appraisal Committee (NEAC), with broad inter-ministerial and NGO participation, to review EIAs and advise the DOE of their adequacy. To date, the procedures have been applied in a significant number of cases. Effluent Limitation Regulations (1995) and Pollution Regulations (1996) have now been promulgated. In addition, hazardous waste regulations and various environmental codes have also been prepared. These regulatory activities have been supported with technical assistance from the USAID under its on-going Natural Resource Management and Protection (NARMAP) Project.

In addition to the broad regulatory authority, the Act also provides the Department of Environment with significant investigation, inspection, and enforcement authorities. In fact, the Act contains substantial penalties for violation of pollution control and EIA requirements, e.g., up to BZ$25,000, two years imprisonment or both. Furthermore, in any conviction for an offense under the Act, the court is authorized to order the offender to take remedial action with respect to the harm caused to the environment, and any person who may suffer loss or damage as a result of an offense may bring a civil action against the offender. These are among the most modern concepts in environmental legislation and provide significant deterrent effect to would-be violators, over and above traditional penalty provisions.

The Act, however, does not appear to provide authority for the imposition of penalties without resort to court action, i.e., administrative penalty procedures like those provided in the Littering Offenses Regulations of 1991. Because historically environmental crimes have been given low priority for prosecution in court in Belize, this may pose problems for effective use of the penalty authorities of the Act. If the traditional imposition of penalties does present difficulties, the Government may wish to amend the Act to provide specific administrative authority for penalties or consider the establishment of a court of special jurisdiction for the consideration of environmental cases. Finally, the Act provides no authority for the use of economic or market-based incentives to promote environmental protection, e.g., pollution fees or taxes. Pollution taxes, licensing fees, and marketable pollution rights are increasingly used in modern environmental legislation to introduce market-based incentives into pollution prevention and control programs.

Table 1.1. Belize: Principal Environmental Laws and Regulations

Environmental Protection Laws	*Date*	*Authority*	*Regulations*
Environmental Protection Act	1992	Establishes Department of Environment, provides authority for environmental protection, management of natural resources, and environmental impact assessment (EIA)	EIA Procedures prepared; EIA regulations, effluent regulations and pollution regulations adopted; hazardous waste regulations drafted
Public Health Act	1983	Provides authority to prevent, control and reduce pollution of air, soil, or water	Removal of Refuse Bylaws, Privy Accommodation By-laws
Pesticides Control Act	1985	Provides authority to control manufacture, importation, sale, storage and use of pesticides	Registered and Restricted Pesticides Regulations
Dumping at Sea Act	1974	Prohibits dumping of substances at sea by vessels	None
Water and Sewerage Act	1971	Provides authority for provision and protection of public water supply and maintenance of sewerage systems	Contamination of Water Supply by-laws
Solid Waste Management Authority Act	1991	Establishes Solid Waste Management Authority and provides authority for regulating solid waste management	None
Natural Resources Management Laws			
Forest Act	1958	Provides authority for establishment of forest reserves and regulation of forest resources	Forest Rules, Protection of Trees and Mangroves Regulations
National Parks System Act	1981	Provides authority for preservation and protection of natural and cultural features	None
Wildlife Protection Act	1981	Provides authority for conservation and management of wildlife	Wildlife Protection Regulations
Ancient Monuments and Antiquities Act	1972	Provides authority for preservation of the cultural heritage of Belize	None
Fisheries Act	1948 1958	Provides authority for management and protection of fisheries and designation of marine reserves	Fisheries Regulations, Marine Reserve Orders, Regulations
Mines and Minerals Act	1988	Provides authority for development of mineral resources and protection of the environment	Mines and Minerals Regulations (General),Mines and Minerals (Health, Safety and Environmental)) Regulations
Petroleum Act	1991	Provides authority for exploration and development of petroleum resources	Petroleum Regulations
Land-Use Planning Laws			
Land Utilization Act	1981	Provides authority for land-use planning in private lands	None
National Lands Act	1992	Provides authority for allocation of national lands, requires EIA for leases of more than 500 acres	National Lands Rules (in draft)
Housing and Town Planning Act	1947	Provides authority for executing urban planning schemes	None

The Department of Environment has prepared major amendments to the Environmental Protection Act, significantly expanding the scope of its regulatory powers and including fiscal and economic incentives for pollution control. Among other things, these amendments would make it

clear that the Act is binding on the Government, increase the levels of fines and sanctions (including stop orders) in the Act, and authorize the Department of Environment to charge fees for permits, licenses and applications. These amendments are expected to be approved by Cabinet in 1996.

A 1983 amendment to the Public Health Act had provided the earliest general regulatory authority for pollution control. This amendment grants the Minister of Health broad authority to make regulations for the "prevention, control, or reduction of pollution or contamination of the air, soil, or water caused by any activity or condition resulting in the emission of a pollutant or contaminant into the environment." The Act authorizes substantial penalties for violation of regulations established under these provisions, i.e., BZ$10,000 or six months imprisonment, and BZ$1,000 per day for a continuing violation as long as the violation continues. It also allows the Government to recover expenses incurred in taking measures to prevent, control, or to reduce pollution, and to order closure of any entity causing such pollution or contamination. Because implementing regulations for this authority have never been established, however, the Public Health Act has not been used effectively for environmental pollution control. For this reason, the new pollution control authority has been clearly specified for enforcement by the Department of Environment in the Environmental Protection Act. The authority and mandate of the Department of Environment have been further strengthened by the recent promulgation of the Pollution Regulations.

The Pesticides Control Act of 1985 provides authority to control the manufacture, importation, sale, storage and use of pesticides. The Pesticides Control Board (PCB) established by the Act carries out this authority. To date, however, only pesticides registration and restricted use regulations have been completed. The PCB has not developed regulations addressing proper handling and use of pesticides, nor requirements for proper storage and disposal. The Act itself identifies specific pesticides that are restricted or prohibited from use in Belize, following the actions taken on pesticides by the U.S. Environmental Protection Agency. The Act provides sufficient authority for enforcement of its provisions, authorizing a penalty for violation of the act or regulations of BZ$1,000 and/or one year imprisonment. However, prosecution of violations can only occur with the consent of the Director of Public Prosecutions, which has an inhibiting effect on full enforcement of the Act's requirements. In 1992, USAID performed a review of the PCB's implementation of the Pesticides Control Act. The review recommends additional regulations addressing labeling, packaging, transportation, use and disposal of pesticides. It also recommends that the PCB charge fees for registration, licensing, and import permits to cover the costs of these activities. Regulations dealing with the labeling, storage, transport, unloading, manufacturing, repackaging, certification of applications and sale of pesticides have recently been adopted by the PCB.

The Dumping at Sea Act of 1974, which appears to have followed British ratification of the International Convention for the Prevention of Pollution from Ships (MARPOL) in 1973, provides specific protection to the marine environment, prohibiting the dumping of substances or articles at sea by vessels used for that purpose. An exception from this prohibition is made for discharges incidental to the normal operation of a vessel. This exception may be unnecessary and should be removed given the importance of the barrier reef to the coastal ecosystem. Enforcement of the Act is supported by penalties of BZ$400 and/or imprisonment for six months. This act is superseded by the prohibition on dumping provisions of Part IV of the Environmental Protection

Act, which prohibits dumping of garbage, refuse, toxic substances or hazardous wastes. Although these provisions also retain the exception for dumping incidental to the normal operation of a vessel, they significantly improve on the previous Act by expanding its applicability to include vessels registered in other countries, by addressing other serious sources of marine pollution, e.g., land-based pollution and transportation of hazardous substances, and by expanding enforcement authorities and increasing the penalties for violation of the Act, i.e., BZ$25,000 or two years of imprisonment, or both.

The Water and Sewerage Act of 1971 affords basic protection to the fresh water resources of Belize. The Act established the Water and Sewerage Authority (WASA) to manage provision and protection of public water supplies and provide for maintenance of sewerage systems. The Act vests all water supply areas in WASA and authorizes WASA to make by-laws or regulations to prevent waste of water resources, contamination of water supplies, and pollution of surface or ground water. The Act specifically prohibits the pollution of any well, spring or water source, with the exception of contamination from cultivation in accordance with principles of good husbandry. Pursuant to the Act, WASA completed by-laws for the protection of water supplies in 1978. As for sewerage, the Act charges WASA with responsibility for maintenance of public sewerage systems and WASA completed the Water and Sewerage (Plumbing) Code for the treatment and disposal of wastes detrimental to public sewer systems in 1982. In addition, the Act authorizes WASA to require sewerage connections in areas where sewerage systems have been built, but WASA has to date failed to implement this authority.

The Solid Waste Management Authority Act of 1991 establishes an independent Solid Waste Management Authority (SWMA) with broad powers to provide for collection and disposal of solid waste in accordance with regulations established by the Minister. The SWMA has the authority to declare service areas, arrange for collection and disposal services (including the use of contractors) for those areas, and explore available recycling alternatives. The Act makes collection mandatory in declared service areas, except for large commercial establishments excepted by the Minister. The Minister is granted broad authority to make regulations governing solid waste management, including requirements for cost recovery. The Act, in conjunction with the waste provisions of the Environmental Protection Act, appears to provide adequate authority to address solid waste management issues in Belize, but its effectiveness will depend on establishment of the SWMA and implementing regulations promoting waste minimization and recycling practices and specifying requirements for environmentally sound solid waste collection, storage, and disposal.

There is administrative enforcement authority provided for solid waste littering offenses under the Littering Offenses (Violation of Tickets) Regulations of 1991. The regulations, which implement the Summary Jurisdiction (Offenses) Act of 1980, authorize the police, health officers, and other officials to issue violation tickets for littering offenses which carry a fine of BZ$50. Pursuant to the regulations, the offender may simply pay the fine under administrative procedures or ask for a court hearing on the offense. Recent amendments to these regulations have increased the fine to BZ$500 and further decentralized authority for enforcement to local officials on City Councils and Town Boards.

Natural resources management laws

Belize has enacted a number of laws, many of them dating from the British colonial period, that address management of its natural resources. The principal laws are the Forest Act, the National Parks System Act, the Wildlife Protection Act, and the Fisheries Act, all of which have recently undergone extensive review and await revision in an effort to bring resource management laws up to date. Important new additions to the resource management laws are the Mines and Minerals Act and the Petroleum Act.

The Forest Act provides authority for establishment and administration of forest reserves on public lands, regulation of logging within such forest reserves and on private lands through a permit system, and protection of forest produce. Pursuant to the Act, the Forestry Department in the Ministry of Natural Resources has designated 48 forest reserves (e.g., Mango Creek, Commerce Bight Reserves), and promulgated implementing regulations (i.e., Forest Rules), to ensure proper forestry management and protection of forest resources. Among other things, the rules provide for forest licenses and permits to exploit forest produce; regulate such activities as squatting, cultivating and grazing in the forest reserves; and set minimum girth requirements for cutting various species and royalty amounts per cubic foot. The provisions of the Forest Rules requiring licenses to exploit forest produce could be effectively used to regulate biodiversity prospecting. However, this would require some revision to statutory provisions relating to the granting of such licenses (In addition, more comprehensive legislation would be necessary to fully implement the provisions of the Biodiversity Convention.).

Of particular significance are the Forest (Protection of Mangroves) Regulations of 1989, which recognize the importance of mangroves to the coastal ecosystem of Belize and establish a permit system for cutting mangroves, on both public and private land, to ensure proper protection. The regulations limit the Department's authority to grant a permit to alter mangroves where the action will change water quality or will not be beneficial or in the interest of the people of Belize. Pending amendments to these regulations would increase the level of fines for violation of these requirements. These regulations may serve as a model for other jurisdictions in the Caribbean region. Although the Forest Act contains adequate penalty authority, i.e., BZ$1,000 or one year imprisonment, or both, for violation of substantive requirements, the arrest and search and seizure powers of forest officers need to be more clearly specified for effective enforcement. The Act also provides some reward incentive for assisting in enforcement by authorizing the court to award up to half of the penalty imposed for a forest violation to the person supplying the information leading to the conviction. The Government may wish to consider establishing a similar incentive to assist in enforcement of the Environmental Protection Act. Furthermore, the Act preserves any civil right of action against the offender.

Additionally, the Private Forests (Conservation) Act extends the protection given to forest resources to forests on private lands. Under this Act, the permission of the Chief Forest Officer is required before cutting any tree on any land in Belize. Trees cut illegally may be seized and forfeited, and the violator may be liable for a BZ$100 fine and/or six months imprisonment.

The National Parks System Act of 1981 provides authority for the establishment and maintenance of terrestrial national parks and protected areas for the preservation and protection of important natural and cultural resources. The Act authorizes the Minister of Natural Resources to designate by order four types of protected areas: national parks (e.g., Guanacaste, Laughing Bird

Caye, Chiquibul), nature reserves (e.g., Bladen Beach, Burden Canal), wildlife sanctuaries (e.g., Crooked Tree, Cockscomb Basin), and natural monuments (e.g., Halfmoon Caye). The Act provides the Minister broad authority to regulate the scientific, educational, and recreational use of these areas. However, the Act also authorizes the Minister to withdraw by order the protected status of an area, which ultimately leaves protected areas insecure and undermines any long-term planning or funding for such reserves. The Chief Forest Officer administers the Act and is charged with preparing a management plan for each of the areas. The Act requires a permit and payment of a fee to enter a national park, and prohibits such activities as residing, building, hunting, polluting, clearing land, and grazing livestock in protected areas. The Act also authorizes the Minister to make regulations for management and protection of protected areas and provides extensive enforcement authority, including search, seizure, and arrest powers, to designated park officers. To date, a number of areas have been designated protected areas, however no implementing regulations have been issued under the Act.

The Wildlife Protection Act of 1981 provides authority for the conservation and management of terrestrial wildlife. Administered by the Ministry of Natural Resources, the Act places strict controls on hunting specified animal and bird species, establishes hunting seasons for other species, and requires licenses and payment of royalties for hunting. Additionally, the export of wild animals is closely regulated through licenses for dealers, and the Act currently places a moratorium on commercial dealers. The Act prohibits hunting in game reserves and forest reserves and proscribes certain inhumane methods of handling animals and birds. Enforcement of the Act is the responsibility of the Game Warden and game rangers, who have powers of search, seizure, and arrest. The Act authorizes penalties of BZ$500 and/or imprisonment for six months or both for violation of the regulations. Wildlife Protection Regulations adopted pursuant to the Act limit the hunting season for various animals, prohibit the use of artificial light when hunting animals, and set license fees for hunting. These provisions need to be integrated with the requirements of the Biodiversity Convention, to which Belize has recently become a party.

The Forest Act, the National Parks System Act, and the Wildlife Protection Act have undergone a careful review with assistance from the British Overseas Development Administration (ODA) Forest Planning and Management Project. The May 1993 report of the forest legislation consultant identifies a number of areas for improving these natural resources management statutes, including consolidating and modernizing the Forest Act to eliminate the plethora of statutes relating to forestry, minimizing overlapping responsibilities among Government resource management agencies, and clarifying the enforcement powers of forest officers. Significantly, the report also recommends qualifying ministerial authority to de-reserve protected areas and providing a coherent overall policy framework to natural resources management in Belize. The consultant's proposals for revised legislation were completed in 1993 and submitted to the Ministry of Natural Resources. There have been extensive consultations on the draft legislation since 1993. At this point, the Government of Belize should act on this revised legislation so that new regulations reflecting the legislative revisions can be adopted and implemented as soon as possible.

In addition, the Government of Belize adopted the Protected Area Conservation Trust Act in 1995, which establishes a trust fund to provide funds to "operate, maintain and enhance protected areas for their conservation and visitor enjoyment." Under the Act, revenues for the trust fund would be derived from a "conservation fee" charged to all airline and cruise ship

passengers arriving in Belize, a percentage of fees collected in protected areas, and donations. The Protected Area Conservation Trust (PACT) represents a major advance in securing sustainable financing for resource conservation and environmental protection efforts in Belize. The Government, which has already prepared an operational plan for the PACT and plans to appoint its board in 1996, should move rapidly to implement this new legislation.

The Ancient Monuments and Antiquities Act provides authority for preservation of the cultural resources and archeological heritage of Belize. The Act defines ancient monuments and antiquities and vests their ownership in the Government of Belize. To protect them, the Act prohibits ownership except under license from the Government and prohibits the import, export, sale or trade in ancient monuments or antiquities without a license. The Archaeological Commissioner in the Ministry of Tourism and the Environment administers the Act and has enforcement powers of search and seizure. Penalties for violation of provisions of the Act are BZ$1,000 or one year imprisonment or both. The Act also authorizes the Minister to designate Archaeological Reserves to be open to the public upon payment of an entry fee.

The Fisheries Act, first adopted in 1948 and revised in 1958, provides basic authority for the management and protection of the inland and coastal fisheries resources of Belize. Pursuant to the Act, the Fisheries Department of the Ministry of Agriculture and Fisheries established Fisheries Regulations in 1977 controlling the minimum size of fish that may be taken, the means of taking fish, and the seasons and areas in which fish may be taken. Fishing licenses are required for both commercial and scientific and research operations and licenses are required for the export of fish. License fees for commercial fishermen remain remarkably low (e.g., BZ$2.00) given the profitability of fishing in Belize and the cost of protecting fisheries resources. The Act provides broad enforcement authorities, including the appointment of Fishery Officers with enforcement powers to stop, board, and search boats suspected of illegal fishing; arrest persons caught violating the law; and remove and detain fishing nets and other equipment used in violation of the law. The penalties imposed for violation of the law are also remarkably low, typically a BZ$500 fine or imprisonment of six months.

The Fisheries Act was amended in 1983 to provide authority for the Minister to designate, by order, marine reserves for special conservation of marine flora and fauna, preservation of fish breeding ground and habitat, and promotion of scientific study. Under this authority, the Fisheries Department established the Hol Chan Marine Reserve in May 1987, a five square-mile area comprising coral reefs, seagrass beds, and mangroves. Regulations governing the Hol Chan Reserve, published in 1988, require visitors to obtain tickets, regulate boating in the reserve, prohibit the discharge of wastes, and proscribe fishing in the reserve without a license. Penalties for violation of marine reserve regulations are set at BZ$1,000 or six months imprisonment, or both. A second marine reserve, Glovers Reef, was designated in March 1993.

The existing fisheries legislation and its implementing regulations have undergone extensive review with assistance from the UN Food and Agriculture Organization (FAO). Among other things, the proposed legislative revisions will address extending the Act's jurisdiction to deep sea fishing off the coast of Belize, raising the fees charged for fishing licenses (e.g., from BZ$2.00 to BZ$25.00 for fishermen, BZ$25.00-$5,000 for fishing boats) to better reflect the value of the resource, and increasing the penalties for violations of the Act and regulations. As in the case of the terrestrial resource legislation, the Government should act on the proposed revisions to the

fisheries legislation so that revised fisheries regulations may be adopted and implemented as soon as possible.

The Mines and Minerals Act of 1988 contains express and extensive authority for protection of the environment. Part VII of the Act requires that the Minister, in deciding whether to grant a mineral right, take into account the need to preserve and protect natural and cultural resources on the land over which the right is sought. Further, the Minister may require that environmental impact studies be performed before granting a mineral right. In addition, the Minister may include in any mining license granted conditions concerning prevention of pollution, minimization of adverse mining impacts on adjoining areas and their inhabitants, and revegetation or reclamation of damaged land. Such reclamation may include leveling, regrassing, or reforesting the damaged area, as well as filling in, sealing, or fencing excavations, shafts, or tunnels. To ensure that such conditions are met in a license, the Minister may require financial security for performance of the conditions. Failure to reclaim damaged land at the direction of the Minister may result in a penalty of BZ$10,000 or imprisonment of three years, or both (or BZ$25,000 in the case of a corporation). Furthermore, the Act authorizes the Minister to take such measures necessary for reclamation of damaged land and to recover the costs for these measures from the miner through court action. The broad environmental provisions in the Mines and Minerals Act are model precedents for mining legislation. To implement these authorities, the Minister adopted the Mines and Minerals (Safety, Health and Environmental) Regulations in 1994.

The Petroleum Act of 1991 governs the exploration, development, and production of petroleum resources in Belize and vests all rights to such resources in the Government. The Inspector of Petroleum in the Ministry of Natural Resources administers the Act and is required to ensure that petroleum operations protect the flora, fauna, and other natural resources and prevent pollution of water resources. Under the Act, the Minister may close areas to petroleum operations and impose conditions on operations near ancient monuments or antiquities. The Petroleum Regulations, promulgated pursuant to the Act in 1992, require that a petroleum operator submit an environmental impact statement and an environmental protection plan for the operations prior to commencement of development and production operations. In addition, the Act requires the Minister to appoint an environmental pollution control board in order to ensure that all petroleum operations comply with the requirements of environmental standards and the relevant laws of Belize. This latter requirement seems unnecessary with the creation of the Department of Environment to perform these environmental monitoring functions.

Land use planning laws

Several laws govern land-use planning in Belize, including the Land Utilization Act, the National Lands Act, and the Housing and Town Planning Act. Although these laws provide sufficient authority to ensure rational land allocation and land-use planning, it is widely recognized that land allocation and planning under current implementation of these laws remain problematic in Belize.

The Land Utilization Act of 1981 provides the primary authority for land- use planning in Belize. The Act requires that government approval be obtained before any parcel of land can be subdivided and provides general authority to regulate land use in order to protect watersheds, prevent soil erosion, control clearing of forest, and regulate the type of development permitted in

designated areas. This is accomplished through the Land Subdivision and Utilization Authority (LUA) established under the Act, which is required to approve the subdivision of any property for development purposes. However, the LUA's authority is hindered by the fact that there are no policies or rules governing implementation of the Act. For example, provisions of the Act suggest that the LUA may request an EIA or information similar to an EIA from an applicant for a proposed subdivision. To date, however, the LUA has not established a policy or rules governing such request. Pursuant to the Act, the LUA may establish Special Development Areas (SDAs) for the purpose of placing special planning controls on development in areas of particular environmental concern, e.g., watersheds, coastal areas. The LUA may prepare a Development Plan for each SDA to specify types of land use within the area. Actual implementation of the Development Plan may be delegated to an appropriate local authority, e.g., the Village Council. The SDAs represent the most effective effort to incorporate environmental considerations into rural development planning, but they have not always proved to be successful. Under current law, the Department of Environment is not an official member of the LUA but is invited to participate in LUA decision-making. It is not clear under this arrangement, however, that the Department's environmental concerns in land use planning are fully incorporated into the land use decisions of the LUA.

A draft Land Utilization Act, under consideration since 1993, would repeal the existing legislation and make several significant changes in current land use planning law. For example, the draft Act applies to all private land in Belize, not simply land outside of cities and towns. Significantly, the draft Act establishes a new Land Utilization Authority (LUA) with expanded membership, including the Chief Environmental Officer among others. Most importantly, the draft Act authorizes the LUA to require an applicant for subdivision of land to submit an EIA approved by the Department of Environment, together with the means intended to avoid any negative impacts identified in the EIA. Finally, the draft Act requires that Development Plans specifying land use be prepared for all SDAs. All of these changes in the land-use law are improvements from the perspective of environmental land-use planning and should be given serious consideration by the Government. Furthermore, consideration should be given to expanding the scope of the LUA to cover public as well as private lands.

The National Lands Act of 1992 controls the allocation of state lands by lease or sale to private ownership. These state lands comprise the majority of the land in Belize, including cayes and sea beds. The Commissioner of Lands and Surveys in the Ministry of Natural Resources administers the Act, with assistance from an Advisory Committee and local committees appointed by the Minister. Under current practice, an applicant may first obtain a long-term lease for national land, then, after making sufficient improvements to the land, may purchase it outright. The Act reserves to the Government all mineral and timber rights in lands allocated in this way. The Act imposes in every lease certain environmental terms and conditions, specifically:

- barring the use of steep land where there is risk of erosion or ecological damage;
- requiring compensation for damage to land resulting from willful or negligent acts; and
- leaving a 66 foot wide strip in its natural state on any land adjoining a running stream, river, or open water.

The Act also requires an EIA for leases of 500 acres or more, and grants the Minister discretion to require an EIA for leases of less than 500 acres. It does not appear, however, that this authority has been carefully enforced by the Commissioner of Lands and Surveys. In fact, there is concern that in some instances land allocation has not fully taken into consideration environmental issues. For example, in some instances lands in forest reserves have been leased for agricultural production without appropriate consultation with the Forest Department, a practice which is clearly in conflict with the provisions of the Forest Act.

The Housing and Town Planning Act of 1947 provides authority for urban planning, to the extent that it exists in Belize. The Act established the Central Housing and Planning Authority (CHPA) for the purpose of executing and enforcing urban planning schemes, which have been prepared for Dangriga, Corozal, Ambergris Caye, and Belize City. Such developmental schemes are intended to address typical urban planning concerns:

- zoning of land for specific purposes;
- provision of views and prospects;
- preservation of buildings and objects of artistic or national interest;
- protection of forests; and
- regulation of waste disposal.

Currently, the CHPA does not exercise control over the major subdivisions being developed in rural areas of the country. However, in view of the accelerating growth in this type of rural development, the CHPA not the LUA should exercise authority over these subdivisions as they will rapidly become urban settlements.

The lack of implementing legislation, regulations, and orders has severely hampered effective implementation of the Act. The fact that the Department of the Environment does not participate in the CHPA is also an impediment to ensuring that environmental considerations are taken into account in town planning. Finally, in terms of enforcement, the penalties for violation of the Act, i.e., BZ$100, are woefully inadequate.

International treaties and conventions

Belize has been since 1981 party to the Convention on International Trade in Endangered Species (CITES), which is critical to preservation of wildlife within the country. More recently, Belize ratified the Climate Change Convention and the Convention on Biological Diversity, and in July 1995 Belize signed the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78). However, Belize is not party to a number of international treaties and conventions dealing with environmental management which are of particular relevance to Belize (see Table 1.2). The Government should consider acceding to other significant environmental conventions, particularly the Convention Concerning the Protection of the World Cultural and Natural Heritage, the Ramsar Convention on Wetlands of International Importance, the International Tropical Timber Agreement, the Cartagena Convention (Convention for the Protection and Development of the Marine Environment in the Wider Caribbean), and its various Protocols (Cooperation in Combating Oil Spills in the Wider Caribbean, Specially Protected Areas and Wildlife). In addition, with the recent concern regarding

the importation of hazardous waste for treatment and disposal, Belize should sign the Basel Convention dealing with this issue.

Table 1.2. Environmental Treaties and Conventions

Treaty/Convention	Coverage
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington, 1973)	Protection of certain endangered species from over-exploitation
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)	Protection of world cultural and natural heritage sites
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971)	Protection of significant wetlands
International Tropical Timber Agreement (Geneva, 1983)	Sustainable utilization and conservation of tropical forests and their genetic resources
Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena, 1983)	Protection and management of marine environment and coastal areas of the Wider Caribbean region
Protocol Concerning Cooperation in Combating Oil Spills in the Wider Caribbean Region (Cartagena, 1983)	Prevention and control of oil spills in the Caribbean
Protocol Concerning Specially Protected Areas and Wildlife (SPAW) (Kingston, 1990)	Research, assessment, management of protected areas and wildlife in the Caribbean
International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78) (London, 1973)	Regulation of ship-generated pollution, including oil, hazardous substances, sewage, and garbage

Conclusion

Belize is well on its way to developing a sound legal/regulatory framework for environmental planning and protection and natural resources management. Enactment of the Environmental Protection Act and promulgation of key implementing regulations has given the Government the comprehensive framework it needed to address unchecked pollution control issues and to use environmental impact assessment in order to ensure environmentally sound development planning. Current modernization efforts for the various resource management laws will provide a solid legal base for protecting the resources of Belize, with the possible exception of the barrier reef. This exceptional resource may warrant special legislative attention. Finally, the proposed revisions to the basic land use legislation will address most of the environmental concerns with the current planning legal framework.

However, the legal/regulatory picture is far from complete in Belize. The primary impediment to an effective legal framework has been the lack of implementing legislation, orders, and regulations necessary to facilitate effective implementation and enforcement of the environmental legislation. A number of the environmental laws of Belize continue to have no implementing regulations. It is difficult to implement and enforce even the best environmental legislation effectively without the benefit of a set of well defined standards, clearly identified requirements, and specifically prohibited actions. The outstanding exception to this rule is the Environmental Protection Act, where early progress in implementation and enforcement has been

remarkable and efforts at encouraging voluntary compliance and raising public awareness have shown results. With respect to natural resources management, much work has already been done on revising and updating the resources management legislation. What remains to be done is action on adopting and implementing these proposed revisions. Finally, some work on legislative measures to clarify existing legislation needs to be undertaken in order to avoid any confusion of authority and responsibilities in environmental management.

Recommendations

Over the next three years, the Government should complete the legal/regulatory framework for environmental management. In the next year, the Government should finish ongoing legal/regulatory work by:

- enacting the draft Environmental Protection (Amendment) Act;
- issuing hazardous waste management (including importation of waste) regulations under the Environmental Protection Act;
- finalizing solid waste management regulations specifying standards for collection and disposal facilities under the Solid Waste Management Authority Act;
- enacting the proposed revisions to the Forest Act, Fisheries Act, National Parks System Act, and Wildlife Protection Act; and
- enacting the proposed Land Utilization Act and issuing implementing regulations.

Over the next three years, the Government should address the significant areas where legal/regulatory gaps remain by:

- enacting legislation for the preservation and protection of the barrier reef; and
- clarifying authorities and responsibilities in existing legislation for environmental management.

Over the next two years, the Government should perform studies on:

- methods for incorporating incentives, similar to the reward incentive currently in the Forest Act, to encourage citizen participation in enforcement of environmental requirements;
- alternatives to the traditional court system of enforcement for environmental violations, including authority for administrative imposition of penalties and establishment of a new court with special jurisdiction over environmental matters; and
- assessment of the success of voluntary compliance efforts and mechanisms for improving voluntary compliance.

2 *Environmental institutions*

Overview

Authority for environmental management in Belize is shared by a number of ministries, departments, quasi-governmental authorities, and non-governmental institutions. The portfolio for environment now rests with the Ministry of Tourism and the Environment, but major environmental responsibilities are also held by the Ministries of Health (e.g., water quality monitoring, solid waste management), Agriculture and Fisheries (e.g., fisheries, coastal zone management, pesticides control), and Natural Resources (e.g., forestry, national parks and protected areas, wildlife, water supply and sanitation, and land-use planning). Quasi-governmental statutory authorities, like the Water and Sewerage Authority, the Solid Waste Management Authority, and the Land Subdivision and Utilization Authority, were created to carry out specific responsibilities. Finally, several non-governmental organizations (NGOs) have taken over certain natural resources management functions for the Government of Belize.

This proliferation of institutions with environmental responsibilities gives rise to a number of implementation problems. For example, the current lack of clearly delineated roles and responsibilities results in unnecessary confusion and wasteful duplication of effort. Inter-ministerial coordination on environmental matters has not been fully institutionalized and needs improvement. The current basis for resource allocation among institutions is not clear, and financial resources and technical capacity remain a problem. Section II provides a brief analysis of the institutional organization for environmental management in Belize, an evaluation of the overall performance of these environmental institutions, and identification of the primary implementation issues that arise.

Institutional organization for environmental management

As in most countries, environmental management in Belize is performed by a number of Government institutions, quasi-governmental bodies, and NGOs. These institutions are organized, for the most part, along the traditional sector lines (e.g., health, agriculture, natural resources), with little or no opportunity for formal cross-sectoral communication and coordination. The exception to this rule is the newly established Department of Environment, which is specifically charged with fostering cross-sectoral collaboration. Table 2.1 contains an organization chart showing these various institutions with environmental management responsibilities. A brief description of each institution and its environmental management functions follows.

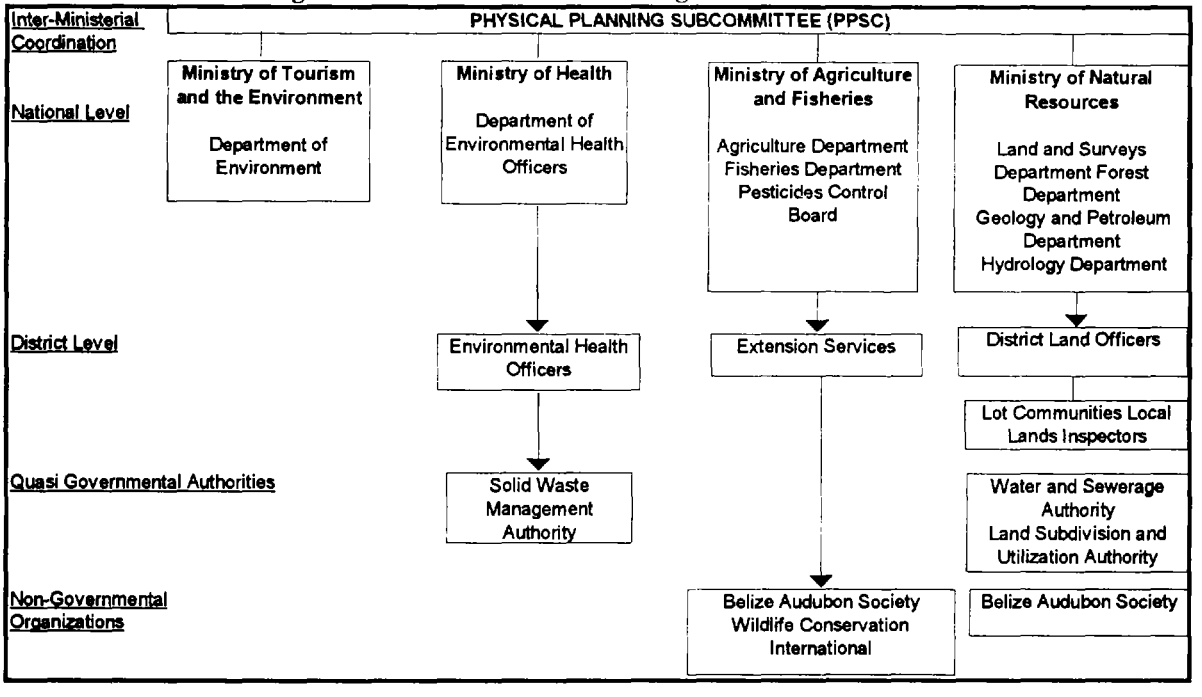
Ministries of government

Five primary ministries and their various departments are responsible at the national level for environmental management. These are the Ministry of Tourism and the Environment, the Ministry of Health and Sports, the Ministry of Agriculture and Fisheries, the Ministry of Natural Resources, and the Ministry of Science, Technology and Transport. Several of the ministries have counterpart institutions that carry out their environmental functions at the district and local levels.

Ministry of Tourism and the Environment. The portfolio for environment is now in the Ministry of Tourism and the Environment, which was created in 1989. Within the Ministry, the

Department of Environment has as its mission fostering, through inter-ministerial cooperation, the prudent use and proper management of the natural resources of Belize, the control of pollution of the natural environment, and the re-establishment of ecological equilibrium. With enactment of the Environmental Protection Act, the Department was given a specific legislative mandate and the necessary statutory authority to ensure environmental protection. Its functions, therefore, now include monitoring and enforcing pollution control standards, advising on planning and natural resources management, and reviewing EIAs submitted for development activities. The Department is headed by a Chief Environmental Officer, who currently has a staff of one Senior Environmental Officer, two Environmental Officers, three Environmental Technicians and one Data Management Technician. The Department's Five Year Staffing Plan (1996-2000) envisages a professional staff of 14 below the Chief Environmental Officer, organized into three units, i.e., a Monitoring Unit, a Public Awareness Unit, and a Project Evaluation Unit, each headed by an Environmental Officer and supported by three Environmental Technicians. The Department currently has in operation the Monitoring and Project Evaluation Units.

Table 2.1: Institutional Organization for Environmental Management



Ministry of Health and Sports. The Ministry of Health and Sports manages its environmental responsibilities through its Public Health Bureau. The Bureau is responsible for implementing the environmental health and pollution control authorities of the Public Health Act. Since enactment of the Environmental Protection Act, however, the Department of Environment has taken the lead on pollution control. The Bureau's functions include abating environment-related diseases (e.g., malaria, cholera, and gastroenteritis), monitoring drinking water quality, and overseeing liquid waste management and solid waste collection and disposal. The Bureau is headed by the Principal Public Health Inspector, who has three Senior Public Health Inspectors and a Public Health Inspector in each of the country's health districts. These inspectors perform inspections, carry out monitoring, and take enforcement actions for violations of Public Health Act requirements. The Bureau has its own Water Quality Laboratory with two Water Analysts for carrying out water quality monitoring responsibilities.

Ministry of Agriculture and Fisheries. The Ministry of Agriculture and Fisheries has both resources management and pollution control responsibilities. The Agriculture Department is charged with implementing agriculture legislation to improve crop yields and farm land management, encourage productive animal husbandry, prevent soil erosion, and promote sound agricultural practices through extension services. The Department is headed by the Chief Technical Officer who has extension officers in each of the agricultural districts. These officers carry out the Department's routine work with farmers on properly handling pesticides, preventing soil erosion, and improving agricultural practices. The Fisheries Department is responsible for implementing the Fisheries Act and its implementing regulations. Its functions include management and conservation of fisheries resources, coastal zone management, and designation and management of marine reserves. The Department also oversees the GEF-funded Coastal Zone Management Project. The Department is headed by the Fisheries Administrator, who has a core staff of approximately 16 professionals, including a number of trained Fisheries Officers who enforce Fisheries Act requirements. Additional staff in the Department funded from non-governmental sources include five who manage the Hol Chan Marine Reserve and three who work at the Conch Mariculture Research Project. The Department is organized into three management units:

- the Conservation Compliance Unit, which is the enforcement arm of the Department;
- the Coastal Zone Management Unit, which manages the GEF-funded project to strengthen coastal zone management in Belize; and
- the Aquaculture Unit, which supports the newly emerging aquaculture fisheries.

The Pesticide Control Board (PCB) also comes under the Ministry of Agriculture. The PCB implements the Pesticide Control Act, regulating the registration and use of pesticides in Belize.

Ministry of Natural Resources. The Ministry of Natural Resources has major resource management responsibilities spread over five departments. The Lands and Survey Department is responsible for land-use planning, allocation, surveying, and management in its implementation of the National Lands Act and the Land Utilization Act. Its functions include physical planning, subdivision design, mapping, land valuation and taxation. The Department is headed by the Commissioner of Lands and Survey, who directs a staff that has been recently reduced by the decision to privatize some of the surveying functions. The Department's land allocation work is supported at the district level by District Lands Officers and at the local level by the local Lot Committee. The Forest Department is charged with administering the Forest Act, the National Parks System Act, and the Wildlife Act. The Department is organized into three functional divisions, i.e., Management, Research, and Utilization and Conservation, and two territorial divisions, i.e., Southern and Western; its responsibilities include management of the forest reserves, designation and management of parks and protected areas, and conservation of wildlife. It is headed by a Chief Forest Officer, who has a staff of 64, including trained Forest Officers, Park Administrators, and Game Rangers who enforce provisions of the various Acts. The Department is also supported by a number of NGOs in its management of certain protected areas.

The Hydrology Department, within which WASA operates, is charged with studying and protecting the water resources of Belize. WASA, with a current staff of about 200, is responsible

for the provision and proper use of water supplies and the construction and maintenance of sewerage systems in the country. In December 1995, the ministry's Rural Water Supply and Sanitation Programme (RWSSP) was closed. The area of service delivery most affected by the closure of this program was the maintenance of handpumps, which some villages depend on as their sole source of water supply. At present, responsibility for the provision of services in rural areas rests with WASA.

The Ministry of Science, Technology and Transport. The Ministry of Science, Technology and Transport also has important environmental management responsibilities. The Meteorology Office collects climatic data through its network of climatic data collection stations and tracks hurricanes by means of an advanced satellite information system. The National Hydrological Service is responsible for the collection and analysis of data on the quantity, quality, and variability of the country's water resources. It performs hydrological investigations for engineering and water resources projects and disseminates information on water resources. The Office of Geology and Petroleum oversees mineral and petroleum exploration and development in Belize, including dredging and filling operations, and implements the Mines and Minerals Act and the Petroleum Act. It is headed by an Inspector of Mines and Petroleum, who has a staff of 25 professionals.

Quasi-governmental authorities

Three statutorily created, quasi-governmental bodies also perform important environmental functions. The Water and Sewerage Authority (WASA), established by the Water and Sewerage Authority Act, is responsible for providing and protecting the drinking water supply for Belize and maintaining sewerage systems. WASA also performs water quality monitoring as one of its environmental functions. The Solid Waste Management Authority (SWMA), authorized in 1992 by the Solid Waste Management Authority Act, is a similar body charged with arranging solid waste collection and disposal services. The SWMA has yet to fully undertake its environmental management functions. The Land Subdivision and Utilization Authority (LUA), established by the Land Utilization Act, carries out land-use and development planning responsibilities for public and private lands in Belize.

Non-governmental organizations

A number of NGOs play active roles assisting the Government in Belize in environmental management and public education. The Belize Audubon Society (BAS), for example, manages seven wildlife reserves and bird sanctuaries for the Ministry of Natural Resources and assists the Fisheries Department in management of Half Moon Caye. BAS also plays an important role in educating the public on wildlife and habitat conservation, hunting laws, and the benefits of wildlife reserves and bird sanctuaries. Most of BAS's financial support comes from international conservation organizations. The Programme for Belize has assisted the Government in identifying and mapping critical ecological zones as protected areas. It also manages the 160,000 acre Rio Bravo Resource Management and Conservation Area as a tropical forest conservation and research center. The Belize Zoo and Tropical Education Center and Belize Center for Environmental Studies make significant contributions to environmental research, education and public awareness in Belize. In addition, a number of NGOs, including Wildlife Conservation International, Programme for Belize, Manomet, and World Wildlife Fund-US, provide direct funding to support environmental management and conservation positions in Government agencies.

Inter-ministerial institutions

The dispersion of authority for environmental management in Government necessitates the creation of inter-sectoral, inter-ministerial coordinating bodies to foster more fully integrated management of the environment. In the past, the principal inter-ministerial coordinating body was the Physical Planning Sub-Committee (PPSC). More recently, the Coastal Zone Management Technical Committee (CZMTC) has proved to be a more effective and enduring inter-ministerial coordinating institution.

Until it became dormant in 1993, the PPSC served to facilitate inter-ministerial, inter-sectoral communication and coordination on environmental management activities in Government. Chaired jointly by the Ministry of Tourism and the Environment and the Ministry of Economic Development, the Sub-Committee functioned as an advisory body to Government to ensure the environmental sustainability of economic development planning. It included all the relevant ministries with environmental management responsibilities and an NGO representative as well. As a purely advisory body without the administrative capacity to follow up on decisions, however, the Sub-Committee lacked the weight and authority to sustain itself. Although the Government has studied options for reinvigorating the PPSC, it appears unlikely that this will be the mechanism for effective inter-ministerial coordination on environment.

The CZMTC is an informal coordinating body established in 1991 and recognized by Cabinet. Chaired by the Fisheries Department, its membership includes the various Government agencies that have an interest in marine and coastal issues. The Technical Committee meets on a regular basis to consider applications for development in the coastal zone. It may decide to approve, approve with conditions, or reject such applications, and its decisions are passed on to the Land Subdivision and Utilization Authority and Cabinet. Although there is no requirement that the Technical Committee's decisions be followed or enforced, it appears that it functions effectively in incorporating environmental considerations into development decisions in the coastal zone.

Overall performance of environmental institutions

As is to be expected, the performance of Government institutions in carrying out their environmental management responsibilities and in implementing and enforcing the environmental laws varies considerably. To varying degrees, all the institutions lack the necessary financial resources and technical capacity to perform their functions effectively. These issues are discussed in more detail in the next section. However, putting these issues aside, the mature natural resources management institutions, i.e., the Fisheries and Forest Departments, appear to have done a more credible job of environmental management than the newer resource management, i.e., Office of Geology and Petroleum, and the traditional pollution control agencies, i.e., Ministry of Health and the Pesticides Control Board, at least in terms of issuing implementing regulations, preparing program management plans, and detecting and enforcing against non-compliance. This may be explained largely because these institutions benefit from longer practical experience, i.e., forest and fisheries management dates from the colonial period, and are based in significant economic sectors, i.e., forestry is 2%, fisheries 4-5% of GDP. The exception to this is the new Department of Environment, which has in a very short time made significant progress in establishing itself as a credible environmental institution.

Resources management institutions

The Fisheries and Forest Departments, despite limited financial resources and technical capacity, appear to be doing a credible job of environmental management. Both are headed by well-qualified public officials, who are supported by trained resources management officers and manage generally competent environmental programs for implementation and enforcement of their laws.

The Fisheries Department, for example, has issued both fisheries and marine reserve regulations for implementing the Fisheries Act and has prepared a draft Fisheries Management Plan for ensuring sustainable management of the fisheries sector in the future. The Conservation Compliance Unit is active in monitoring and detecting illegal fishing activities and brings approximately 30 fishing prosecutions annually. The Department is also notable for expanding its limited resources by means of donor-funded activities, as evidenced by the GEF-funded coastal resources project managed by the Coastal Zone Management Unit. The activities of this unit, in fact, may serve as a model for coastal zone management for other countries in the Caribbean. Finally, the Department participated actively in the review and revision of the Fisheries Act and fisheries regulations.

Similarly, the Forest Department has issued forest rules and tree protection regulations implementing the Forest Act, including mangrove protection regulations that are the best in the Caribbean, and wildlife protection regulations implementing the Wildlife Protection Act. The Department has not been as effective, however, in issuing regulations implementing the National Parks System Act. The Department is currently implementing a Mangrove Management Plan and is preparing Forest Management Plans for sustainable management of two of the country's 16 Forest Reserves, with the intention of completing plans for the others as well. The Department then will need to prepare similar management plans for national parks, protected areas, and wildlife management. The Department's Forest Officers are working to detect and enforce against noncompliance with forest regulations, but illegal logging in Forest Reserves and unpermitted mangrove cutting remain a problem. To maximize its limited resources, the Department utilizes extensive technical assistance from external sources to support its forest management program, e.g., ODA and U.S. AID, and to manage parks and protected areas, e.g., the Belize Audubon Society. With respect to the latter, the Department has entered into an agreement fully delegating management of six protected areas to the BAS, a singular example of delegating such authority to an NGO in the Caribbean. Finally, the Department worked closely with the external assistance provided to modernize its environmental legislation.

In contrast, the newly created Office of Geology and Petroleum appears less interested in ensuring environmental protection than in encouraging exploration and development of mineral and petroleum resources. The Department has issued environmental protection regulations implementing the Mines and Minerals Act and the Petroleum Act, but their actual impact has yet to be seen in practice, particularly with respect to mining activities in Belize which are much more extensive than petroleum exploration or development. Moreover, the Inspector of Mines has yet to use the authority provided by law to require environmental impact studies before granting a mineral right.

Environmental protection institutions

Belize is fortunate not to have suffered substantial environmental degradation from municipal, agricultural, or industrial pollutants. For this reason, pollution control does not have the history in Belize that natural resources management does, and this fact is reflected in the late development and weak performance of the pollution control institutions. The various institutions with authority to protect public health and the environment from pollution, the Ministry of Health, the Pesticides Control Board, and the Department of Environment, are just beginning to establish a credible pollution prevention and control program.

The Ministry of Health, for example, has had an Environmental Health Program for decades and, as part of a 1978 Caribbean Regional Strategy and Plan of Action for Environmental Health, targeted water supply, liquid waste and excreta disposal, solid waste disposal, industrial waste, pesticide use, and beach pollution for priority action. To support this Environmental Health Program, the Ministry was given specific authority to address environmental pollution in the 1983 amendment to the Public Health Act. The Ministry, however, does not appear to have taken any steps to implement or enforce the pollution control provisions. Because the Ministry never issued pollution control regulations implementing the provisions, Health Inspectors who discover pollution problems in the course of their inspections have been incapable of taking appropriate enforcement actions. With the Environmental Protection Act and its pollution regulations, however, the Department of Environment has assumed this enforcement authority.

Further, the Pesticides Control Board (PCB) has not used the statutory authority to control pesticide pollution given to it under the Pesticides Control Act. Although the PCB has issued pesticide registration and restriction regulations, it has stopped short of issuing regulations for proper pesticide handling, storage, and disposal that would ensure greater protection of public health and fragile ecosystems from pesticide residues. In addition, monitoring for pesticide residues in ground and surface water is virtually non-existent in Belize, so there are no data on the extent of pesticide contamination of these resources.

This picture is changing with implementation and enforcement of the new Environmental Protection Act by the Department of Environment. For the first time, the Government of Belize has an institution specifically charged with preventing and controlling environmental pollution, i.e., setting environmental quality criteria, establishing pollutant emission standards, issuing licenses for activities that may cause pollution, monitoring and enforcing compliance with environmental requirements. As noted above, the Department has made substantial progress in issuing the regulations necessary to implement and enforce the Act, including EIA procedures, effluent limitation and pollution regulations addressing air, water, noise, solid and hazardous waste management. In addition, to carry out its compliance monitoring and enforcement responsibilities under the Act, the Department has undertaken a number of activities to encourage voluntary compliance and to raise general awareness of environmental legislation and its requirements. These activities include preparing a Compendium of Environmental and Natural Resources Legislation, a Guide for Developers on environmental requirements and environmental codes of practice for various industries, conducting a workshop for judges, magistrates and prosecutors on environment enforcement, giving a course on the principles of environmental enforcement, and holding a seminar on environmental legislation for environmental enforcement officers.

Land use planning institutions

Land allocation and land-use planning by the Government are generally recognized to be problematic issues in Belize. Despite repeated efforts to regularize the land allocation and land-use planning process in implementing the National Lands and Land Utilization Acts, the Lands and Survey Department appears to fall victim far too often to external political and financial influence. In the extreme instance, land allocation decisions by the local Lot Committee may depend on the applicant's party affiliation or political activity. In another example, protected Forest Reserve land has been cleared for cultivation at the behest of politically connected or financially powerful agricultural interests. It appears that the ostensibly transparent process for rational land allocation and land-use decision-making is often short-circuited by direct appeal to the Minister. In such cases, the safeguards ensured by a transparent process are overpowered by patently political decision-making.

In principle, use of the new Geographic Information System (GIS) by the Lands and Survey Department should inform the land allocation and land-use decision-making process. However, the GIS is currently being used exclusively for tax valuation purposes, so it is not clear that it will have this intended effect. Furthermore, the EIA provisions in the National Lands Act, while adequate to ensure review of environmental considerations in land allocation decisions, will remain ineffectual as long as the Commissioner of Lands and Survey ignores them and acts unilaterally in making land-allocation decisions.

Primary implementation issues

A number of overarching institutional implementation issues emerge as impediments to effective environmental management by Government institutions in Belize. These institutional implementation issues involve (i) clear delineation of roles and responsibilities; (ii) rational resource allocation; (iii) improved inter-ministerial coordination; and (iv) strengthening of technical capacity. Each of these issues is discussed in more detail.

Clear delineation of responsibilities

The current lack of clarity in roles and responsibilities among institutions with environmental management functions results in unnecessary confusion (e.g., authority over pollution control), and wasteful duplication of effort (e.g., water quality monitoring). With its severely constrained financial and technical resources, the Government can scarcely afford to have confusion or duplication of effort in its environmental management institutions.

A case in point is authority over pollution control. The Ministry of Health has had authority since 1983 under the Public Health Act to prevent or reduce pollution or contamination of air, soil, or water. The Department of Environment was given more comprehensive authority in the Environmental Protection Act in 1992. However, with the promulgation of pollution control and environmental assessment regulations in the last few years, the Department of Environment has emerged as the primary environmental regulatory institution.

Another case in point is water quality monitoring. Currently the Ministry of Health performs routine water quality monitoring under the Public Health Act to ensure safe drinking water supplies in rural areas and monitor potential contamination of surface and coastal waters.

The Ministry maintains a Water Quality Laboratory in Belize City for this purpose. At the same time, WASA performs water quality monitoring under the Water and Sewerage Act for its water supplies in urban areas and for its surface water sources. WASA maintains its own laboratory for this purpose. Under the Environmental Protection Act, the Department of Environment is also authorized to monitor and take samples of water resources. The potential for duplication of effort in these activities suggests the need for the Government to clarify and coordinate water quality monitoring responsibilities. The Government is taking steps to address these issues through development of the National Water Quality Monitoring Program with assistance from the NARMAP project.

Finally, the various statutory provisions with respect to environmental impact studies, statements and assessments pose potentially conflicting requirements. The comprehensive EIA provisions in the Environmental Protection Act were preceded by similar requirements for environmental impact studies, statements and assessments in the National Lands Act, the Mines and Minerals Act, and the Petroleum Act. These various requirements have been superseded by the EIA procedures and regulations under the Environmental Protection Act, however, this point must be clarified by Government in order to strengthen the position of the Department of Environment with respect to these provisions.

These examples of overlapping roles and responsibilities indicate that the Government will need to take actions to rationalize environmental functions to improve overall environmental program management and to ensure appropriate use of limited resources. The Government will need to examine the various types of environmental activities, e.g., background studies, EIAs, regulations, sampling, monitoring, inspection, implementation, and enforcement, currently performed by Government institutions, quasi-governmental bodies, and NGOs to determine where rationalizing functions is needed.

Rational allocation of resources

It is not clear that the Government's current allocation of resources among environmental institutions is based on an analysis of environmental program needs and priorities. The human and financial resources available to the various departments appear to be based as much on political clout (e.g., Lands and Survey Department), institutional history (e.g., Department of Environment), and ability to attract donor support (e.g., Fisheries, Forest Departments), as on careful allocation of budget resources to targeted national environmental priorities.

The Lands and Survey Department within the Ministry of Natural Resources reflects as much the political weight of its functions as its actual management needs. Likewise, the relative newness of the Department of Environment, which was established in 1989, explains its limited staff more than its resource requirements to implement the EIA, pollution prevention and control, and monitoring and enforcement provisions of the Environmental Protection Act. Finally, both the Fisheries and Forest Departments depend on augmenting their Government resource allocations for their environmental management programs with external assistance: the Global Environment Facility (GEF), Wildlife Conservation International, and World Wildlife Fund-US in the case of Fisheries, and ODA and USAID in the case of the Forest Department. Without these external sources, neither department would be able to perform its environmental management functions as effectively.

The case of the Department of Environment is the most acute. The Department is charged with implementation of major new environmental functions under the Environmental Protection Act, including EIA review, preparation of pollution control standards, monitoring, and enforcement. Yet the Department has only been allocated a Chief Environmental Officer, a Senior Environmental Officer, two Environmental Officers, three Environmental Technicians and one data management specialist. With this complement of staff, the Department will be hard pressed to establish a credible environmental protection program. There are currently plans to increase the professional staff to 15 persons over the next five years, and the Department has already established Compliance and Project Evaluation Units for the purpose of monitoring voluntary compliance and taking enforcement actions and of reviewing and approving environmental assessments. However, to effectively carry out its mandate under the Environmental Protection Act, the Department will also need an Environmental Planning and Policy Unit, for developing environmental policy and preparing environmental quality criteria and pollution control standards, and a Public Awareness/NGO Coordination Unit, for promoting environmental education and public awareness and coordinating activities with environmental NGOs.

In terms of financial resources, the Department of Environment also comes up woefully short. A comparison of the recurrent budgets for 1993-94 of the key ministries with environmental management responsibilities, contained in Table 2.2, indicates that the Ministry of Tourism and the Environment has been allocated less than one-third of the budget of the next lowest environmental ministry, the Ministry of Agriculture and Fisheries. This budget allocation is less than one quarter of that allocated for the Ministry of Natural Resources and one-tenth of that allocated for the Ministry of Health. It should be noted that this Tourism and the Environment allocation also includes the budget for the tourism and archaeological activities contained within the ministry.

Table 2.2: 1993-94 Budget Allocations for Selected Ministries

Ministry	*Recurrent Budget 1995-96 BZ$*	*Percentage of Budget*
Ministry of Health and Sports	22,071,488	8.0
Ministry of Natural Resources	7,983,571	2.9
Ministry of Agriculture and Fisheries	5,848,718	2.1
Ministry of Tourism and the Environment	1,137,241	.41

The foregoing discussion illustrates the need for the Government to perform a careful analysis of the human and financial resources needs of its environmental management institutions based on established environmental program priorities if it intends to improve the effectiveness of these institutions.

Inter-Ministerial coordination

Under the current institutional arrangement in Belize, inter-ministerial coordination is critical to effective environmental management. The dispersion of environmental responsibilities among multiple institutions makes inter-ministerial communication and coordination essential. To a large extent, however, current coordination efforts appear to be based on informal rather than formal institutional arrangements and have not always worked smoothly.

With the demise of the Physical Planning Sub-Committee (PPSC) in 1992, the Government lost its formal inter-ministerial coordinating mechanism for ensuring that environmental considerations were weighed in Government activities. The result has been less effective and consistent communication and coordination among institutions on environmental issues. For example, the Office of Geology and Petroleum, in granting a mining license, does not always coordinate closely with the Department of Environment in assessing the environmental impacts of prospective mining operations. Without a formal coordinating mechanism there is little the Department of Environment can do.

The one exception to this lack of coordination rule appears to be the Coastal Zone Management Technical Committee (CZMTC), which functions as the coordinating mechanism for review of activities planned in the coastal zone. Under the leadership of the Fisheries Department, the CZMTC brings together the relevant agencies of Government with an interest in activities in the coastal zone. It operates effectively to ensure that such activities will have minimal adverse impacts on the fragile ecosystem.

The Government, however, will need to take action to institutionalize higher-level, inter-ministerial coordination to ensure integrated environmental management not only in the coastal zone but throughout the country. At one point, the Government considered the reinvigoration of the PPSC. For a revived PPSC, or any other inter-ministerial committee for that matter, to play a meaningful coordinating role, however, it will have to be given specific statutory authority to perform its functions, approval by Cabinet to enhance its authority, and the administrative capacity to follow up on its decisions.

Technical capacity

The current lack of technical capacity for environmental management seriously undermines the Government's ability to provide credible environmental protection. This includes not only the serious lack of trained technical personnel to perform essential environmental management functions but also the lack of necessary technical equipment, including laboratory facilities, to perform pollution monitoring, data collection, sampling and analysis.

The shortage of technical personnel is most acute in the Department of Environment, which essentially has eight Environmental Officers to carry out its EIA review, regulation development, monitoring and enforcement functions; but it is also true in many of the other departments with environmental responsibilities. For example, the Fisheries and Forest Departments rely to a great extent on NGOs like the Belize Audubon Society to manage protected areas, wildlife reserves, and bird sanctuaries. In addition, many of the technical personnel in the Fisheries, Lands and Survey, and Forest Departments are non-Belizeans provided by external donor assistance. This includes the Technical Adviser for the GEF project in the Fisheries Department and the Forest Management Specialist. While the use of this external assistance expands technical capacity in these environmental programs, the Government must not continue to rely on this assistance but ensure that these external technical personnel work continuously to transfer technical skills to native Belizeans.

A number of ongoing donor projects include institutional development components that will address this issue:

- the USAID-sponsored NARMAP Project for the Department of Environment has assisted in building technical capacity within the Department by providing: long-term university training; short-term training courses on environmental monitoring, education, solid/hazardous waste management, and analysis of pollutants; and equipment and training for a Conservation and Environmental Data System (CEDS);

- the ODA Forest Planning and Management Project for the Forest Department provides training for Forest Officers and technical assistance in preparation of forest management plans;

- the GEF Coastal Zone Management Project provides staff development and training for the Fisheries Department; and

- the UNDP Project for strengthening capacity in the Office of Geology and Petroleum.

The Government will need to coordinate these various efforts to maximize its technical capacity for environmental management.

Conclusion

The current institutional arrangement for environmental management in Belize provides a basically sound administrative structure for ensuring environmental protection, fostering sustainable natural resources management, and promoting rational land use planning. However, much remains to be done by the Government to ensure that the institutions attain these goals. Strengthening the new Department of Environment in order to enable it to meet its statutory responsibilities under the Environmental Protection Act will provide the Government, for the first time, with the basis for a credible EIA review and pollution prevention and control program. Reinforcing conservation efforts in the resources management agencies, particularly the Fisheries and Forest Departments, will put them on the right track to ensuring sustainable development of natural resources in Belize. Finally, with renewed commitment to remove political and financial influence from the land-use planning process, the Lands and Survey Department should be able to ensure that land allocation and use is done in an environmentally appropriate manner.

In addition, under the existing institutional structure the Government faces a number of serious issues in the implementation and enforcement of its environmental management programs. For example, the Government will have to take steps to rationalize roles and responsibilities for environmental functions in order to minimize confusion and duplication of effort. Additionally, the Government will have to perform a careful analysis of its allocation of budget resources among environmental agencies to see that it follows established national environmental priorities. Also, increasing inter-ministerial communication and coordination in order to improve integrated environmental management will have to be a Government priority. Finally, the Government will have to address the serious shortage of technical capacity that undermines the effectiveness of its environmental management programs.

Recommendations

During the next year, the Government should establish an Inter-Ministerial Coordinating Committee on Environment, chaired by the Ministry of Tourism and the Environment, to ensure increased communication and coordination of Government institutions in environmental management activities.

To increase the effectiveness of this Inter-Ministerial Coordinating Committee on Environment, the Cabinet should approve a resolution establishing the committee and specifying its environmental coordination mandate, including the participation of NGOs and the private sector. The Government also should establish a secretariat to provide the administrative support necessary to enable the committee to monitor and enforce compliance with its decisions.

During the next two years, the Government should undertake an overhaul of its budget allocations for the various environmental institutions. In order to achieve a rational allocation of budget resources among environmental programs, the Government should:

- prepare a National Environmental Action Plan (NEAP) establishing national environmental priorities; and
- budget resources for environmental programs based on the priorities established in the NEAP.

During the next three years, the Government should further strengthen the Department of Environment. The Department should be expanded to comprise four units:

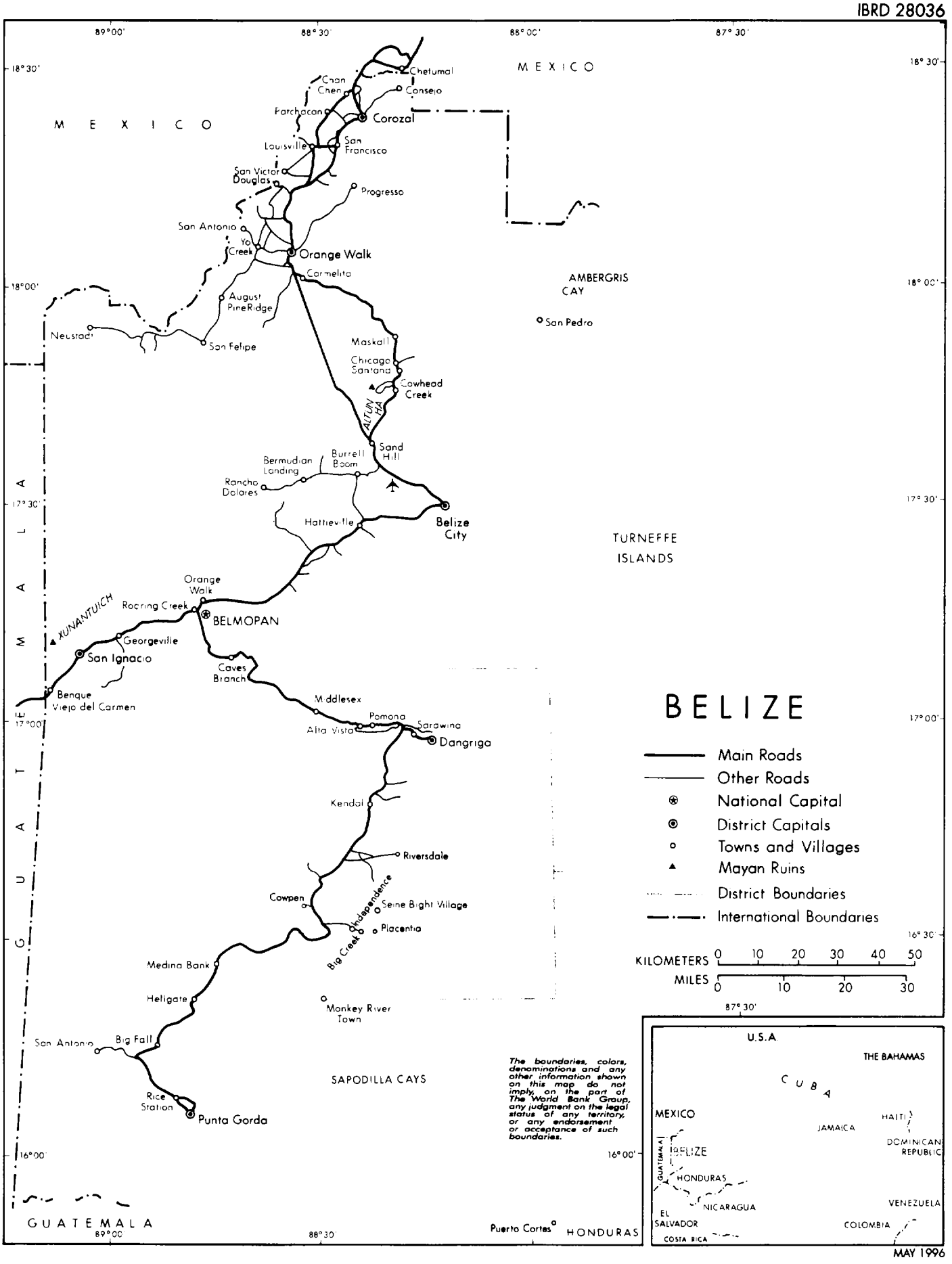
- a Project Evaluation Unit with responsibility for reviewing and approving EIAs;
- a Compliance Unit with responsibility for issuing licenses and monitoring and enforcing compliance with pollution requirements;
- a Public Awareness/NGO Coordination Unit for addressing public and community involvement; and
- an Environmental Policy and Planning Unit with responsibility for formulating environmental policy and issuing environmental quality criteria and pollution prevention and control standards.

The Government should adopt appropriate policies to ensure a rational and transparent process for land allocation and land-use planning. This should involve:

- establishment of clear and enforceable environmental criteria for all land allocation and land use planning; and
- incorporation of GIS data into all land allocation and land use decision-making.

MAP SECTION

IBRD 28036



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MAY 1996