

# **AGRICULTURAL POLICY ANALYSIS PROJECT, PHASE II**

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## **BELIZE NATURAL RESOURCE POLICY INVENTORY USAID/ROCAP RENARM PROJECT**

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## PREFACE

### A. Purpose of the Report

Natural resource management for sustainable development is particularly needed in the region of Central America, where severe problems of environmental degradation are inextricably connected to economic crises and political instability. In recent years numerous studies, reports, and articles have documented and drawn attention to predicaments of resource deterioration in Central America--from deforestation and soil erosion to agrochemical pollution--and to the debilitating socio-economic problems they have generated. The international community has recognized the urgent need to change the prevailing patterns of resource exploitation and to pursue new directions of sustainable economic development and natural resource conservation in this region. Governments, non-government organizations and international donors have begun to develop policies and projects to resolve these seemingly intractable dilemmas.

The Regional Environmental and Natural Resource Management Project (RENARM) is a comprehensive new ten-year effort to address these problems. Its central goals are to help create "conditions for sustained use of natural resources in a manner that minimizes damage, protects biodiversity, and provides the means for equitable and sustainable economic growth," and to "assist public and private institutions to generate, transfer and apply the information and technologies essential for sustained use of natural resources." The development of natural resource policies is a crucial component of RENARM, which will complement and shape the other components (i.e. education, wildlife conservation, sustainable agriculture and forestry, and institution building). The policy component is based on the following premise:

"Attention to the political and legal framework which governs economic policies, regulations, enforcement, land use, economic incentives and environmental protection is a required element for successful strategies. Project interventions and long-range planning cannot proceed effectively without support and compatible policies and laws."<sup>1</sup>

The objectives of this component are to help create effective public policy and enforcement measures conducive to sustainable resource use, overcome policy constraints that jeopardize the environment and development, promote policy dialogue between governments and donors, and support constructive processes of policy-making for this purpose. The expected products include new legislation with effective enforcement measures, improved inter-agency cooperation, greater awareness of environmental policy issues, and incentives for improved management of land, watersheds, energy, fisheries, agrochemicals, forests and wildlands.

In order to fulfill RENARM's ambitious goals, it is first essential to understand the existing policy environment and the political-economic context that circumscribe and determine natural resource management and conservation in

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<sup>1</sup> Environmental and Natural Resource Strategy for Central America, USAID/ROCAP 1989.

the region. Implementing improvements in this area is not feasible without fully comprehending the past and present strategies or lack thereof and the socio-economic forces related to resource use activities, problems and policies.

A policy inventory providing essential background information for this purpose entails the following tasks:

- a) identifying all policies and laws from both the public and private sectors at the regional, macroeconomic, and local levels which affect natural resources (including those pertaining to the economy, commerce, agriculture, forestry, energy, and industry);
- b) identifying institutions and agencies (both government and non-government) that create and implement such policies;
- c) conducting a qualitative assessment of the impacts of each policy on economic growth and the natural resource base in both the short and long run; and
- d) analyzing the interactions of these policies, discussing significant gaps in the current policy set and determining principal policy alternatives for a research agenda.

Natural resource policy inventories will be conducted for Guatemala, Belize, Honduras, El Salvador, Costa Rica and for the Central American region as a whole. This report presents the results of the policy inventory for Belize.

Policy analysis is the second step in the policy component of the RENARM strategy. The inventories will contribute to the preparation of country-specific strategies for implementing RENARM. The policy analysis component of RENARM will analyze alternative environmental and natural resource policy options indicated in the inventories; adapt, improve and evaluate a range of methods for analyzing policy options; and characterize the political/institutional milieu in which policies are developed and implemented. The policy analysis component supports the policy dialogue and reform required to achieve RENARM's objectives.

## **B. Background Context of the Policy Inventories**

Concern for the environment arises at a time when the energies of Central American countries are devoted to development goals that highlight expansion of production and alleviation of poverty. Through the global economic crises, deepening debts, and declining terms of trade of the last two decades, the governments of Central America have faced increasing economic pressure to expand export production, repay burgeoning loans, and raise gross national product (GNP) in the short term. Governments have established policies and laws, including fiscal measures (such as taxation and subsidies), credit systems, colonization schemes, and customary land use legislation, which maximize short-term profits and rapid growth. Large-scale monocultural enterprises, such as beef-cattle and cotton, and small-scale export crops have received particularly strong state support. These sectors have contributed greatly to the increase of exports, thereby generating badly needed foreign exchange. In addition, the larger farmer

groups have built political-economic power which has been consolidated through influential business/lobbying associations. Foreign industries and large investors have been encouraged to expand extractive resource activities in pursuit of unfettered economic growth.

The main objective of the policy inventory is to prioritize avenues of policy reform in which the goals of environmental conservation and economic growth are compatible. However, there are no "blueprint" policies and actions to resolve these complex dilemmas. The citizens and leaders of the individual countries need to adapt policy measures to their own situations.

At the same time, these countries urgently need to collaborate and learn from each other in the process of identifying successful measures. Some environmental and natural resource problems are regional predicaments that do not observe national boundaries. Inter-country exchange of information and formation of region-wide policies are essential initiatives that serve the interest of all Central American people.

The RENARM initiative of conducting policy inventories for natural resources in five Central American countries and one for the region as a whole was designed with these concepts in mind.

### **C. Contents of the Report**

This report is organized into a series of chapters that progressively build the foundation needed to support the final chapter's recommendations for subsequent policy analysis of natural resource issues in Belize. In Chapter 1, the Inventory clearly defines the terms "policy" and "natural resource." Structure for the Inventory is created by categorizing policies and identifying four major natural resource themes. A brief description of Belize's resources as they relate to each of these four themes is provided.

In Chapter 2, the report provides background information on Belize's political factors that directly influence the manner in which individuals and institutions make, implement and enforce decisions concerning natural resources. Social factors, including demographic trends and education, and their role in the management of the natural resources are also discussed.

Chapter 3 is devoted to a discussion of the role of institutions in Belize in the natural resource policy-making environment. For each natural resource policy theme identified in Chapter 1 (sustainable agriculture, production from natural forests, management of water resources, and management of wildlands), the main institutions, at international, public and private sector levels, and their interactions are briefly described with the aid of a chart. A discussion that highlights the degree of institutional complexity, coordination and cooperation follows each chart.

Chapter 4 summarizes the results of the Policy Inventory. After regional, international and macroeconomic policies are analyzed, the sector and subsector policies are discussed by each natural resource issue. The analysis focuses on the interactions of these policies and their effects on each natural resource theme and is sensitive to cases where policies do not exist or are not

implemented properly. At this point in the study, conclusions from the analysis of the social, cultural, institutional and political factors in previous chapters will be incorporated into the discussion. Policy inventory tables for the most significant policies discussed in this chapter are presented in Appendix A. A policy is described; the main institutions implementing or creating the policy are listed; its impact on economic growth, and on the natural resource issue in the short and long run is assessed and briefly explained; and policy alternatives requiring further research are listed.

Chapter 5 concludes the study with a series of policy priorities that require collection of data and further analysis. Priorities will be determined based on several factors:

- a) the political, social and economic feasibility of policy reform;
- b) the potential severity of the socio-economic and environmental impacts resulting from policy reform; and
- c) the potential of the policy reform to close the gap between the objectives of economic growth on the one hand and preservation of a sustainable natural resource base on the other hand.

Information useful for subsequent research in this area is provided in appendices at the end of the report. A list of the more than 50 people who were interviewed in Belize is presented in Appendix B. A bibliography is provided in Appendix C. Finally, the names and a brief description of the backgrounds of the authors of this report are provided in Appendix D.

#### D. Summary

This inventory was conducted to gain a comprehensive understanding of the specific influences of all relevant policies, or lack thereof, and the political, institutional, social and economic factors influencing natural resource conditions. There are many information gaps and conceptual difficulties in linking policy incentives to human behavior, and the behavior to its long-term impact on the country's natural resource base. These are largely qualitative influences, often involving incommensurable political, social, and economic forces. Seldom can they be documented quantitatively. Yet this complexity does not discount their importance. Further research on policies will be needed over time to clarify the impacts and assess new responses and evolving conditions. The inventory of policies in this report is designed to fill the need for better information on existing strategies to help stimulate the design of policies and actions for sustainable, equitable development and natural resource management in Belize and the entire Central American region.

**E. Acknowledgements**

The team would like to thank the many people and institutions who provided information, frank opinions, and helpful comments. In addition to those interviewed during this study listed in Appendix B, we would like to acknowledge the support of the USAID/Belize mission and USAID/ROCAP. Comments made at the ROCAP seminar in Costa Rica by representatives from all of the Central American USAID missions were also quite helpful. The Belize Center for Environmental Studies, under the direction of Lou Nicolait, provided logistic and technical support for the study. Editing by Bill Levine and Paula Hirschhoff at Abt Associates in Washington, D.C. are also gratefully acknowledged.

## ABSTRACT

Under The Regional Environmental and Natural Resource Management Project (RENARM), USAID/ROCAP funded country case studies of policies affecting the management of natural resources in Central America. This report presents the results of the Belize Inventory. Chapter 1 provides structure for the study by categorizing policies and identifying four major natural resource themes: sustainable agriculture, production from natural forests, management of water resources and management of wildlands. A brief description of Belize's resources as they relate to each of these four themes is provided. Chapter 2 presents background information on Belize's political and social factors that directly influence the manner in which individuals and institutions make, implement and enforce decisions concerning natural resources. For each natural resource theme, Chapter 3 discusses the role of institutions in the policy making environment and highlights the degree of institutional complexity, coordination and cooperation. Chapter 4 summarizes the results of the Policy Inventory. After regional, international and macroeconomic policies are analyzed, the sector and subsector policies are discussed by each natural resource issue. The analysis focuses on the interactions of these policies and their effects on each natural resource theme and is sensitive to cases where policies do not exist or are not implemented properly. Policy inventory tables for the most significant policies discussed in this chapter are presented in Appendix A. A policy is described; the main institutions implementing or creating the policy are listed; its impact on economic growth, and on the natural resource issue in the short and long run is assessed and briefly explained; and policy alternatives requiring further research are listed. Chapter 5 concludes the study with a series of policy priorities that require collection of data and further analysis.

In addition to the analysis of regional and macroeconomic policies, over thirty policies were identified as having a significant impact on the management of Belize's natural resources. Problems of lack of laws, institutional overlap, and insufficient resources for enforcement of policies were identified and highlighted.

## EXECUTIVE SUMMARY

Under The Regional Environmental and Natural Resource Management Project (RENARM), USAID/ROCAP funded country case studies of policies affecting the management of natural resources in Central America. This report presents the results of the Belize Inventory. There are four main steps to conduct a Natural Resource Policy Inventory:

- a) identify all major policies and laws from both the public and private sectors at the regional, macroeconomic, and local levels which affect renewable natural resources;
- b) identify institutions (both government and non-government) that create and implement such policies;
- c) conduct a qualitative assessment of the impacts of each policy on economic growth and the natural resource base in both the short and long run; and
- d) analyze the interactions of these policies, discussing significant gaps in the current policy set and determining principal policy alternatives and a research agenda.

In addition to the analysis of regional and macroeconomic policies, over thirty policies were identified as having a significant impact on the management of Belize's natural resources. Problems of lack of laws, institutional overlap, and insufficient resources for enforcement of policies were identified and highlighted. Results are presented under four major natural resource themes: sustainable agriculture, production from natural forests, management of water resources and management of wildlands. The Executive Summary highlights the most critical issues and policies within each of these four natural resource themes.

### 1. Sustainable Agriculture

An Overview. Sustainable development in the agricultural sector is defined as the management and conservation of the natural resource base and the orientation of technological change to ensure the attainment and continued satisfaction of human needs--food, water, shelter, clothing and fuel--for present and future generations. Such sustainable development conserves genetic resources and land and water resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. Issues related to pesticide management, habitat destruction and disruption and biodiversity losses from agricultural practices and soil erosion are discussed under this theme.

Belize has good soils for agricultural production, with an estimated 19% of the land suitable for mechanized agriculture. Particularly appropriate for agriculture are the lands in the northern Cayo District and the lands of the northern sugar cane region. Soils of the Toledo lowlands are generally fertile

and appropriate for long-fallow milpa agriculture or permanent tree crops. Recent soil surveys have been conducted in the Toledo and Stann Creek districts, and the other areas of the country will have soil surveys completed in 1990.

Evidence of poor agricultural practices and soil erosion have been identified across the country. Recently, citrus production has been expanded on hillsides with inappropriate soils and land clearing and drainage for citrus in the Stann Creek Low Pine Ridge area and the Toledo District have also caused soil erosion problems. In the Cayo District, drainage on heavy clay soils has severely eroded the gullies.

With respect to pesticide and fertilizers, many interviewees identified heavy use by banana growers. Banana cultivation requires large quantities of pesticides and irrigation. This process adds fertilizers and pesticides to the water at times when the river flows lowest and is least able to disperse pollutants.

#### Policy and Institutional Framework.

o The inventory identified 10 major sector policies with significant affects on sustainable agriculture, however, only one of the 10 policies was the direct responsibility of the Ministry of Agriculture and Fisheries: the comprehensive agricultural policy statement that sets the tone and direction for all the ministry's efforts. Two other policies, administered by the Belize Marketing Board and the Pesticide Board which are linked directly to the Ministry, improve product marketing and processing and regulate the use of pesticides.

o The inventory identified 26 public and private organizations which have a major role in sustainable agriculture. This relatively large number of decision-making bodies leads to considerable complexity in policy-making, including duplication of effort and inadequate coordination of programs.

o Perhaps the most important policy category concerning sustainable agriculture is land resources, which includes three laws that play especially important roles in shifting land to more productive agricultural use: the land tax law, the law to distribute public lands (Crown Lands Ordinance) and the law providing for road access.

#### What Does Not Work.

o Land laws are not effective in regulating land use. The transfer of additional land to agricultural use will damage the natural resource base. Anyone can apply to the Ministry of Economic Development for a tax holiday or a import duty concession, and more concessions have been approved for agricultural enterprises than for any other type of business. However, these concessions are granted without investigating the optimal use of the land.

o Often disposition of public lands and the building of public roads is dictated more by political expediency than by sound policies designed to accommodate both economic growth and natural resource conservation. Adequate information is unavailable to justify changes in land use, which leads to

decisions that damage both agriculture and the environment. The present allocation system is subject to political whims which results in dereserving forestland that, based on technical information concerning the natural resources, should be either retained in natural cover or only partially dereserved.

- o Policies to increase efficiency and production in the agriculture sector include regulations on pesticide use, agricultural credit, market and processing facilities and fiscal policies to promote investment in productive agriculture. While favorable to agricultural development, these policies can harm the natural resource base in two ways.

First, they tend to result in more intensive agriculture by encouraging such practices as excessive fertilizer and pesticide use, heavy machine compaction of fragile soils, stream siltation and burning of natural land cover. For example, credit is not specifically targeted to farmers using sustainable agriculture technology.

Second, Belize has very adequate regulatory policies, but only limited resources for monitoring and enforcing them. As a result, the government does not always respond to reports of river contamination and pesticide contraband is a problem. The Pesticide Board has not levied any fines for violations and prefers a policy of educating the public.

- o There is a policy prohibiting the cutting of vegetation along river banks, however, this has never been enforced. Expansion of the banana industry, coupled with its heavy use of pesticides, has caused soil erosion and water contamination.

- o Control boards and producer associations for the three major commodities-- sugar, citrus and bananas increase grower profitability and expand output. However, there has been a deterioration in the natural resource base associated with this economic success. Citrus and banana production has been shifting from flat, fertile lands to marginal hillside and poorly drained areas. Clearing of vegetation cover up to stream banks has caused siltation in streams that appears to be spreading all the way to the reef. Aerial spraying of chemicals has also contaminated streams. Continued expansion of these input-intensive commodities in relatively small, well-defined areas will exacerbate deterioration of the natural resource base.

#### Policy Gaps.

- o Lack of a land use policy.
- o No established standards for testing pesticide residue in crops or beef.
- o Extension services are not geared toward the promotion of sustainable agriculture techniques, i.e. environmentally sound land clearing, plowing and drainage techniques.

Conclusions. Belize has the potential to promote agricultural development without conflicting with the natural resource base. Because agriculture consumes only a small fraction of total land area, the expansion of this sector can remain as the top national development priority while the natural resource base is simultaneously preserved and maintained.

However, existing policies will have to be enforced if this objective is to be met. Enforcement will entail improving the data base for making decisions and to the extent possible, transforming land use decision making from an ad hoc, political process to an effort which conforms to a national land use plan. In addition, ministerial portfolios should be realigned to reduce the overlapping of responsibilities. In this process, the Ministry of Agriculture should play a greater role in the sector it is charged to develop. At present, the ministry administers few policies that have any influence on sustainable agricultural development.

## **2. Production From Natural Forests**

An Overview. Production from natural forests is concerned with the management of forested areas that have high potential for the sustainable production of forest products, water and other environmental benefits. Issues related to deforestation, reforestation, habitat destruction and disruption, and biodiversity losses resulting from forest production are discussed under this theme.

Although forest covers much of the land in Belize, very little of it is accessible for timber production. Throughout this century, the extraction of hardwoods in Belize, especially mahogany, has not been accompanied by reforestation programs. Over the long run, this has drastically depleted the forestland available for sustained timber production. If extraction practices continue, ceterus paribus, timber producers in Belize are expected to be out of business within 10 years.

Limited road access and steep hillsides are major constraints to expansion of hardwood extraction. The timber production technology used in Belize is also limited. Only four sawmills produce a significant quantity of boards. At best, a timber company extracts two trees per acre. Secondary woods are not extracted because the treatment process required is too expensive for the limited domestic and export market.

### Policy and Institutional Framework.

o Domestic price controls, maximum girth limits for cutting, royalty rates and logging license policies provide the core incentive structure for production from natural forests.

o Policies affecting the management of natural forests in Belize fall under relatively few institutions. In the public sector, policy decision-making and implementation is mainly under the Ministry of Natural Resources and Industry. Within this ministry, conflicts have arisen between the Forestry Department, which supports the conservation and maintenance of forest reserves, and the Lands Commission over recent policies to "dereserve" forests for

agriculture production, especially citrus.

o The private sector has little involvement in making and implementing policies. However, the Timber Association, which is relatively new, and public sector institutions concerned with forestry sector policies have been making significant efforts to coordinate. In addition, the Belize Tourism Institute Association, the Belize Center for Environmental Studies, and the Belize Audubon Society have lobbied the Ministry of Natural Resources against dereserving forestland.

#### What Does Not Work.

o Girth limits are not used as a tool to promote optimal and sustainable management of the forests. In fact, issuing minimum felling girth restrictions without implementing a policy which controls the area exploited is harmful to the forests of Belize in the long run: repeated logging of the largest trees and repeated licensing of a given forest area without allowing for recuperation removes the genetic traits for fast-growing trees from the forests. Hence, the policy is in direct conflict with sustainable yield.

o Prices of woods are not sufficiently differentiated. Mahogany and cedar in particular are highly undervalued compared to world prices. These domestic price distortions discourage production of secondary hardwoods and encourage domestic consumption of high value hardwoods. In the long run, the forest is not managed as well as it could be, because the social value of the forest resources is not realized in the market economy.

o Price distortions, coupled with a road system that only permits the use of expensive log transportation equipment which substantially raises operating costs, go a long way in explaining the unsustainable harvesting of cedar and mahogany species and the lack of a secondary wood market in Belize.

o Royalties are charged per cubic foot of timber removed from a licensed area. This practice encourages the cutting of trees which bring the highest returns per unit of volume harvested rather than per unit of area harvested.

o Variations in royalty rates among species do not reflect the differences in the world market values of species and their qualities, or in the logging costs of a particular licensed area. These distortions create inefficiencies in the timber industry over the long run.

o Licenses and permits for timber operations are issued on an annual basis, with an option for renewal if the licensee has followed regulations. However, conditions for issuing forest reserve licenses and permits are vague and not based on sustainable yield information. As such, they often encourage the removal of entire forests for temporary or permanent agriculture.

#### Policy Gaps.

o There are no major reforestation efforts in Belize.

o Lack of resources in the Forestry Department is a key constraint in effective implementation and enforcement of forest management policies. The department is understaffed and it has no formal technical training programs. As a result, protection and management of the forests is ineffective; fines for damaging regeneration of forests are not imposed; powers to direct and control road and trail building are not used; and charges for Forestry Department constructed roads are minimal.

Conclusions. Price controls on lumber must either be eliminated or adjusted to reflect the variation in values of different species. The present pricing system causes overcutting and undervaluing of mahogany and cedar while secondary wood markets are not tapped. To further encourage the domestic production of secondary woods and discourage the mining of cedar and mahogany species, policies, such as tariffs on plywood, extension services to upgrade private sector production and marketing skills, the expansion of the road system in forest reserves and adjustment of the relative royalties on tree species to reflect different harvesting and transportation costs and market values should be considered.

Forest management policy alternatives to the present girth limit system merit further investigation. One alternative is to require that a tract of land granted in a logging permit be subdivided into sections which would then be logged in rotation. This type of permit would prevent selective cutting of primary hardwoods and would reduce damage to the forests from random harvesting.

In addition to improving production efficiency from the present stock of forests, policy incentives, such as tax exemptions, that encourage private reforestation should be investigated. The potential for agroforestry and other feasible production activities also should be investigated.

Closer monitoring of the rate of extraction of timber for specific areas is needed to evaluate the impact of production incentives on the stock of forest resources. Information on international markets for secondary hardwoods and the extent of Belize's comparative advantage in entering these markets is also needed.

### **3. Management of Water Resources**

An Overview. Management of water resources is concerned with all water bodies: rivers, lakes, coastal zones, seas and oceans. This theme covers the management of critical watersheds, which refers to the improved use of natural resources of watersheds, emphasizing upland areas. Issues related to river sedimentation, water management practices, quantity and quality of water supply, water distribution, sustainability of fishery (fin and shellfish) yields, and mangrove management are discussed under this theme.

Belize has an extensive freshwater system consisting of rivers, streams, creeks, lagoons and underground streams. This system provides Belize with an adequate supply of potable water. Bordered on the east by the Caribbean Sea, Belize also has extensive and diversified tropical coastal and marine ecosystems, including lagoons, mangroves, and seagrass beds. However, many Belizeans live on the coast which places significant pressures on resources: mangroves are cut down for housing and industrial development, coastal areas are used as dumping

Belize also has extensive and diversified tropical coastal and marine ecosystems, including lagoons, mangroves, and seagrass beds. However, many Belizeans live on the coast which places significant pressures on resources: mangroves are cut down for housing and industrial development, coastal areas are used as dumping grounds for toxic waste, debris from large-scale dredging operations affects the marine environment, and sand mining results in beach erosion.

#### Policy and Institutional Framework.

o The Inventory identified over 30 policies that significantly affect the management of water resources. Water resource issues can be subdivided into three main areas: water quality, physical alteration or degradation of the shorelines and substrates and exploitation of the resource.

#### Water Quality:

o Land development, waste disposal management, potable water and pesticide policies significantly affect the quality of the water supply. Land development policies are found in the Land Reform, Belize Land Development Authority, Crown Lands, Land Tax, Land Acquisition, Registered Land and Aliens Landholding Acts. These policies, in promoting the agricultural sector, impact the quality of the water supply as land clearing leads to increased soil runoff and contamination from pesticides which are washed into the water course.

o Waste disposal management policies are found in the Public Health Act and Water and Sewage Authority Act.

o Under the Public Health Bureau and Water and Sewage Authority, water quality is monitored using chemical and bacterial analysis on a regular basis throughout the country, following World Health Organization standards. The public health inspector is present at time of installation to advise on location of drilling and water sample is analyzed before a hand pump is installed in rural areas.

o The Ministry of Agriculture and Fisheries, through its Fisheries Department, and the Ministry of Health, through its Public Health Bureau, are the two predominant agencies issuing and executing policies for water quality management.

#### Physical alteration or degradation of shorelines and substrates:

o Several policies affect water resources through physical alteration of shorelines and substrates including provisions in the Mines and Minerals Act to issue licenses for mining prospecting and dredging, a policy of maintaining a strip of public land along any navigable waterway and the Belize Port Development Act.

o Many agencies affect decisions on the physical alteration or degradation of shorelines and substrates. The major player is the Ministry of Natural Resources through the Department of Forestry, the Department of Lands and the Geology and Petroleum Unit. Other agencies that play a role in or have some effect on the alteration of shorelines and substrates are the Ministry of Works

and the Belize Port Authority.

#### Resource Utilization:

o Development of an aquaculture industry is promoted through export tax exemptions and development concessions while the Fisheries Act provides for the protection of aquatic fauna and flora to ensure the continuity of commercially exploited species.

o Resource utilization is another area of institutional complexity. Although the major player is the Fisheries Department, other groups and agencies include the Ministry of Tourism and the Environment, Ministry of Natural Resources, Ministry of Trade and Commerce, Ministry of Foreign Affairs, Belize Tourism Industry Association, Belize Fishermen Cooperative Association, the fishermen cooperatives, the Tourist Guide Association and Care International.

#### What Does Not Work.

o Key agencies involved in managing water resources interact very little. When crises occur, agencies are forced to work together under difficult circumstances, which results in slow mobilization and inefficient use of equipment and labor.

o Waste disposal management strategies are focused on addressing short-term needs, rather than developing and implementing a long-term strategy that reduces the effects of increased organic and toxic loads on water resources.

o Although the availability of potable water is a critical factor in determining the extent and the rate at which development takes place, especially in the tourist industry, development concessions do not require assessment of water availability.

#### Policy Gaps.

o The most significant gap in the policy arena is the lack of coastal zone management, given the importance of the coral reef for the economy and ecology of Belize. Many agencies partially address this issue, however, there is no institutional coordination or comprehensive policy on coastal zone management.

o There is no policy related to plans or emergency preparation for an offshore oil spill.

o Testing water quality is not required prior to the granting of a development concession.

o There is no monitoring of water contamination from industry or agriculture.

o There is no requirement to treat water sources for villages.

- o There is no policy to require compliance with Belize fishing laws for the renewal of a joint venture contract between Belizean fishermen and companies from other countries engaging in shrimping.

Conclusions. As outlined above, these critical policies are supported by laws that broadly outline intent and give the appropriate minister the authority to establish specific regulations. On paper, these policies support the long-term sustainability and viability of the water resources of Belize. However, in practice there are problems.

Ineffective policy implementation appears to be at least a partial explanation. The key reason for this failure is the lack of financial, material and human resources. Moreover, there is little or no inter-agency cooperation and coordination in areas where it is clearly needed. Jurisdictional overlap is another major problem.

#### 4. Management of Wildlands

An Overview. Management of wildlands refers to the consolidation and sustainable management of legally declared national parks and reserves. Issues related to habitat destruction and disruption, hunting, gathering and poaching (within the country and also by poachers from other countries), ecosystems (land and marine), biodiversity, and national parks and protected areas are discussed under this theme.

With extensive forest cover and low population density, Belize has an abundance of flora, birds and large mammals, some of which are endangered in other Central American countries. About a fifth of area for forest reserve is regarded as protected, although no areas are specifically managed to maintain environmental stability.

Currently, the largest concentration of tourist activity is on Ambergris Caye and the adjoining reef where there are already signs of excessive pressure on both the infrastructure and the resource base. Lobster is reportedly being over-harvested to fill tourists' demands for seafood. Increased tourism has also placed stress on water resources as evidenced by the shortage of pure water at San Pedro. Waste disposal has become a problem and an unconfirmed report indicates the reef may be deteriorating. If the reef deteriorates, both tourism and fishing will suffer, and the standard of living of the people involved in these activities will, of course, decline.

#### Policy and Institutional Framework.

- o The Crown Lands Ordinance and the National Parks Act provide the legal basis for environmental conservation and the establishment of protected areas.

The National Parks System Act calls for the preservation, protection, and regulated use of highly important natural and cultural features. Provisions within the act allow the Minister of Natural Resources to designate a specified area of crown land as a national park, a nature reserve, a wildlife sanctuary or a natural monument. The chief forest officer is legally responsible for managing

all areas established under this act.

The Belize Audubon Society, with approval from the Minister of Natural Resources and Industry, currently manages and protects the areas designated under the National Parks Act. Also, all the bird sanctuaries and parks established under the Crown Lands Ordinance have been placed under the interim management of the Belize Audubon Society.

The Forestry Department of the Ministry of Natural Resources and Industry is mandated to manage the forest reserve lands. However, over the years, various other organizations from both the public and the private sectors have become involved in the promotion, establishment and management of protected areas.

- o The private sector has taken several initiatives in the creation of parks and protected areas. The Shipstern Reserve and the Community Baboon Sanctuary are private lands that have been converted to protected areas for the conservation of the region's biodiversity.

- o Belize is fast becoming a tourist destination. Because private institutions involved with tourism, such as the Belize Tourism Industry and Tour Guide Associations recognize that the main attraction is the national parks and other protected areas, they support the agencies involved with protected areas.

- o Several international agencies participate in conservation activities in Belize. World Wildlife Fund-US, one of the key players, provides financial support for several major conservation projects. The International Union for the Conservation of Nature and Natural Resources is actively involved in promoting proper management of the Belize Barrier Reef. Wild Wings Foundation, New York Zoological Society and the MacArthur Foundation also promote wildlands management and protection of the biological diversity of Belize. These agencies work directly with the country's private voluntary organizations such as the Belize Audubon Society, the Belize Zoo and Tropical Education Center and the Belize Center for Environmental Studies.

#### What Does Not Work.

- o The forest reserves were created in the 1920s, based on geography rather than technical analysis of appropriate land use.

- o In general, the Belize Audubon Society does not coordinate its activities with other non-governmental organizations of Belize.

- o Belize Fishermen's Cooperative Association interests are in conflict with the interests of agencies involved in creating marine reserves. Fishermen tend to see the creation of protected areas along the reef as a threat to the size of their fishing ground.

- o The Hol Chan Marine Reserve sporadically enforces its policies that restrict access to and activities permitted in the Reserve, although no citations have been issued or fines imposed.

Conclusions. In stark contrast to the other natural resource themes, these policies provide significantly positive incentive structures that promote both economic development and long-run sustainable management of wildlife. Local grassroots support and participation in the policy process is significant to the success of these policies because the government lacks sufficient funds to effectively manage protected areas. However, in areas where private sector participation and management is lacking, resource degradation continues. Continuous grassroots support is also critical to secure the permanent establishment of national parks because the declaration of national parks is by ministerial fiat, rather than legislation. The Minister of Natural Resources and Industry has the ability to establish or abolish a national park without the consensus of any party.

## 5. Summary

As a country that has embarked on economic growth relatively recently, Belize must give priority to expansion of economic activity. However, careful planning is necessary to determine the development alternatives appropriate to Belize; economic planning can avoid the costly mistakes that have been made in other countries. The country should use technical information such as the new soil surveys and data on biodiversity as the foundation for defining land use zones and creating a long run land use policy. This policy would identify which areas are appropriate for agriculture production, forest production and preservation of biodiversity. Based on this information, a comprehensive policy to evaluate proposals for new reserves could be issued and appropriate management plans developed.

To facilitate such land-use planning, research is needed on the macro trade-offs between further development of commercial agriculture and preservation of the natural resource base as a stimulus for ecotourism and multiple-use forestry. Systematic requirements for comprehensive environmental impact assessments and consideration of the long-run sustained agricultural yield under alternative development systems will help policymakers decide which geographic areas to develop, how intensively to develop them, and what production systems to use.

## LIST OF ACRONYMS

BARD	Belize Agency for Rural Development
BDF	Belize Defence Force
BEIPU	Belize Export and Investment Promotion Unit
BEST	Belize Enterprise for Sustained Technology
BMB	Belize Marketing Board
BTIA	Belize Tourism Industry Association
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Common Market
DFC	Development Finance Corporation
EEC	European Economic Community
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
IUCN	International Union for the Conservation of Nature and Natural Resources
LDC	Less Developed Country
MAF	Ministry of Agriculture and Fisheries
NGO	Non-Governmental Organization
ODA	Overseas Development Agency
RENARM	Regional Environmental and Natural Resource Management Project
ROCAP	Regional Office for Central American Programs
USAID	United States Agency for International Development
WWF	World Wildlife Fund

## 1.0 AN OVERVIEW OF BELIZE'S NATURAL RESOURCE ISSUES

### 1.1 Definitions of Policy and Natural Resources

The first step in conducting the Policy Inventory is to define the two basic parameters of the study: policies and natural resources. To provide structure to the Inventory, categories have been created for the policies and the natural resources.

Policies are defined as rules designed to influence human behavior, which are created by members of the society, collectively or individually. This very general definition covers not only formal policies of official government institutions, but also policies emanating from the private sector and from a society's traditional and cultural practices. The latter two sources often fill the gaps between government policies or laws. Therefore, this inventory identifies relevant gaps in the policy framework as well as describing the policies themselves.

This study has three major policy categories: regional, macroeconomic, and sector and subsector.

#### 1.1.1 Policy-Making

Regional and International Policies. These policies include multilateral and bilateral agreements between the governments of Belize and other Central American countries. Reference to international agreements that Belize has signed and to the role of donor agencies and their individual programs or projects is made, however, in depth analysis is beyond the scope of this report.

Macroeconomic Policies. This category considers the overall development strategy of the national government and public credit, monetary and taxation policies.

Sector and Subsector Policies. These policies are divided into four subcategories: fiscal, trade, regulatory, and development.

Fiscal policies concern taxes placed on specific sector activities; trade policies concern all price and non-price restrictions on imports and exports; regulatory policies include laws and regulations; and development policies are primarily concerned with credit policies, land development policies, forestry management projects, tourism and infrastructure development (i.e. irrigation, hydroelectric plants, roads, potable water) and public and donor development projects. Regional and macroeconomic policies will be analyzed separately from sector-specific policies, because their objectives, tools and effects transcend sectors within the economy. The effects of regional and macroeconomic policies on the natural resource base will be summarized, as opposed to a separate analysis of the effects for each natural resource theme.

In contrast, sector-specific policy objectives are narrower and their effects on specific natural resource themes are more easily isolated. Thus, for each major sector-specific policy identified, a qualitative assessment of the

impact on each relevant natural resource theme and on economic growth in the long and short run is presented in a policy inventory table compiled in Appendix A. These results are discussed in Chapter 4.

### 1.1.2 Natural Resources

Natural resources as discussed in this Inventory are restricted to the country's renewable resources. This study places natural resource issues into four themes: sustainable agriculture, production from natural forests, management of water resources, and management of wildlands.

These themes provide structure to the policy inventory tables, the subsequent discussion of policy issues, and the identification of areas for further policy research. The specific issues that they encompass are briefly discussed below.

Sustainable Agriculture. In this report, sustainable development in the agricultural sector is defined as the management and conservation of the natural resource base and the orientation of technological change to ensure the attainment and continued satisfaction of human needs--food, water, shelter, clothing and fuel--for present and future generations. Such sustainable development conserves genetic resources and land and water resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable ("Potentials for Agricultural and Rural Development", 1988, p. 135).

Issues related to pesticide management, habitat destruction and disruption and biodiversity losses from agricultural practices and soil erosion are discussed under this theme.

Production from Natural Forests. Production from natural forests is concerned with the management of forested areas that have high potential for the sustainable production of forest products, water and other environmental benefits ("RENARM", 1989).

Issues related to deforestation, reforestation, habitat destruction and disruption, and biodiversity losses resulting from forest production are discussed under this theme.

Management of Water Resources. Management of water resources is concerned with all water bodies: rivers, lakes, coastal zones, seas and oceans. This theme covers the management of critical watersheds, which refers to the improved use of natural resources of watersheds, emphasizing upland areas. This part of a watershed has direct downstream impacts on infrastructure, agriculture, water supply and coastal areas.

Issues related to river sedimentation, water management practices, quantity and quality of water supply, water distribution, sustainability of fishery (fin and shellfish) yields, and mangrove management are discussed under this theme.

Management of Wildlands. Management of wildlands refers to the consolidation and sustainable management of legally declared national parks and reserves. Wildlands preserve biodiversity, tropical forests and the heritage of the human race. The wildlands provide clean water, a productive and stable coastal zone, an attraction for tourists, and habitats for diverse species of plants and animals ("RENARM", 1989).

Issues related to habitat destruction and disruption, hunting, gathering and poaching (within the country and also by poachers from other countries), ecosystems (land and marine), biodiversity, and national parks and protected areas are discussed under this theme.

## **1.2 An Overview of Belize's Natural Resources**

Many studies have described the climate, geography, and abundant natural resources of Belize (Hartshorn, 1984; "Belize Tropical Forestry Action Plan", 1989). The purpose of this section is to briefly summarize these resources within the context of the four major natural resource themes described above.

### **1.2.1 Sustainable Agriculture**

Belize has good soils for agricultural production, with an estimated 19% of the land suitable for mechanized agriculture. Particularly appropriate for agriculture are the lands in the northern Cayo District, with calcareous soils derived from hard miocene limestone, and the lands of the northern sugar cane region, with calcareous soils derived from soft siliceous limestone. Soils of the Toledo lowlands, composed of mudstone, shales and sandstone, are generally fertile and appropriate for long-fallow milpa agriculture or permanent tree crops. Recent soil surveys have been conducted in the Toledo and Stann Creek districts, and the other areas of the country will have soil surveys completed in 1990. The survey results will enable the government to base specific land allocation decisions on technical criteria and to promote sustainable agricultural practices.

Evidence of poor agricultural practices and soil erosion have been identified across the country. Recently, citrus production has been expanded on hillsides with inappropriate soils (D. Gibson, personal communications 1990). Land clearing and drainage for citrus in the Stann Creek Low Pine Ridge area and the Toledo District have also caused soil erosion problems (Holder, personal communications 1990). In addition, some of the calcareous soils of Karst Landscapes are used for mechanized farming and cattle ranching, but are better suited for milpa production of corn (Hartshorn, 1984). In the Cayo District, drainage on heavy clay soils has severely eroded the gullies (Holder, personal communications 1990).

In contrast, the Spanish Lookout area that the Mennonites farm has a wide variety of soils. Many observers view their agricultural practices, including soil management, as an example of successful sustainable agriculture in Belize (Carr and Holder, personal communications 1990).

With respect to pesticide and fertilizers, many interviewees identified heavy use by banana growers. Banana cultivation requires large quantities of pesticides and irrigation. This process adds fertilizers and pesticides to the water at times when the river flows lowest and is least able to disperse pollutants. (J. Garcia, T. Chanona, and L. Miller, personal communications 1990). Others argued that the Mayan farmers transfer their past experience with cotton production in El Salvador, where extensive use of pesticides is required, to Belizean crops and lands, which have less need for high pesticides levels. In one case study, 25% of the loan for a cooperative in the Valley of Peace was allocated to purchase pesticides for corn production (Chavarria, personal communications 1990).

### 1.2.2 Production from Natural Forests

Although forest covers much of the land in Belize, very little of it is accessible for timber production (Roberson, personal communications 1990; "Belize Tropical Forest Action Plan", 1989). Throughout this century, the extraction of hardwoods in Belize, especially mahogany, has not been accompanied by reforestation programs. Over the long run, this has drastically depleted the forestland available for sustained timber production. If extraction practices continue, ceterus paribus, timber producers in Belize are expected to be out of business within 10 years (Roberson, personal communications 1990).

Limited road access and steep hillsides are major constraints to expansion of hardwood extraction. The timber production technology used in Belize is also limited. Only four sawmills produce a significant quantity of boards. At best, a timber company extracts two trees per acre. Secondary woods are not extracted because the treatment process required is too expensive for the limited domestic and export market (John Roberson, personal communications 1990).

### 1.2.3 Management of Water Resources

Belize, bordered on the east by the Caribbean Sea, has extensive and diversified tropical coastal and marine ecosystems, including lagoons, mangroves, and seagrass beds. However, many Belizeans live on the coast. This places significant pressures on resources: mangroves are cut down for housing and industrial development, coastal areas are used as dumping grounds for toxic waste, debris from large-scale dredging operations affects the marine environment, and sand mining results in beach erosion.

Belize has an extensive freshwater system consisting of rivers, streams, creeks, lagoons and underground streams. This system provides Belize with an adequate supply of potable water. At present, less than 5% of the water available for potable and industrial purposes is used (Belize Tropical Forestry Action Plan, 1989). Belize River carries the largest volume of water, draining 27% of the country's water into the sea. North of Belize River, the Booths River and New River are recharged from underlying cretaceous limestones and drain northeast. Watercourses south of Belize River are divided by the Maya Mountains. Streams draining southeast and east have a well-developed branching pattern with relatively steep, straight courses. On the coastal plain savanna, streams are

sluggish and drainage is less effective. West of the Maya Mountains, drainage is very branched although many streams drain underground to major rivers. The Macal River drains from 1020 to 70 meters of elevation and is the most tumultuous river in the country.

#### 1.2.4 Management of Wildlands

The area of reserved forests total 2,545 square miles or 28% of the land area. About a fifth of this area is regarded as protected. With extensive forest cover and low population density, Belize has an abundance of flora, birds and large mammals, some of which are endangered in other Central American countries. Native species of Belize that are considered either endangered or threatened with extinction include 15 mammals, 33 birds and 7 reptiles (Hartshorn, 1984). An estimated 4,000 species of flowering plants and over 700 types of trees grow in Belize, although only a few are endemic to the country. The Cockscomb Basin Wildlife Sanctuary, established in 1986, is the world's first jaguar reserve. Today, the Reserve has the highest number of jaguars recorded. In addition, the Cockscomb Basin has a sizeable percentage of other endangered species, including the Ocelot, Margay, Baird's tapir and Scarlet Macaw.

Off the coast of Belize lies the second longest barrier reef in the world. In addition, over 400 mangrove islands and sandy cayes<sup>2</sup> lie off the coast, some of which have and/or are undergoing development for the tourism industry. These ecosystems provide nursery and feeding grounds for Belizean wildlife, including economically important aquatic resources, such as fin fish, spiny lobster, shrimp and conch.

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<sup>2</sup> A caye is a low island or sandbank off a mainland.

## 2.0 THE POLICY ENVIRONMENT

### 2.1 Belize's Policy Environment Related to Natural Resource Use

As part of the policy inventory, interviewees identified specific political and social factors as significant constraints to forming and implementing long-run strategies for sound natural resource management. Thus, before individual policies are assessed, this section describes the broader framework of conditions for forming and implementing natural resource policies.

#### 2.1.1 Policy-Making Issues

An Historical Perspective. The economy of Belize from its inception has been based on extractive industries. Lumber initially was the major source of revenue as virgin forests were exploited. Later, fish contributed to development, both as a source of domestic food and as a foreign exchange earner. Not until relatively recently did agriculture receive priority as a national development goal. In fact, for many years English governors, anxious to expand their exports to the colony, imposed policies which discouraged agricultural production. These three sectors provided 60% of total export value and employed 45% of the labor force in 1988.

The economic development described above has had the following significant impacts on the management of Belize's natural resource base:

- o Due to the low population density, all emphasis was on exploitation of the forest, with little regard for management or sustained yield.
- o Colonial policy discouraged food production and conversion of forestland to agricultural land until relatively late in the country's development. The stigma persists today, with farming viewed as a low-status occupation by many Belizeans.
- o Preservation of natural resources has never been a serious concern and is rarely considered in the process of public policy-making.

Domestic Political Structure. Belize is a politically stable democracy modeled on the British parliamentary system of government. There are two major political parties in Belize. In contrast to legal systems in the rest of Central America which are based on Roman law, Belizean law is founded on the British system. The historical development of the country's government and laws, combined with its colonial past, has produced a highly centralized government with substantial power vested in the prime minister and his cabinet of ministers. Centralization of political power is reinforced by budgetary control, with the Prime Minister also serving as Minister of Finance.

It is clear that ministers have wide decision-making authority that can be used to reward or withhold benefits. After an issue has been discussed in

cabinet, they have great latitude to make certain decisions on their own. For example, most laws and ordinances contain a clause similar to those found in Chapter 115 of the Laws of Belize, Forests:

"Such license (to work timber) shall be in such form as the Minister shall determine in each case" [Part II, 5, 1]

"The Minister shall not be obliged to direct the issue of a license to the person submitting the best tender or any tender" [Part II, 7, 2]

"Fees shall be determined in each case by the Minister." [Part III, 23, 5]

In addition, there are unofficial government policies that follow party lines and are often sensitive to the concerns of special interests. Although ministers promote a program agenda defined by the party manifesto, most ideas for policy discussion are the result of lobbying by groups, organizations or individuals. Because of the open-door policy of the present government, it is possible for people to discuss issues personally with a minister and receive a direct response. Many requests are channeled through an advisory board which submits its suggestions to the cabinet. Other policy decisions are the outcome of external pressure from lending and donor agencies which attach clauses and stipulations to grants and loans. Finally, some policies result from official cabinet-level responses to crises.

As a result, proposed policies and projects undergo little technical analysis or internal debate. Decision-making is often ad hoc and may be strongly influenced by intercession of a constituent group at the ministerial level. In this setting, commercial interests have almost always taken precedence over environmental safeguards or natural resource preservation. The combination of limited budget resources and short-run allocation procedures also favors economic interests over sustained natural resource issues.

Political polarization and limited political power at the local level have made it practically impossible for communities to make decisions without some interference from the central government. The six district bodies are only advisory to the national government, and the seven town boards have limited powers of taxation and spending within city boundaries. Lack of political power and financial resources have contributed to problems in providing public water and sewage services. Given economies of size and the initiation of national level land-use planning, it is unlikely that the towns will supplant the national government in natural resource policy-making.

Contributing to the centralization of political power is a similar concentration of wealth and hence, political power, in the private sector. A few international trade merchants enjoyed a preferred position during the colonial era, a situation that continues to the present. Their actions have influenced the availability and relative prices of consumer and producer goods. Through its economic power, the commercial sector has thus been able to significantly influence government policy, including decisions affecting the natural resource base.

Availability of Technical Information. The Central Statistical Office is charged with collecting, analyzing and publishing statistical information. The office has made remarkable strides in the past few years in computerization, staffing and training but is still severely restrained by available resources. Moreover, the data that is gathered relates to commerce and focuses little on natural resources.

One of the major problems is the collection of basic data. In many cases, as with fisheries, the industry itself serves as the primary source of the information used to tax and regulate. In other cases such as agriculture, district extension officers provide their estimates of annual commodity production based only on observation of crops. The government has not yet given high budget priority to needed improvements in the quality and quantity of data. However, as decision making moves from ad hoc to a more consistent, analytical basis, increased importance will be attached to the data underlying national-level decisions.

### 2.1.2 Public Policy Implementation and Enforcement Issues

It is universally recognized that a major obstacle to effective policy implementation is the relatively small size of the country and lack of human and financial resources. The realization that all the national government's functions ranging from foreign relations to social welfare must be accomplished on a budget (total current expenditure) of \$133 million (Belize dollars, 1988/89), less than the average U.S. county budget, places the challenge in proper perspective.

Thus, policy monitoring and enforcement are weak. The limited public budget and low population (187,000 in 1989) place constraints on government services that manage natural resources. A handful of public servants, many lacking both training and access to transport and other essential services, are attempting to provide the same level of service as that of a much larger economy. Examples are abundant: seven fisheries officers cannot be expected to patrol all bodies of water, even when petrol is available and patrol boats are in working order; a forestry staff of 6 professionals, 16 technical personnel and 24 forest guards cannot enforce regulations over 8,000 square miles of forestland; and a hydrology staff of one cannot monitor water quality in all the towns and villages of the country, let alone the rural areas.

As in most developing countries, the government of Belize is unable to effectively implement and enforce many policies because of insufficient human, financial and technical resources. For example, there is no formal training scheme for the Department of Forestry staff ("Belize Tropical Forestry Action Plan", 1989). As a result, several non-governmental organizations have been founded with external funding to work on natural resource issues. In an extreme case, the Belize Audubon Society is delegated the responsibility to management protected areas (Letter from Mr. Rodney Neal, 1987). This complicates the policy-making environment, because these NGOs not only advocate their own programs, but they are also somewhat obligated to promote policies advocated by their funding agencies. Although they are not formally involved in policy-making, they are developing significant power through their lobbying efforts. Their interests may or may not be compatible with those of the government.

Despite their heavy lobbying of ministers, the extent of the NGO impact on the formulation and implementation of policy is not clear.

## **2.2 Other Socio-Economic Aspects that have an Impact on Natural Resources**

Today, both human and economic pressures are affecting the resource base in Belize. These factors include a rapidly growing population with limited opportunities in the manufacturing and service sectors, political and economic conditions that restrict access to the most fertile lands, adherence to cultural and traditional practices and a false sense of security about the carrying capacity of the renewable natural resource base. Given that approximately 44% of the population is under 15 years old, these pressures will not diminish over time unless the structure of the economy changes.

### **2.2.1 Demographics**

The census of 1980 placed the population of Belize at about 145,000, a number which by 1990 has likely grown to about 190,000 (Leonard, 1987). Roughly half the people live in seven large urban centers while the dispersed rural population makes up little more than 5% of the total. The population density of about eight persons per square kilometer is the lowest of any country in the Central American region. El Salvador, for instance, is almost the same size as Belize but its population is over 5 million. The low density can be partly explained by the swampy and unproductive land near the coast and the steep slopes and shallow soils of the interior, both of which discourage settlement and development. In addition, cultural tradition has encouraged heavier settlement along the coast.

### **2.2.2 Environmental Awareness**

Heretofore, national resource conservation was not a serious consideration in policy-making, largely because of the widespread perception that Belize's natural resources are bountiful relative to the small population base. However, it is clear that this perception is changing through the efforts of teachers in the schools, and the NGO community, including The Belize Center for Environmental Studies, The Belize Audubon Society, The Belize Zoo and Education Center and the Hol Chan Marine Reserve Visitors Center. The Government's recent hesitation to commit additional land to intensive uses without adequate physical planning and private sector efforts such as the new Timber Association's encouragement of sustainable timber harvest practices are positive outcomes from increasing environmental awareness. These efforts and others need to be encouraged and accelerated to ensure that natural resource issues are embedded in policy discussions.

Demonstration of sustainable development also has positive spill over effects. Benefits to the tourism and fishing industries from the establishment of the Hol Chan Marine Reserve has fostered private sector support for more marine reserves (Azueta, personal communications 1990). The Spanish Lookout region's high agricultural productivity and use of sustainable agricultural techniques have had important demonstration effects on Santa Teresita and other nearby areas. Subsistence farmers began to adopt modern agricultural technologies within one year of exposure to techniques used by the Spanish Lookout farmers (Chavarria, personal communications 1990).

### 3.0 NATURAL RESOURCE POLICY INSTITUTIONS

Institutions issue both formal and informal rules and procedures affecting the way that society manages its natural resources. For each natural resource theme (sustainable agriculture, production from natural forests, watershed management and management of wildlands), the main official institutions and their interactions are briefly described using charts.

These four charts illustrate the complexity of the institutional environment in a compact format. Along both the vertical and horizontal axes, the names of the main institutions that implement policies related to the particular natural resource issue are listed. In each non-diagonal cell of a chart an "+" appears if there is a cooperative relationship between the two institutions identified by that cell. A "-" appears if the two institutions interact but not on a cooperative basis. If the cell is blank, it indicates that although both institutions are involved in policies affecting the natural resource issue, there is no interaction.

A discussion that highlights the degree of institutional complexity, coordination and cooperation follows each chart. This information provides the institutional framework needed to discuss the policy issues presented in Chapters 4 and 5.

	PUBLIC AND QUASI GOVERNMENT										PRIVATE FOR PROFIT																	
	MINISTRY OF AGRICULTURE	MINISTRY OF TRADE & COMMERCE	MINISTRY OF ECONOMIC DEVELOPMENT	MINISTRY OF NATURAL RESOURCES & INDUSTRY	MINISTRY OF TOURISM & ENVIRONMENT	MINISTRY OF EDUCATION	MINISTRY OF PUBLIC WORKS	MINISTRY OF SOCIAL SERVICES	MINISTRY OF FINANCE	D F C	PESTICIDE BOARD	BANANA CONTROL BOARD	SUGAR CONTROL BOARD	MARKETING BOARD	COMMERCIAL BANKS : PRIVATE FOR PROFIT	CITRUS GROWERS ASSOCIATION	BANANA GROWERS ASSOCIATION	CANE FARMERS ASSOCIATION	LIVESTOCK PRODUCERS ASSOCIATION	BEST : PRIVATE NON - PROFIT	BARD	BEIPN	BABCO	HELP FOR PROGRESS	CARICOM : INTERNATIONAL ORGANIZATIONS	CARDI	CARE	FAO
MINISTRY OF AGRICULTURE	-	+	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+
MINISTRY OF TRADE & COMMERCE																												
MINISTRY OF ECONOMIC DEVELOPMENT																												
MINISTRY OF NATURAL RESOURCES & INDUSTRY																												
MINISTRY OF TOURISM & ENVIRONMENT																												
MINISTRY OF EDUCATION																												
MINISTRY OF PUBLIC WORKS																												
MINISTRY OF SOCIAL SERVICES																												
MINISTRY OF FINANCE																												
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BANANA CONTROL BOARD																												
SUGAR CONTROL BOARD																												
MARKETING BOARD																												
COMMERCIAL BANKS : PRIVATE FOR PROFIT																												
CITRUS GROWERS ASSOCIATION																												
BANANA GROWERS ASSOCIATION																												
CANE FARMERS ASSOCIATION																												
LIVESTOCK PRODUCERS ASSOCIATION																												
BEST : PRIVATE NON - PROFIT																												
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BABCO																												
HELP FOR PROGRESS																												
CARICOM : INTERNATIONAL ORGANIZATIONS																												
CARDI																												
CARE																												
FAO																												

### 3.1 Sustainable Agriculture

Agriculture is the largest economic sector in Belize as measured by contribution to GDP (1988), employment or number of institutions involved in decision-making. The relatively large number of decision-making bodies leads to considerable complexity in policy-making, including duplication of effort and inadequate coordination of programs.

In Chart 3.1, 26 public and private organizations are identified as major role players in sustainable agriculture. Not listed but certainly important in the Belizean style of decision-making is an array of advisory committees and associations organized to influence policy on individual commodities or functions.

The Ministry of Agriculture and Fisheries (MAF) plays the dominant role in policy for sustainable agriculture. Its strongest positive interactions are with groups on which it has formal representation. Specific examples include the Development Finance Corporation (DFC), the Belize Marketing Board (BMB) and the relatively new Pesticide Board, which make decisions on, respectively, agricultural credit; the purchase, storage, release and price support activities of major food grains and other commodities; and permissible pesticides and safe procedures for handling and applying them. Each organization interacts closely with a ministry representative serving on the board of directors.

A second category of organization with strong bonds to MAF consists of the private, nonprofit and international development organizations whose program success is linked closely to ministry programs or personnel. Relationships with the private nonprofit groups are usually informal and directed toward improving the productivity of low-resource farmers. These relationships are much improved over past periods when each group had its own agenda and little coordination with the ministry. The international organizations generally have a formal reporting or participatory relationship focused on completing a particular project or funding commitment.

Positive interactions affecting sustainable agriculture also occur between the Ministry of Trade and Commerce and the commodity boards (and member associations) that it regulates. While there are intense discussions on such topics as quotas and prices paid, the relationships focus primarily on achieving specific goals. Good relationships are also developing among the several private nonprofit groups and between them and the international organizations. Cooperation among the smaller private organizations is spurred by the need to augment their limited resources by drawing on help from each other.

Certain other organizations have adversarial relationships with MAF by virtue of their functions, most notably the Ministries of Trade and Commerce, Natural Resources, and Industry and Finance (relating primarily to annual and within-year budget allocations for the latter). The budget process has a negative impact on MAF because disbursements are monthly while many agricultural needs are seasonal. MAF has negative relationships with Trade and Commerce because of conflicting opinions and at times insufficient consultation on the timing and quantity of the import and export of food commodities. Conflicts arise between the Ministry of Natural Resources and the Ministry of Industry over

land use and the dereserving of forestland for agriculture. In addition, the two ministries overlap on the activities of the citrus and sugar control boards.

Likewise, relationships are not good between MAF and the grower associations in citrus, bananas and cane, primarily because the associations are not well served by MAF and so they have formed specialized and competing extension efforts for their members.

Additional difficulties can be expected between these associations and the Ministry of Tourism and Environment, and the Pesticide Board. Both the ministry and the board, which are both in the process of being established, can be expected to exert control where little or none existed before.

In Belize the failure to coordinate programs may have more of a long-term negative impact on economic growth and resource use than friction in mandated joint efforts. For example, MAF and the Ministry of Public Works should cooperate far more on decisions regarding the location of new farm-to-market roads.

The programs of two other ministries that affect sustainable agriculture are not well-coordinated with MAF. The Ministry of Social Services is responsible for rural development efforts and the 4-H program. The Ministry of Education implements programs in the technical high schools with vocational agriculture programs and in rural schools. Neither of these educational programs coordinates well with the research and extension programs and the Belize College of Agriculture, which MAF supervises. Coordination in training and better utilization of public resources would enhance sustainable agricultural development in the long run.

Efforts to establish coordination between government ministries usually take the form of an advisory board set up along functional lines. However, if decisions are not reported back to the ministries or if excessive time is spent discussing the problem and not agreeing on recommendations, the advisory board is not effective.

A common complaint from the commodity groups and private nonprofit organizations is that their views are excluded from policy-making. Because of the limits in ministry personnel and travel budgets, there is little opportunity for public service workers to learn firsthand what is happening in the countryside. Nonetheless, it is important to increase interaction between the private sector and government policy-makers.

CHART 3.2  
 PRODUCTION FROM NATURAL FORESTS

<u>PUBLIC AND QUASI GOVERNMENT</u>	MINISTRY OF NATURAL RESOURCES AND INDUSTRY	LANDS COMMISSION	FORESTRY DEPARTMENT	MINISTRY OF AGRICULTURE & FISHERIES	MINISTRY OF TRADE & COMMERCE	MINISTRY OF FINANCE	MINISTRY OF ECONOMIC DEVELOPMENT	PRIVATE - FOR PROFIT	TIMBER ASSOCIATION	BTIA	PRIVATE - NON PROFIT	PROGRAMME FOR BELIZE	INTERNATIONAL ORGANIZATIONS	CARICOM
<u>MINISTRY OF NATURAL RESOURCES AND INDUSTRY:</u>														
A) LANDS COMMISSION	-	+	+	+	+	+	+	-	+					
B) FORESTRY DEPARTMENT		-	+	+	+	+	+		+					
	<u>MINISTRY OF AGRICULTURE &amp; FISHERIES</u>													
	<u>MINISTRY OF TRADE &amp; COMMERCE</u>				+	+	-							+
	<u>MINISTRY OF FINANCE</u>													
	<u>MINISTRY OF ECONOMIC DEVELOPMENT</u>													+
<u>PRIVATE - FOR PROFIT</u>	<u>TIMBER ASSOCIATION</u>													
	<u>BTIA</u>													
<u>PRIVATE - NON PROFIT</u>	<u>PROGRAMME FOR BELIZE</u>													
<u>INTERNATIONAL ORGANIZATIONS</u>	<u>CARICOM</u>													

### 3.2 Production From Natural Forests

Policies affecting the management of natural forests in Belize fall under relatively few institutions, as illustrated in Chart 3.2. In the public sector, policy decision-making and implementation is mainly under the Ministry of Natural Resources and Industry.

Within this ministry, conflicts have arisen between the Forestry Department, which supports the conservation and maintenance of forest reserves, and the Lands Commission over recent policies to "dereserve" forests for agriculture production, especially citrus. MAF has a cooperative relationship with the Lands Commission and an antagonistic relationship with the Forest Department on this issue. In the private sector, the Belize Tourism Institute Association, the Belize Center for Environmental Studies, and the Belize Audubon Society have lobbied the Ministry of Natural Resources against dereserving forestland. Decisions to set aside lands for forest reserves were made in the 1920s based on geographic location, not on technical information such as soil surveys. Hence, some observers argue today that certain portions of the forest reserves are more appropriate for agriculture. However, recent actions to "dereserve" forestland have also been criticized as failing to consider technical information concerning appropriate land use and proceeding without consultation with the Forestry Department (Rosado, personal communications 1990). When the Forestry Department was in the Ministry of Agriculture, and the Lands Department was within the Ministry of Natural Resources and Industry, approval by two ministers was required before a concession was granted. Now, with both departments under the Ministry of Natural Resources and Industry, the process of dereserving is accelerated (Belisle, personal communications 1990).

The ministry as a whole has a cooperative relationship with the Ministries of Finance and Economic Development in granting land concessions for timber production.

Within the private sector, the Programme for Belize has worked closely with the Ministry of Natural Resources and Industry on the Programme for Belize management plan. This program is an innovative and recent effort to use a forest area located in the northwest of the country as a demonstration model for sustainable natural forest production and management.

Recently, public and private sector institutions concerned with forestry sector policies have been making significant efforts to coordinate. The Minister of Industry and Natural Resources has requested that the Timber Association, along with members of the Ministry of Trade and Commerce and the Ministry of Finance, work with his lands officer to assess the key fiscal policies governing the forestry sector.

Among other ministries, there are some interactions directly affecting the forests. The Ministry of Economic Development works closely with other ministries to set policies regarding all concessions. These general relationships affect the timber industry to the extent that the ministries make policies regarding concessions on import duties for the timber industry. Also, to the extent that CARICOM and the Ministries of Trade and Commerce negotiate tariffs concerning forestry products, they indirectly affect the management of

the natural forests.

Chart 3.2 also has some important gaps. The Ministry of Works, which builds roads and infrastructure, does not interact with the Ministry of Natural Resources or the Timber Association when deciding where to locate roads. Although other sectors of the economy are aided by government infrastructure, the private forestry sector builds its own roads (Roberson, personal communications 1990).

On the financial side, the forestry sector is not aided by DFC or private bank loans. These institutions have a policy of not lending to timber producers, based on past financial performance.

The private sector has little involvement in making and implementing policies. However, the Timber Association is relatively new, so private sector participation might increase in the future. The Timber Association has lobbied against the current royalties for timber production paid to the Ministry of Trade and Commerce (Canton, personal communications 1990).

CHART 3.3  
MANAGEMENT OF WATER RESOURCES

	MINISTRY OF AGRICULTURE & FISHERIES	MINISTRY OF DEFENCE	MINISTRY OF ECONOMIC DEVELOPMENT	MINISTRY OF ENERGY	MINISTRY OF ENVIRONMENT & TOURISM	MINISTRY OF FOREIGN AFFAIRS	MINISTRY OF HEALTH	MINISTRY OF NATURAL RESOURCES	MINISTRY OF TRADE & COMMERCE	MINISTRY OF WORKS	QUASI - GOVERNMENT	PESTICIDE CONTROL BOARD	WATER AND SEWAGE AUTHORITY	PRIVATE	INTERNATIONAL
MINISTRY OF AGRICULTURE & FISHERIES	+	+													
MINISTRY OF DEFENCE															
MINISTRY OF ECONOMIC DEVELOPMENT			+												
MINISTRY OF ENERGY															
MINISTRY OF ENVIRONMENT & TOURISM															
MINISTRY OF FOREIGN AFFAIRS						+									
MINISTRY OF HEALTH															
MINISTRY OF NATURAL RESOURCES															
MINISTRY OF TRADE & COMMERCE															
MINISTRY OF WORKS															
QUASI - GOVERNMENT															
BELIZE PORT AUTHORITY															
DEVELOPMENT FINANCE CORPORATION															
PESTICIDE CONTROL BOARD															
WATER AND SEWAGE AUTHORITY															
PRIVATE															
BELIZE FISHERMEN CO-OPERATIVES ASSOCIATION															
BELIZE TOURISM INDUSTRY ASSOCIATION															
FISHERMEN CO-OPERATIVES															
TOURISM GUIDE ASSOCIATION															
INTERNATIONAL															
CAPE INTERNATIONAL															
WORLD BANK															

### **3.3 Management of Water Resources**

Water resources have played an important role in the economic development of Belize. Traditionally, certain agencies have been associated with particular aspects of water management and control, while others have operated on the periphery in relative obscurity. This has encouraged a feeling of ownership in the policy arena, whether the agency's involvement has been officially mandated or not. Because the management of water is primarily regulatory, most of the organizations involved in determining policy on this resource are government or government-related agencies.

Water resource issues can be subdivided into three main areas: water quality, physical alteration or degradation of the shorelines and substrates and exploitation of the resource. With respect to water quality management, some of the agencies have positive relationships with each other. MAF, through its Fisheries Department, and the Ministry of Health, through its Public Health Bureau, are the two predominant agencies issuing and executing policies. The Public Health Bureau's participation was mandated by law through the Public Health Act, while the Fisheries Department involvement has largely resulted from its responsibilities concerning the fishing industry. Two quasi-government agencies--the Water and Sewerage Authority and the Pesticide Control Board--have also been given legal mandate over water quality. Because the Pesticide Control Board is new, its impact on water resources has been limited. It has developed a close relationship with the Public Health Bureau (Linares, personal communication 1990). The Public Health Bureau and Water Sewerage Authority do coordinate activities with respect to water contamination and waste disposal. The Fisheries Department and Public Health Bureau coordinate with each other on standards for fish processing plants, but otherwise each agency operates relatively autonomously on water contamination and waste disposal.

Many agencies affect decisions on the physical alteration or degradation of shorelines and substrates. The major player is the Ministry of Natural Resources through the Department of Forestry, the Department of Lands and the Geology and Petroleum Unit. To date, they are the only agencies that request impact assessment statements from other agencies with some major involvement including MAF and the Ministry of Economic Development. The Ministry of Economic Development is responsible for granting development concessions, and usually tries to obtain a technical assessment of development projects and their possible effects before concessions are granted. This is a particularly complex situation since even departments within the Ministry of Natural Resources have some negative interactions. Most of these agencies coordinate with each other to some extent, with the exception of the Lands Department. For example, the Lands Department approves mangrove areas for development, while the Forestry Department tries to protect mangroves through the Mangrove Act. Other agencies that play a role in or have some effect on the alteration of shorelines and substrates are the Ministry of Works through its roadwork and public project activities, and the Belize Port Authority through its ports development and maintenance projects. The Ministry of Works and the Port Authority interact with each other but tend to operate in isolation from other agencies.

Resource utilization is another area of institutional complexity. Although

the major player is the Fisheries Department, which is legally mandated through the Fisheries Act to manage marine resources, other groups and agencies actively participate in the policy process. Some of the major actors include the Ministry of Tourism and the Environment, Ministry of Natural Resources, Ministry of Trade and Commerce, Ministry of Foreign Affairs, Belize Tourism Industry Association, Belize Fishermen Cooperative Association, the fishermen cooperatives, the Tourist Guide Association and Care International.

Many of the conflicts over marine resources occur between the fishing and tourism-oriented interests. The more positive relationships are found in formulation of interministry strategies for effective utilization of resources, especially between the Fisheries Department (MAF) and the Ministry of Tourism. The Ministry of Economic Development coordinates well with most of the relevant agencies involved in a development plan.

Key agencies involved in managing water resources interact very little, as illustrated in Chart 3.3. Most agencies are independent of and oblivious to other institutions with whom they clearly should interact. For example, the Geology and Petroleum Unit is responsible for sand and mineral mining. However, the Ministry of Works, which mines sand from the rivers, does not follow closely the policies and requirements of the Geology Unit (Neal, personal communications 1990). Furthermore, official policy mandates overlap. For example, the Geology and Petroleum Unit, the Public Health Bureau, the Water and Sewerage Authority and the Pesticide Control Board are all legally charged with pollution monitoring and control. When crises occur, agencies are forced to work together under difficult circumstances, which results in slow mobilization and inefficient use of equipment and labor.



### 3.4 Management of Wildlands

Belize began to develop a system of protected areas in the 1920s. The Forestry Department of the Ministry of Natural Resources and Industry is mandated to manage these lands. However, over the years, various other organizations from both the public and the private sectors have become involved in the promotion, establishment and management of protected areas, as indicated by Chart 3.4. The nature of the interactions among these agencies vary, but for the most part they are positive.

The private sector plays a very active role in wildlands establishment and management. In general, it has strong cooperative relationships with the public sector. The Belize Audubon Society, with approval from the Minister of Natural Resources and Industry, manages and protects the areas designated under the National Parks Act (Letter from Mr. Rodney Neal, 1987).

The private sector has taken several initiatives in the creation of parks and protected areas. The recently established Programme for Belize, the major private land holder among the private sector agencies, worked closely with the government in creating a forestry and wildlife management plan for its land holdings. As it is implemented, interactions with both private and public agencies will become more clearly defined.

The Shipstern Reserve and the Community Baboon Sanctuary are private lands that have been converted to protected areas for the conservation of the region's biodiversity. Shipstern Reserve recently underwent managerial change and is now in the process of exchanging information with public and private sector organizations engaged in protected land management. The Community Baboon Sanctuary, managed by the Belize Audubon Society, is a grassroots conservation effort by rural small-scale farmers. In addition, private landowners with property along the northern end of Ambergris Caye have made a pledge to regulate environmental conditions, such as artificial light during the night, to preserve a turtle nesting site (J. Gibson, personal communications 1990).

Presently neither the Belize Zoo and Tropical Education Center nor the Belize Center for Environmental Studies manages wildlands. However, the Belize Center actively supports agencies directly involved in doing so, and the Belize Zoo is promoting the establishment of a protected area in the Vaca Plateau Region of Cayo District.

Not all interactions among private institutions are positive. In general, the Belize Audubon Society does not coordinate its activities with other NGOs of Belize. Chart 3.4 also shows that the Belize Fishermen's Cooperative Association interests are in conflict with the interests of agencies involved in creating marine reserves. Fishermen tend to see the creation of protected areas along the reef as a threat to the size of their fishing grounds ("Fishermen Respond to Tuesday Beacon", January 10, 1989).

Belize is fast becoming a tourist destination. Because private institutions involved with tourism, such as the Belize Tourism Industry and Tour Guide Associations recognize that the main attraction is the national parks and other protected areas, they support the agencies involved with protected areas.

For example, given that an estimated 80 percent of tourists to Belize are destined for the beaches and coral reef near San Pedro, both agencies were major lobbyists for the creation of the Hol Chan Marine Reserve. The tourism division of the Ministry of Tourism and the Environment also has a close working relationship with those involved with wildlands.

The recently established environmental segment of the ministry has begun to develop ties with other institutions involved in wildlands management. It has established a Belize National Environmental Council, composed of 16 members from the NGO community and the business community, and permanent secretaries and department heads from key ministries. The permanent secretary views its institutional role to be in the areas of environmental impact assessments, public education and awareness of environmental issues, and information gathering (Perdomo, personal communications 1990). To the degree that this ministry develops these avenues of policy-making and implementation, it will develop mechanisms to interact with private and public sector institutions.

Several international agencies participate in conservation activities in Belize. World Wildlife Fund-US, one of the key players, provide financial support for several major conservation projects, such as the Hol Chan Marine Reserve and the Cockscomb Basin Wildlife Sanctuary. The Community Baboon Sanctuary has also benefitted from its assistance.

The International Union for the Conservation of Nature and Natural Resources (IUCN), with a regional office in San Jose, Costa Rica, has also participated in the conservation effort in Belize. This organization is actively involved in promoting proper management of the Belize Barrier Reef. IUCN promotes sustainable development throughout the region and is currently seeking ways to carry out the effort in Belize. IUCN has pledged to do in-country training of Belizeans in environmental impact assessment as part of the effort.

Wild Wings Foundation, New York Zoological Society and the MacArthur Foundation also promote wildlands management and protection of the biological diversity of Belize. These agencies work directly with the country's private voluntary organizations such as the Belize Audubon Society, the Belize Zoo and Tropical Education Center and the Belize Center for Environmental Studies.

Peace Corps Belize is also active, having provided volunteers over the past five years to the Belize Audubon Society to assist in the daily management and development of protected areas.

## 4.0 THE NATURAL RESOURCE POLICY INVENTORY

This chapter discusses the role of Central American and Caribbean regional policies and international agreements affecting Belize's natural resources and summarizes the results from the policy inventory tables for sector and subsector policies.

### 4.1 Regional Policies

Belize has a history of economic cooperation with its Caribbean neighbors through CARICOM, the Caribbean Development Bank, and CARDI. It also has close ties to the U.S. through the Caribbean Basin Initiative, bilateral agreements with the U.K. and a preferential position in EEC markets through the Lome Convention. Banana, citrus and sugar export markets are protected. The U.S. grants Belize a quota for sugar, U.S. import duties on citrus products are exempted, and the EEC gives preferential treatment to Belize's sugar and banana industries. With respect to natural resource issues, the Government of Belize participated in a 1989 regional conference on environmental issues in Barbados and is planning to send representatives to a conference on sustainable development in Jamaica in May 1990, sponsored by the Canadian Institute for Research and Public Policy and CARICOM (Y. Hyde, personal communications 1990).

Belize has limited interaction with its Central American neighbors on natural resource issues, despite the fact that such linkages are critical to the management of the resources. Some these relationships are divisive rather than cooperative. These include Belize's territorial fishing disputes with Guatemala, Mexico and Honduras and the settlement of refugees from El Salvador and Guatemala in Belize. With respect to water resource policies, there is no cooperation between Belize and Guatemala concerning the quality of water in the rivers flowing from Guatemala into Belize. In addition, the national territory of Belizean waters is not strictly enforced.

Several efforts are underway to improve regional cooperation in environmental issues. In the past decade, tensions have eased with Guatemala and stronger ties developed with Mexico. Currently, the governments of Mexico, Belize and Guatemala are discussing a proposed tri-national park (D. Gibson, personal communications 1990). In addition, Belize and Mexico exchange information and technical assistance concerning forestry conservation. Although no agreements relating to pollution problems of shared waters (Chetumal Bay and the Rio Hondo) have been signed, talks between Mexico and Belize are gaining momentum and water quality is expected to be addressed soon.

The governments of Mexico, Belize, Guatemala, Honduras and El Salvador have entered into an agreement to promote Maya tourism in the region. The Ruta Maya project is managed by a joint commission with two representatives from each country, one each from the public and private sectors. A provisional secretariat has been established in Guatemala and funding for administration costs and promotion is provided by the EEC.

In 1989, Belize became a member of the Confederacion Centroamerica Para

Desarrollo, a regional NGO organization. It is also a member of REDES, a regional network of environmental organizations for the sustainable development of Central America. In June of 1990, efforts were initiated to bring Belize into the recently created Central American Environment and Development Commission (Comision Centroamericana de Ambiente y Desarrollo [CCAD]). Although not a signatory to CCAD, Belize has been invited and participated in the Commission's workshops. Nevertheless, for cultural affinity and economic ties, Belize continues to rely more on the U.K, the U.S. and Caribbean countries.

#### **4.2 International Policies**

Belize has signed two major international treaties and agreements concerned with conservation: the Law of the Seas (not yet ratified) and the Convention International Trade in Endangered Species of Fauna and Flora (CITES).

International donors have significant leverage in the policy-making process in Belize. In the 1990-1991 government budget, 27.5 percent of the government projects are paid for by external funding (Waight, personal communications 1990). These international donors place some resource mining control conditions, such as environmental impact assessment and management plan requirements, on loans (Y. Hyde, personal communications 1990).

#### **4.3 Domestic Policies**

The political party of the current government, the People's United Party, has issued its "Party Manifesto." This document outlines the broad policy objectives and strategies of the current government, including promotion of the agriculture and tourism industries and the protection of the environment. It gives little detail in the policy tools it uses to achieve the objectives. The People's United Party Manifesto 1989-1994 calls for the promotion of agricultural production and exports in citrus, bananas, vegetables, oil crops and livestock. Production of staple commodities will be promoted in the Toledo District. Strategies to reach these objectives include providing land clearing, technical assistance and credit services are provided to farmers, supporting the Caribbean Basin Initiative and protecting other export markets, improving port facilities, and improving pastures and livestock production technology. With respect to the protection of the environment, the Party Manifesto calls for a comprehensive plan to protect the coral reefs and to combat coastal erosion and pollution of rivers and streams. It also promotes the creation of national parks and reserves and the advancement of tourism as a channel for economic development. The government promises training for tourism, hotel management and services, road building to Mayan ruins, and coordination of the objectives of tourism promotion resource protection. Ecotourism is given high priority, given its compatible economic growth and protection of the natural environment objectives.

The ministers use the Party Manifesto as a guideline for policy making decisions. However, the actual policies governing management of Belize's natural resources are more expansive than those briefly outlined in the Party Manifesto, given the very general terms of the manifesto, the enormous decision-making power granted to the individual ministers, and the other political and financial constraints discussed in Chapter 2.

#### 4.3.1 Macroeconomic Policies

Macroeconomic policies are generally designed to support the national development strategy of promoting export-led growth by diversifying agricultural production and exports away from sugar into bananas, citrus, cocoa and fisheries. The garment and tourism markets are also promoted ("Belize Economic Memorandum," 1990 and Rau, personal communications 1990). In addition to fiscal, trade and regulatory policies, the government promotes these industries through infrastructure development and support of private investment. Infrastructure projects include upgrading and maintaining key roads, constructing and upgrading bridges, and constructing rural access roads and bridges to facilitate efficient transportation of agricultural produce. Government budget allocation policies follow these lines with increasing attention to the social sector, particularly education, road construction and housing. Except for loan conditions from international donor agencies, natural resource issues are taken into account in the budget allocation process (Waight, personal communications 1990).

Domestic agricultural markets are protected by tariffs and import license requirements. While the average tariff across all commodities is 30%, livestock and crops have a preferential 45% rate as well as import duties. Import licenses are required for staple commodities (beans, maize, rice), sugar, flour, fresh fruits and vegetables (citrus), meats, poultry, jams and jellies, animal feed, and fertilizer.

The allocation of government loans also favors agriculture, which received over 30% of the Development Finance loans in 1989, surpassed only by housing loans. However, DFC policies are not consistent with the macroeconomic policy of crop diversification. While over 67% of the loans for agriculture were allocated for sugar cane production, only 13% was allocated to citrus, 7% to livestock, and 0.1% to vegetable production. No credit was allocated to bananas, dairy, fishing, forestry, honey, coconut, or mixed farming.

DFC has no policy regarding the environmental impact of their agriculture loan portfolio and it does not target sustainable agricultural activities. In fact, past DFC lending to small farmers without land title who practice slash and burn agriculture has discouraged adoption of sustainable agriculture techniques. Sustainable agriculture could be enhanced if DFC provided loans for economically viable capital.

Monetary policies are fairly restrictive and are designed to encourage savings. Interest rates are controlled by requiring commercial banks to maintain a minimum lending rate of 10%. Because there is no government insurance on private bank deposits, commercial banks typically hold more than the 28% of their liquid assets required by the Central Bank (Rau, personal communications 1990).

Without such insurance and with interest rate controls, commercial banks are quite averse to risk. Because they perceive that Belize has a limited client base, the banks are not willing to expand their loan portfolio into marginal and high risk borrowers. The uncertainties regarding future market fluctuations, coupled with interest rate restrictions, intensify the reluctance of commercial banks to issue long-term loans (Bedran, personal communications 1990). The combination of equity requirements, unfavorable interest rates and unavailability

of loanable funds is a major deterrent to new investment. With respect to the current account, there are no capital controls other than the fixed exchange rate of two Belize dollars for one U.S. dollar. To avoid the flight of capital out of the country, capital controls forbid Belizeans from holding foreign assets (Rau, personal communications 1990).

Tax revenue for the government is collected mainly from import duties. There is no sales tax, property taxes are based on undervalued land, and export taxes are minimal. The income tax is biased against wage earners, with deductions taken directly from their paychecks, and biased toward businesses using cash transactions. In general, the income tax is not enforced (Rau, personal communication 1990). This tax structure encourages private sector activities, but provides insufficient funds for government programs and projects and enforcement of policies.

Thus, macroeconomic policies result in a high rate of personal and public savings, conservative commercial bank lending policies, and limited government resources, all of which significantly constrains the country's economic development. For instance, in the manufacturing industries and the timber industry, poor infrastructure and credit constraints are major obstacles to development. As a result of these factors and the limited population pressure, damage to the natural resources from activities such as dumping of industrial wastes, are relatively low. The key exception is the agriculture sector where government policies designed to promote exports, without regard to the environmental impact, result in heavy demands on water and land resources.

#### 4.3.2 Sector and Subsector Policies

The summary tables below provide lists of the sector and subsector policies identified for each natural resource issue and places them in their respective policy categories. After each summary table, the policy issues are presented. For specific information on a policy, the reader is referred to the policy inventory tables in Appendix A. These tables, one for each of the most significant policies listed in the summary tables, are organized first by natural resource theme and second by policy categories (i.e. sustainable agricultural tables are first under the following policy categories: fiscal, trade, regulatory and development; followed by production from natural forests with the same policy categories).

Each policy inventory table contains the basic components of the inventory:

1. The policy
2. The objectives
3. The institutions
4. A qualitative assessment of the policy impact on short run economic growth, natural resources in the short run, the long run economic growth, and natural resources in the long run.
5. A brief explanation of the policy impact
6. The principal alternatives suggested for analysis

## SUMMARY TABLE OF POLICIES AND THEIR OBJECTIVES

### SUSTAINABLE AGRICULTURE

<u>POLICY</u>	<u>OBJECTIVES</u>
Land Tax Act 1982 (Rural Land Utilization)	To generate tax revenues from rural lands differentiated according to vegetative cover and proximity to public roads and to provide incentives to shift idle rural lands to productive use or to avoid lands lying idle for speculative purposes.
Development Incentives of Income Tax Holidays and Import Duty Concessions for Agricultural Production	To stimulate private sector investment in agriculture.
Crown Lands Act	Provides authority for sale, lease, grant, and any other disposition of all lands other than reserved forests and cayses.
Sugar Industry (Control) and Sugar Cane Farmer's Association Laws	Regulates producer sales of sugar cane by license and quota, manufacture and sale of sugar including import and export.
Citrus (Production and Processing) Law	Control by license the sale of citrus from producers to processor, price received by producers, processing of fruit and import and export of products.
Restricted Use of Pesticides (Pesticide Control Act)	To classify pesticides use into three categories: registered, restricted and prohibited; to license their import manufacture or sale and to prescribe conditions for storage and application.
Credit Policies of the DFC Law	To finance the development of agriculture and other sectors and to promote capital investment.
Public Roads Law	To provide for construction and maintenance of all public roads.
Agriculture Policy of Belize	To develop a comprehensive guideline for agricultural development and establish priorities based on the resource base and competitive marketing advantages.
Marketing Board Law	To purchase, store, process and sell products of Belize. It is also the organization responsible for implementing Government price support activities for major grains.

#### 4.3.2.1 Sustainable Agriculture.

The policies that provide the framework for sustainable agricultural development can be grouped into three categories: those primarily affecting access to lands; those directed to productive factors other than land; and those that are commodity-specific. This analysis focuses on the 10 policies judged most important in influence on agricultural development. Selection of these 10 policies was based on a qualitative assessment of information gathered during the inventory from interviews and documents.

A startling finding of the analysis was that only one of the 10 policies was the direct responsibility of the Ministry of Agriculture and Fisheries. The one ministry-administered policy is the comprehensive agricultural policy statement (not a law of Belize) that sets the tone and direction for all the ministry's efforts. Two other policies, administered by the Belize Marketing Board and the Pesticide Board which are linked directly to the Ministry, improve product marketing and processing and regulate the use of pesticides. The other seven policies, discussed below are implemented by other agencies of the government.

Perhaps the most important policy category concerning sustainable agriculture is land resources, which includes three laws that play especially important roles in shifting land to more productive agricultural use: the land tax law, the law to distribute public lands (Crown Lands Ordinance) and the law providing for road access.

An immediate observation concerning these laws is that the transfer of additional land to agricultural use will damage the natural resource base. For example, land appraisal for the land tax system is not based on guidelines related to land productivity. Rural lands are differentiated according to vegetative cover and proximity to public roads. Also, the Land Tax Act contains tax exemptions on rural properties where permanent improvements have been made on parcels of less than 100 acres. These exemptions are designed only to discourage the use of idle lands for speculative purposes, rather than encourage sustainable development. Policies concerning the granting of income tax holidays and import duty concessions have similar weaknesses. Anyone can apply to the Ministry of Economic Development for a tax holiday or a import duty concession, and more concessions have been approved for agricultural enterprises than for any other type of business. However, these concessions are granted without investigating the optimal use of the land.

Often disposition of public lands and the building of public roads is dictated more by political expediency than by sound policies designed to accommodate both economic growth and natural resource conservation. Recently, 300 acres of public lands with marginal soils was granted to citrus producers despite the fact that the Ministry of Agriculture's technical evidence and analysis showed that the land was not appropriate for agriculture (Y. Hyde and Neal, personal communications 1990). Since the late 1980s, 1400 acres of land were dereserved for citrus, of which only 400 were suitable for citrus production (T. Chanona, personal communications 1990). There is no coordinated effort to match productive lands with infrastructure development (T. Chanona, personal communications 1990). The Ministry of Economic Development consults informally

with other ministries on environmental issues for development concessions, but this is on an ad hoc basis (Y. Hyde, personal communications 1990). Dean Lindo, former Minister of Agriculture, Forestry and Fisheries<sup>3</sup> could not identify an example when environmental issues were raised in a development concession case (Lindo, personal communications 1990).

The gap between an optimal allocation of lands and actual practice is considerable for several reasons. First, adequate information is unavailable to justify changes in land use, which leads to decisions that damage both agriculture and the environment. Second, traditional slash and burn agriculture often severely harms the environment while failing to expand agricultural output. Third, the present allocation system is subject to political whims which results in dereserving forestland that, based on technical information concerning the natural resources, should be either retained in natural cover or only partially dereserved. All these practices create conflict between sustainable agriculture and the natural resource base.

There is clearly room in Belize for further agricultural development in conjunction with natural resource protection. An examination of land-use figures places the issue in perspective. Agriculture use constitutes a very small proportion of the total land surface in Belize. The total land area of Belize is 5.7 million acres with some 2.2 million classified as suitable for agriculture. However, it is estimated that less than 15% the land suitable for agriculture is currently being cultivated<sup>4</sup> ("An Assessment of Belize's Agricultural Sector," 1988, p.11). In total, there are 11,011 farm holdings with 626,009 acres in agriculture including pasture and farmer-owned forest ("1984-85 Agricultural Census," 1987, p. 228).

Conversion of lands into agriculture should not damage the natural resource base if concession decisions are based on a sound land use policy. A conflict between economic development and natural resource conservation is possible when unsuitable soils are converted and/or sustainable agricultural production practices are not followed. The clear implication for the category of laws affecting land use and road construction is to ensure the retention of the lands most appropriate for forestry or other natural vegetative cover.

The policies in the second category--those directed at productive factors other than land--cover pesticide use, agricultural credit, market and processing facilities and fiscal policy designed to stimulate investment in productive agriculture. The general objective of all policies in this category is to increase efficiency and production. The Pesticide Law classifies pesticides use into three categories: registered, restricted and prohibited; licenses their import, manufacture and sale; and prescribes conditions for storage and

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<sup>3</sup> This ministry is now The Ministry of Agriculture and Fisheries.

<sup>4</sup> Some change in this classification is expected from a soils typing project now underway.

application. Credit is provided for capital investment in agriculture and the Belize Marketing Board (BMB) is mandated to purchase, store, process and sell products and implement government price support policies for major grains to reduce market risk to producers and encourage agricultural expansion.

While favorable to agricultural development, these policies can harm the natural resource base in two ways. First, they tend to result in more intensive agriculture by encouraging such practices as excessive fertilizer and pesticide use, heavy machine compaction of fragile soils, stream siltation and burning of natural land cover. For example, credit is not specifically targeted to farmers using sustainable agriculture technology. Second, Belize has very adequate regulatory policies, but only limited resources for monitoring and enforcing them. BMB has had only a small expansionary impact in encouraging the production of rice and maize in the south. Only two of six inspector positions included in the Pesticide Control Act have been filled to date, even though the law was enacted in 1985. As a result, the government does not always respond to reports of river contamination (Escalante, personal communications 1990) and pesticide contraband is a problem (Franklin and Neal, personal communications 1990). The Pesticide Board has not levied any fines for violations and prefers a policy of educating the public (Franklin, personal communications 1990). There is a policy prohibiting the cutting of vegetation along river banks, however, this has never been enforced. Expansion of the banana industry, coupled with its heavy use of pesticides, has caused soil erosion and water contamination (T. Chanona, personal communications 1990). As a result, agricultural development contributes directly to environmental damage in many of these areas.

The third category relates to production of three major commodities--sugar, citrus and bananas--which together comprised 64% of total exports in 1988 ("Annual Trade Report"). The organization of control boards and producer associations in these commodities is designed to regulate processing and sales, gain access to productive input and establish equitable prices and production rights. The Citrus Processing and Production Law controls by license the sale of citrus from producers to processor, price received by producer, processing of fruit and international trade of products. The Sugar Industry Control Law regulates producer sales of sugarcane by license and quota, and manufacture and sale (both domestic and international) of sugar. The Banana Industry Law authorizes the Banana Control Board to produce, purchase, sell or export bananas, issue licenses for cultivation of bananas in areas designated by the Minister of Agriculture, provide credit to the Banana Growers Association, issue licenses for international trade in bananas. The sum total of these activities is to increase grower profitability and expand output. These policies have evidently succeeded, based on a one-third expansion in the exports of the three commodities over the four-year period of 1984-88 ("Annual Trade Reports").

However, there has been a deterioration in the natural resource base associated with this economic success. Citrus and banana production has been shifting from flat, fertile lands to marginal hillside and poorly drained areas. Clearing of vegetation cover up to stream banks has caused siltation in streams that appears to be spreading all the way to the reef. Aerial spraying of chemicals has also contaminated streams. Continued expansion of these input-intensive commodities in relatively small, well-defined areas will exacerbate deterioration of the natural resource base.

The causes of conflict are twofold: inadequate or nonexistent enforcement of protective policies and intensive pressure on the resource base in a small area. Concessions have been granted for citrus production on over 300 acres of marginal lands (Y. Hyde, personal communications 1990). Regulations prohibiting the clearing of lands along riverbanks and pesticide laws are not enforced. While agricultural lands constitute a small portion of the total area, environmental problems do arise in particular areas where production is concentrated or where the rules governing conversion of natural vegetative cover to agricultural use are disregarded.

In addition to these major policies, private sector organizations, funded by donor agencies, promote sustainable agriculture through several small-scale projects. The Belize Agency for Rural Development provides support to informal cooperatives. Its activities include providing technical assistance to small subsistence farmer to transfer into sedentary agriculture, using mechanized techniques and growing permanent crops. Help for Progress' activities include educating milperos and refugees by maintaining an organic farm to demonstrate sustainable agricultural practices and providing training to implement a long-term crop diversification program.

There are a few significant policy gaps in the area of sustainable agriculture. In addition to the lack of a land use policy, Belize has not established standards for testing pesticide residue in crops or beef (Chavarria, personal communications 1990). Extension services are not geared toward the promotion of sustainable agriculture techniques, i.e. environmentally sound land clearing, plowing and drainage techniques (Chavarria, personal communications). An area of 6000 acres located in southern Stann Creek District provides a good example of the natural resource implications from this lack of services. This area is ideal for citrus production, with access to markets, electricity and a factory, and appropriate soil for citrus production. However, because no services are provided to drain the area, citrus farmers are expanding their production into critical watershed areas (T. Chanona, personal communications 1990).

In summary, Belize has the potential to promote agricultural development without conflicting with the natural resource base. Because agriculture consumes only a small fraction of total land area, the expansion of this sector can remain as the top national development priority while the natural resource base is simultaneously preserved and maintained.

However, existing policies will have to be enforced if this objective is to be met. Enforcement will entail improving the data base for making decisions and to the extent possible, transforming land use decision making from an ad hoc, political process to an effort which conforms to a national land use plan. In addition, ministerial portfolios should be realigned to reduce the overlapping of responsibilities. In this process, the Ministry of Agriculture should play a greater role in the sector it is charged to develop. At present, the ministry administers few policies that have any influence on agricultural development.

## SUMMARY TABLE OF POLICIES AND THEIR OBJECTIVES

### PRODUCTION FROM NATURAL FORESTS

<u>POLICY</u>	<u>OBJECTIVES</u>
Royalty for Cutting Standing Timber	To obtain government revenue.
Price Controls on Lumber Products	To prevent high consumer prices in periods of supply shortages.
Permits and Licenses for Logging	To regulate private sector logging activities.
Maximum Girth for Cutting Timber on Public and Private Lands	To regulate cutting of timber to ensure natural regeneration.

#### 4.3.2.2 Production from Natural Forests.

Domestic price controls, maximum girth limits for cutting, royalty rates and logging license policies provide the core incentive structure for production from natural forests.

Girth limits are set to ensure that mature specimens of commercial species remain to reseed the site. However, girth limits are not used as a tool to promote optimal and sustainable management of the forests. In fact, issuing minimum felling girth restrictions without implementing a policy which controls the area exploited is harmful to the forests of Belize in the long run. Because the majority of commercial species found in Belize are intolerant of shade after the seedling stage and are fast-growing, intermediate size classes of trees cut off the light to succeeding cohorts of their species. As such, there are naturally a limited number of trees in intermediate size classes. Repeated logging of the largest trees and repeated licensing of a given forest area without allowing for recuperation removes the genetic traits for fast-growing trees from the forests. Hence, the policy is in direct conflict with sustainable yield ("Belize Tropical Forestry Action Plan", 1989).

Price controls on timber have significant negative impacts on both the economic health and natural resource base for the timber industry. Prices of woods are not sufficiently differentiated. Mahogany and cedar in particular are highly undervalued compared to world prices. These domestic price distortions discourage production of secondary hardwoods and encourage domestic consumption of high value hardwoods. In the long run, the forest is not managed as well as it could be, because the social value of the forest resources is not realized in the market economy. Price distortions, coupled with a road system that only permits the use of expensive log transportation equipment which substantially raises operating costs, go a long way in explaining the unsustainable harvesting of cedar and mahogany species and the lack of a secondary wood market in Belize.

Royalties are charged per cubic foot of timber removed from a licensed area<sup>5</sup>. This practice encourages the cutting of trees which bring the highest returns per unit of volume harvested rather than per unit of area harvested. Variations in royalty rates among species do not reflect the differences in the world market values of species and their qualities, or in the logging costs of a particular licensed area. These distortions create inefficiencies in the timber industry over the long run.

Licenses and permits for timber operations are issued on an annual basis, with an option for renewal if the licensee has followed regulations. However, conditions for issuing forest reserve licenses and permits are vague and not based on sustainable yield information. As such, they often encourage the removal of entire forests for temporary or permanent agriculture ("Belize Tropical Forestry Action Plan," 1989). The licenses and permits do not

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<sup>5</sup> Royalties for private lands are one-half the amount charged for trees harvested from forest reserves or Crown Lands, except for private lands under 100 acres, for which no royalty is charged for trees cut for personal use of the landowner.

incorporate sustainable forest management policy tools, such as the definition of annual coupes or logging blocks. Coupled with the lack of a national land use policy, these policies satisfy short-run economic growth objectives at the expense of sustainable timber and agriculture activities and the natural resource base.

As discussed in the sustainable agricultural section above, policies related to the conversion of natural forests to agricultural use in general are not based on technical information concerning optimal land use, economic feasibility and sustainability and the relevant agricultural technology. Without a comprehensive land use policy, the natural forests cannot be managed optimally in the long run.

In addition to these policies which do not encourage sustainable lumber production activities, the lack of resources in the Forestry Department is a key constraint in effective implementation and enforcement of forest management policies. The department is understaffed (Table 4-A), and it has no formal technical training programs. As a result, protection and management of the forests is ineffective; fines for damaging regeneration of forests are not imposed; powers to direct and control road and trail building are not used; and charges for Forestry Department constructed roads are minimal ("Belize Tropical Forest Action Plan," 1989).

**TABLE 4-A**

**ACTUAL AND RECOMMENDED STAFFING OF THE FORESTRY DEPARTMENT**

	<u>ACTUAL</u>	<u>RECOMMENDED</u>
Professionals	6	10-12
Technicians	16	16-20
Forest guards/park wardens	24	40

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 Source: Belize Tropical Forest Action Plan, 1989.

Reforestation constitutes an important gap in the set of policies identified. Neither the private or public sector has any significant reforestation programs nor any management of plantation areas from past reforestation projects. A lumber grading system is also lacking and contributes to an inefficient domestic pricing system.

## SUMMARY TABLE OF POLICIES AND THEIR OBJECTIVES

### MANAGEMENT OF WATER RESOURCES

<u>POLICY</u>	<u>OBJECTIVES</u>
Licenses for Mining Prospecting and Dredging (Mines and Minerals Act)	To control the amount of physical degradation, provide funding for possible damaging effects on environment associated with extraction, and provide revenue to the government for private sector use of nonrenewable resources.
Public Health Act and Water and Sewage Authority Act	To prevent the contamination and pollution of surface and ground water resources through proper liquid and solid waste disposal methods.
Potable Water Supply	To ensure that there is a potable supply of water from ground or surface source for all communities in Belize.
Protection of Aquatic Fauna and Flora (Belize Fisheries Act)	To guarantee the continuity of commercially exploited species. Ensure the continuity of natural populations in their natural habitat.
Shoreline Maintenance Along Navigable Waterways and Prevention of Mangrove Destruction (Crown Lands Act and Mangrove Legislation)	To prevent destruction of mangroves, and restrict development close to edge of waterways to prevent erosion, shoreline degradation and destruction of critical habitat.
Restricted Use of Pesticides (Pesticide Control Act)	To classify pesticides use into three categories: registered, restricted and prohibited; to license their import manufacture or sale and to prescribe conditions for storage and application.
Port Development (Belize Port Authority Act)	To develop and maintain port facilities.
Duty Exemptions and Development Concessions for Aquaculture Industry	To encourage private sector investments both local and foreign and development of aquaculture industry.
Land Development Policies	To provide land for development and administer the development of land.

#### 4.3.2.3 Management of Water Resources.

Over 30 policies were identified by the Inventory as significantly affecting the management of water resources. Nine of these are discussed in detail in Appendix A. Policies affecting water resources are focused on three main areas: water quality, the physical alteration of shorelines and substrates, and the utilization of aquatic resources, primarily through fishing and tourism. These policies often take the form of regulations since they affect a renewable resource that is common property.

Water Quality. Land development, waste disposal management, potable water and pesticide policies significantly affect the quality of the water supply. Land development policies are found in the Land Reform, Belize Land Development Authority, Crown Lands, Land Tax, Land Acquisition, Registered Land and Aliens Landholding Acts. As discussed in the Sustainable Agriculture section 4.3.2.1 above, these laws are used to promote the agricultural sector. Land development policies also impact the quality of the water supply as land clearing leads to increased soil runoff and contamination from pesticides which are washed into the water course.

Waste disposal management policies are founded in the Public Health Act and Water and Sewage Authority Act. However, the management strategies are focused on addressing short-term needs, rather than developing and implementing a long-term strategy that reduces the effects of increased organic and toxic loads on water resources.

Belize has a policy to ensure that there is a potable supply of water from ground or surface sources for all communities. Under the Public Health Bureau and Water and Sewage Authority, water quality is monitored using chemical and bacterial analysis on a regular basis throughout the country, following World Health Organization standards. The public health inspector is present at time of installation to advise on location of drilling and water sample is analyzed before hand pump is installed in rural areas. (Linares, personal communications 1990). However, although the availability of potable water is a critical factor in determining the extent and the rate at which development takes place, especially in the tourist industry, development concessions do not require assessment of water availability (Nicolait, personal communications 1990).

Pesticide policies are described in the sustainable agriculture section 4.3.2.1. Their impact on the water resources is difficult to determine, given no baseline data. However, informal observations point toward deterioration in water quality and destruction of marine habitat in coastal zones.

Physical Alteration of Shorelines and Substrates. Several policies affect water resources through physical alteration of shorelines and substrates including provisions in the Mines and Minerals Act to issue licenses for mining prospecting and dredging, a policy of maintaining a strip of public land along any navigable waterway and the Belize Port Development Act.

Utilization of Aquatic Resources. Development of an aquaculture industry is promoted through export tax exemptions and development concessions while the Fisheries Act provides for the protection of aquatic fauna and flora to ensure

the continuity of commercially exploited species.

As outlined above, these nine critical policies are supported by laws that broadly outline intent and give the appropriate minister the authority to establish specific regulations. On paper, these policies support the long-term sustainability and viability of the water resources of Belize. However in practice, there are problems: faulty potable water supply systems are sometimes installed in rural area, causing financial costs and resource problems in the long-run; the Fisheries Act is not updated to reflect changing demands on aquaculture resources; the current rate of harvesting conch is not sustainable; and environmental impact assessments of development activities on watersheds, shorelines and substrates are not systematically conducted. The question, then, is why are they not working?

Ineffective policy implementation appears to be at least a partial explanation. The key reason for this failure is the lack of financial, material and personnel resources. For example, approximately 50% of the fishermen abide by the regulations and 40% of the catch enters the black market (Azueta, personal communications 1990). Alan Burn estimates that 25% of the fishermen commit violations that harm the industry in the long run (personal communications 1990). The Fisheries staff with two patrol boats cannot effectively monitor the activities of Belize's territorial waters. With respect to water management, there are only two sewage treatment plants in Belize and the Water and Sewerage Authority has only three engineers on staff. Other policies that could be used as a tool to manage aquatic resources are not effectively implemented. For examples, the government has never denied a request for a fishing license (Burn, personal communications 1990), and a license for mining rivers for gravel is easy to obtain. Four licenses for river mining operations were issued for locations in close proximity along the Belize River without any environmental assessment made (Hufford, personal communications 1990).

Moreover, there is little or no inter-agency cooperation and coordination in areas where it is clearly needed. Jurisdictional overlap is another major problem. When two departments in the same ministry have overlapping mandates, the adverse effects can be mitigated at the upper levels of administration, but when the overlap is between two ministries, it can cause strained relations, as is evident in the areas of waste disposal and development incentives.

The most significant gap in the policy set is the lack of coastal zone management, given the importance of the coral reef for the economy and ecology of Belize. Many agencies partially address this issue: The Fisheries Department has jurisdiction over aquatic species; the Geology and Petroleum Unit, mining and dredging; the Forestry Department, mangroves; the Lands Department, land for development; and the Water and Sewerage Authority and Public Health Bureau, liquid and solid waste disposal. However, there is no institutional coordination or comprehensive policy on coastal zone management. Since structures for controlling these activities are already in place, the problems of coastal zone management can be addressed by mandating coordination of these agencies. Private sector institutions concerned with environmental issues have taken on the task of developing a coastal zone management plan. Research, funded by IUCN, WWF, USAID, ODA and Australia's Great Barrier Reef Marine Park Authority, is underway to develop a comprehensive coastal zone management plan. Wildlife Conservation

International and the Hol Chan Marine Reserve held a workshop on coastal zone management issues in August 1989 (J. Gibson, personal communications 1990).

The Inventory identified other gaps in the policy set:

- o There is no policy related to plans or emergency preparation for an offshore oil spill. Belize imports 100% of its demand for oil.
- o Testing water quality is not required prior to the granting of a development concession.
- o No monitoring of water contamination from industry or agriculture.
- o No requirement to treat water sources for villages.
- o There is no policy to require compliance with Belize fishing laws for the renewal of a joint venture contract between Belizean fishermen and companies from other countries engaging in shrimping.

## SUMMARY TABLE OF POLICIES AND THEIR OBJECTIVES

### MANAGEMENT OF WILDLANDS

<u>POLICY</u>	<u>OBJECTIVES</u>
Establishment of Protected Areas and Forest Reserves (Crown Lands Act and National Parks Systems Act)	To preserve and protect important natural and cultural heritage. Regulate scientific, educational and recreational use of Belize's natural and cultural heritage.
Establishment of Marine Reserves	To protect the marine ecosystem.
Mangrove Legislation	To establish rules and regulations to protect mangroves.
Declaration of Wildlife Protection (Wildlife Protection Act)	To protect the wildlife of Belize.

#### 4.3.2.4 Management of Wildlands.

Several policies were identified as having significant impacts on the management of Belize's wildlife of which four are deemed most important:

- o The establishment of protected areas and forest reserves
- o The establishment of marine reserves
- o Protection of mangroves
- o Protection of wildlife

The Crown Lands Ordinance (1924), and the National Parks Act (1982) provide the legal basis for environmental conservation and the establishment of protected areas. Under the Crown Lands Ordinance, 51 acres of forest were declared a crown reserve, known as the Guanacaste National Park. Several small mangrove cayes and Half Moon Caye are crown reserve bird sanctuaries under the Crown Land Ordinance. These areas are important since they serve as nesting sites for many species. All the bird sanctuaries and parks established under the Crown Lands Ordinance have been placed under the interim management of the Belize Audubon Society.

The National Parks System Act calls for the preservation, protection, and regulated use of highly important natural and cultural features. Provisions within the act allow the Minister of Natural Resources to designate a specified area of crown land as a national park, a nature reserve, a wildlife sanctuary or a natural monument. The chief forest officer is responsible for managing all areas established under this act. To date, the following areas have been established under the National Parks System Act of 1981:

NAME	ACREAGE	YEAR ESTABLISHED
Cockscomb Basin Wildlife Sanctuary	3640	1986
Society Hall Nature Reserve	6741	1986
Blue Hole National Park	575	1984
Crooked Tree Wildlife Sanctuary	2900	1984
Half Moon Caye Natural Monument	9700	1982

Belize's great barrier reef, the atolls and the sand and mangrove cayes are not only critical to the well-being of the county's fishing and tourism sectors, but also to the protection of wildlife and marine species. The Hol Chan Marine Reserve, established in 1988, covers approximately 5 square miles off the Ambergris Caye and is divided into three ecological zones: the coral reef, seagrass beds and mangroves.

In February 1989, an amendment to the Forestry Law was passed to protect mangroves. A permit for cutting from the Forestry Department is required before clearing any mangroves. The effectiveness of these regulations depends on how thoroughly the permit applications are reviewed and the degree of enforcement. Mangrove cutting without permit does occur, to some extent, in Belize.

The legal protection of wildlife is based on the Wildlife Protection Act of 1982. This act permits licensed hunting of game animals used by Belizeans, while protecting species listed in the CITES agreements. The law also prohibits hunting of immature wildlife and females accompanied by young. Enforcement of these regulations is practically nonexistent because the Forestry Department lacks resources. However, the government is effective in stopping illegal large-scale export of animals (Hartshorn, 1984).

Local grassroots support and participation in the policy process is significant to the success of these policies because the government lacks sufficient funds to effectively manage protected areas. For example, the Programme for Belize, which was established in 1988 with funds from the Massachusetts Audubon Society and endorsed by several Belizean and U.S. NGOs, is dedicated to "manage and conserve major areas of Belize's natural ecosystems and the wildlife and plant resources contained in these areas" (Programme for Belize, 1990). In areas where private sector participation and management is lacking, resource degradation continues. Continuous grassroots support is also critical to secure the permanent establishment of national parks because the declaration of national parks is by ministerial fiat, rather than legislation. The Minister of Natural Resources and Industry has the ability to establish or abolish a national park without the consensus of any party.

Some elements of these policies hinder economic growth in the short run. For instance, the development of a marina for power boats in the West Landivar area is currently under consideration. However, members of the community are opposed to its construction because the area is appropriate for manatees (sea cows). Other examples include restricting timber production to selective logging in forest reserves and prohibiting hunting and gathering of protected species (particularly in big game hunting). In the long run, however, these protection policies provide strong economic growth potential through the development of ecotourism in Belize.

Currently, the largest concentration of tourist activity is on Ambergris Caye and the adjoining reef where there are already signs of excessive pressure on both the infrastructure and the resource base. Lobster is reportedly being over-harvested to fill tourists' demands for seafood. Increased tourism has also placed stress on water resources as evidenced by the shortage of pure water at San Pedro. Waste disposal has become a problem and an unconfirmed report indicates the reef may be deteriorating. If the reef deteriorates, both tourism and fishing will suffer, and the standard of living of the people involved in these activities will, of course, decline. The government is well aware that excessive traffic can also destroy the very qualities that make the environment attractive to tourists. Nevertheless, the Hol Chan Marine Reserve has only one biologist and two rangers to gather data and enforce regulations. This staff

sporadically enforces its policies that restrict access to and activities permitted in the Reserve, although no citations have been issued or fines imposed (Azueta, personal communications 1990).

The one policy area where various groups have significant conflicting interests is the establishment of marine reserves. Some fishermen are strongly opposed to creating more marine reserves, holding that new reserves adversely affect their livelihood. Other fishermen, in particular those who also serve as tour guides for the coral reef, are proponents of new marine reserves. According to Azueta, manager of the Hol Chan Marine Reserve, approximately half of the tour guides are also fishermen by trade and they earn 300% more in tourist activities. As a result, only 5% of the fishermen are still opposed to the Reserve. As information is collected on the positive impact of the Hol Chan Marine Reserve on the supply of marine life in the reef<sup>6</sup>, these conflicting interests should be mitigated. Some fishermen began requesting that reserves be created near Caye Caulker and Placencia a few months after Hol Chan was established (Azueta, personal communications 1990).

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<sup>6</sup> Large increases in fauna were observed near the Reserve 3 months after its creation (Azueta, personal communications 1990).

## 5.0 IDENTIFICATION OF MAJOR RESEARCH AREAS

### 5.1 Introduction

Two main conclusions relating to natural resource use have been drawn from the inventory of natural resource policies in Belize. First, except for the few omissions mentioned in Chapter 4, Belize has an adequate legislative framework that with only minor modification can protect its natural resource base. Second, the legislation is often not enforced; hence, it fails to achieve its objectives.

The lack of enforcement is due to limited financial and human resources, an inadequate data base with which to estimate the stock of natural resources and its sustainable yield, and the low priority that politicians place on preserving natural resources, as opposed to achieving short-run economic growth.

The solutions to the understaffing problem are not readily apparent but several steps could help. The government workforce is probably excessive in certain areas and could be selectively pruned. The remaining employees need to be trained so as to become more productive and to be paid at a level comparable to their worth in the private sector. Resources essential to the performance of duties must be made available as they are needed. Transport, for example, along with spare parts and petrol, must be available consistently, not just on a random basis. The national budget process must be revised to reflect performance incentives and updated priorities. Without increasing budget outlays, public service salary increases could be directly linked to job performance consistent with policy goals. Basing budget allocation decisions partly on an agency's ability to generate revenue rather than directing all revenue to the general fund would also improve performance incentives.

It is no surprise that public sector pay is low compared to the private sector and will likely remain so. However, an effort should be made to retain the more productive workers and to encourage efficiency by linking pay to performance rather than continuing to make blanket pay adjustments. Moreover, performance review and reward should be removed from political influence by setting dates for pay adjustments which do not correspond to political elections.

Incentives for revenue generation could easily be created. A unit of a government ministry, which in the course of its duties sells a product or service to the public, has no incentive to increase sales or to deliver a higher quality product because all sales revenues must revert to the general fund. It would be much more rational to provide incentives to encourage job performance in the form of bonuses or better working conditions. Not only would worker rewards be increased but general fund revenues would rise. Moreover, private sector opposition to taxes might decline if some of the government revenues from such fiscal policies were directly channeled back to the industry (Burns, personal communications 1990).

Resources for enforcement will increase as public perception of the problem grows and as donor organizations increasingly make project funding conditional on a natural resource component. The development of public appreciation and

political commitment is, of course, a long-term educational process. Researchers must contribute by providing new data on which to base policies for maintaining the stock of natural resources and for creating economic incentives for sustainable harvests.

## **5.2 Research to Improve the Data Base**

### **5.2.1 Sustainable Agriculture**

Information is needed on soil types and the production capabilities of various land areas in Belize. A soils mapping project presently underway will provide some needed data, which should be supplemented with topography, ownership and type of use information, all consolidated in the Lands Department for immediate access. This lands information bank could become the basis to remove land-use decisions from as much political pressure as possible. The national land-use plan would be especially important in the distribution of crown lands for private use and for more intensive uses. Providing a logical basis for distributing and using lands would be a major step in preventing further natural resource deterioration. These efforts would be enhanced by use of a plan to develop roads and other public facilities and to define permissible uses of private lands.

Information is needed on the sale and use of pesticides in agriculture by type, application and location. Belize is in the process of shifting from a subsistence, largely milpa type of agriculture to a larger scale, more commercial system dependent on agricultural chemicals. At present little is known about the chemicals used, their rates of application or their impacts on the environment.

Assistance needs to be provided to the relatively new Pesticides Board in obtaining this information, as well as data on alternative means of pest control and the levels of pesticide residue that humans absorb from foods and the impact of pest control on natural resources. With this information, policymakers can determine appropriate pesticide use in Belize.

### **5.2.2 Production from Natural Forests**

Under the current licensing system, harvest records are kept only for the entire concession area. Closer monitoring of the rate of extraction of timber for specific areas is needed to evaluate the impact of production incentives on the stock of forest resources. Information on international markets for secondary hardwoods and the extent of Belize's comparative advantage in entering these markets is needed. The potential for agroforestry and other feasible production activities should be investigated. Research and development in forestation would provide useful information for future reforestation projects and productive use of cleared lands.

### **5.2.3 Management of Water Resources**

Effective watershed management requires data on the quantity and quality of all water resources in the country. In addition, baseline data on marine resources, changes in water temperature, nutrient level and quantity of algae both within and beyond the coral reef are needed to isolate the causes of

deterioration in water quality, to assess the rate at which marine resources are being depleted and the sustainable level of tourism on the reef and to evaluate the feasibility of deep sea fishing. An appropriate coastal zone management plan cannot be created or implemented without this information. Some data on the coral reef are being collected by the Hol Chan Marine Reserve staff, but much more are needed.

Some efforts have been made to obtain industry data. As of 1989, firms mining rivers for gravel must submit logs of prices and quantities to the government.

#### 5.2.4 Management of Wildlands

Inventories of flora and fauna in the forest reserves and ecological studies on specific species must be taken to develop and evaluate management plans for forest reserves. Baseline data are needed to monitor the impact of changes in land use on biodiversity in Belize. Although research permits are issued to scientist visiting Belize, there is no policy requiring that the results are presented to the government.

### 5.3 Research to Develop Policy Alternatives for Sustainable Economic Growth and Natural Resource Conservation

#### 5.3.1 Sustainable Agriculture

Research is needed to develop packages of farming systems for Belizean soils. These systems should have the dual objective of improving agricultural productivity and conserving resources. Thus far, little consideration has been given to natural resources in making loans for agricultural development. The growing concern about environmental degradation has sparked an interest in policies that have this dual objective.

Research information is needed on cost-effective, agricultural production methods using low input, resource conserving practices. Milpa farming generally requires a low level of inputs, but it depletes the soil, forestland and wildlife. Larger scale, commercial agriculture often wastes resources and depends heavily on agricultural chemicals. Both types of agriculture can benefit from research-extension packages of farming practices adapted to Belizean soils and topography. Special efforts should focus on milperos to develop and communicate farming systems packages designed to reduce migration and to increase practices that conserve resources. At the same time, conservation practices should avoid depleting soils, forests and wildlife and reducing water quality. Research on agroforestry systems appropriate for Belize and the development of extension services to train farmers in agroforestry management practices is needed.

The government has developed a set of priorities on refugee issues which include health care, market infrastructure, water supply and sanitation, settlement in rural areas appropriate for agricultural use and formal agricultural education. Given the demographic trends described in Chapter 2 and the traditional slash and burn agricultural practices of the refugees, many of whom are of Mayan descent, policy analysis and research of refugee issues should

focus on issues related to incentives to adopt long run natural resource management agricultural practices. For example, a refugee's insecure tenure status and lack of technical skills in agroforestry production, processing and marketing are major constraints to investment in long-term sustainability practices.

Research is needed on the economic use of the by-products of agricultural processing. Large quantities of unused sugar cane, citrus pulp and bananas pollute the streams and soils of Belize. Finding economic uses for these materials could increase returns to agriculture and reduce processing wastes.

Citrus pulp and bananas are potentially valuable livestock feed, and cane may be used as an energy source. Belize has very high energy costs and imports large quantities of livestock feed. Research on the technical suitability of these materials as feed and energy sources and the economic ratios under which substitution is practical could reduce on going and potential damage to the environment.

### 5.3.2 Production from Natural Forests

Price controls on lumber must either be eliminated or adjusted to reflect the variation in values of different species. The present pricing system causes overcutting and undervaluing of mahogany and cedar while secondary wood markets are not tapped. To further encourage the domestic production of secondary woods and discourage the mining of cedar and mahogany species, policies, such as tariffs on plywood, extension services to upgrade private sector production and marketing skills, the expansion of the road system in forest reserves and adjustment of the relative royalties on tree species to reflect different harvesting and transportation costs and market values should be considered. The newly created Timber Association could be used as a channel to disseminate marketing information to timber producers and exporters. In addition to improving production efficiency from the present stock of forests, policy incentives, such as tax exemptions, that encourage private reforestation should be investigated. Finally, forest management policy alternatives to the present girth limit system merit further investigation. One alternative is to require that a tract of land granted in a logging permit be subdivided into sections which would then be logged in rotation. This type of permit would prevent selective cutting of primary hardwoods and would reduce damage to the forests from random harvesting.

### 5.3.3 Management of Water Resources

Top priority should be given to the development of a comprehensive coastal zone management plan and a mechanism to foster institutional coordination for implementation of the plan. Other policy areas which merit further research and policy dialogue include:

- o Update of the Fishing Ordinance to reflect changing demands on aquatic resources (Azueta, personal communications 1990).
- o Foster public support through education for a moratorium on conch harvesting for at least two years.

- o Consider issuing policies which regulate contracts for joint ventures for shrimping and require compliance with Belize fishing laws for renewal of a contract.
- o Study mechanisms to require environmental impact assessment on watersheds for the construction of infrastructure, such as new roads or drainage or irrigation systems.

#### 5.3.4 Management of Wildlands

Tourism is one economic growth area that has been performing especially well. Major expansions in hotel capacity, tourist association projects and the international airport hold promise for continued economic growth. Tourism growth is a major benefit for the economy but can exert pressure on the natural resource base. Tourism policies should promote markets in which Belize has a comparative advantage over its Caribbean neighbors (i.e. inland ecotourism and the coral reef) and whose development can be supported by the natural resource base of the area. The Ministry of Tourism and the Environment is considering policies to protect these markets in the long run. Restricting the activities of dive boats and cruise ships in the reef area is one example (J. Gibson, personal communications 1990). Other policies should be implemented, such as the training tour guides and issuing certifications based on specified qualifications.

#### 5.4 Conclusions

As a country that has embarked on economic growth relatively recently, Belize must give priority to expansion of economic activity. However, careful planning is necessary to determine the development alternatives appropriate to Belize; economic planning can avoid the costly mistakes that have been made in other countries. The country should use technical information such as the new soil surveys and data on biodiversity as the foundation for defining land use zones and creating a long run land use policy. This policy would identify which areas are appropriate for agriculture production, forest production and preservation of biodiversity. Based on this information, a comprehensive policy to evaluate proposals for new reserves could be issued and appropriate management plans developed.

To facilitate such land-use planning, research is needed on the macro trade-offs between further development of commercial agriculture and preservation of the natural resource base as a stimulus for ecotourism and multiple-use forestry. Systematic requirements for comprehensive environmental impact assessments and consideration of the long-run sustained agricultural yield under alternative development systems will help policymakers decide which geographic areas to develop, how intensively to develop them, and what production systems to use.

## APPENDIX A

### THE POLICY INVENTORY TABLES

#### INTRODUCTION

This appendix presents the policy inventory tables and is divided into four sections by the natural resource themes sustainable agriculture, production from natural forest, management of water resources and management of wildlands. A summary table of the policies identified is provided in the beginning of each section. Within each section, the policies are further divided into the categories of fiscal, trade, regulatory and development. These tables are used to support the policy discussions of Chapter 4 and 5.

Each table describes a policy and its objectives, cites the main institution implementing or creating the policy, makes qualitative assessments of its impact on economic growth and the natural resource base in the short- and long-run and briefly explains each assessment, and lists policy alternatives or issues requiring further research. Qualitative assessments are based on the following scale:

- 2 significant negative impact
- 1 slightly negative impact
- 0 no impact
- +1 slightly positive impact
- +2 significant positive impact

Short-term is defined as a period less than two years, and long-term is defined as a period of greater than ten years. Medium-term effects were not analyzed. The assessments were made under ceterus paribus conditions, unless otherwise noted. Often assumptions concerning the implementation of a policy were needed to assess long-run impacts of the policy, and these were incorporated into the brief explanation of each assessment. These tables were made with limited quantitative information and stem from "round table" policy discussions among the team members and other experts.

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NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture  
POLICY CATEGORY: Fiscal

POLICY: The Land Tax Act 1982 (Rural Land Utilization) (The Laws of Belize Chapter 48).

PURPOSE: To generate tax revenues from rural lands differentiated according to vegetative cover and proximity to public roads and to provide incentives to shift idle rural lands to productive use (or to avoid lands lying idle for speculative purposes).

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Lands Department, Ministry of Natural Resources and Industry.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
----- +1	----- -1	----- +1	----- -2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: The act contains tax exemptions on rural properties where permanent improvements have been made or on parcels of less than 100 acres. These incentives lead to development of lands that might otherwise be idle.

SHORT-RUN NATURAL RESOURCE: To the extent that the rate of development accelerates, pressure on the natural resource base increases.

LONG-RUN GROWTH: The act (in conjunction with the Aliens Landholding Act, The Laws of Belize Chapter 144) is designed to prevent large tracts of land from being purchased (especially by foreigners) and held idle for speculative purposes. Tax incentives are used to encourage the shifting of idle land to productive use, thus stimulating more rapid economic growth.

LONG-RUN NATURAL RESOURCE: To the extent that the act succeeds in shifting land better left idle into a more intensive use and/or creates negative impacts on wildlife or stream sedimentation, the natural resource base will be degraded. Tax incentive structure is not related to a national land use policy.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o To examine the response of landholders to fiscal incentives for shifting land use.
- o To examine existing landholding patterns, including size of parcel, use, foreign ownership and changes over time in development impact.
- o To complete computerization of Lands Department records and the soils mapping project. Use information to define a national land use plan and requirements for an environmental impact assessment.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture

POLICY CATEGORY: Fiscal and Trade

POLICY: Development Incentives of income tax holidays and import duty concessions for agricultural production (The Laws of Belize Chapter 40).

PURPOSE: To stimulate private sector investment in agriculture.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Ministry of Economic Development; Ministry of Agriculture.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+1	-2	+2	-2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Development concessions have been successful in stimulating investment in Belize. Short-run growth is derived from initial investment and start-up.

SHORT-RUN NATURAL RESOURCE: Concessions are granted without technical analysis of proper land use. Short-run impact on the resource base is related to land clearing and start-up operations. Too often, the rush to enter production or to comply with provisions of the development plan causes wasteful practices that further deplete the resource base.

LONG-RUN GROWTH: More development concessions have been approved for agricultural enterprises than for any other type. As these mature and expand, the endeavors will contribute to national economic growth.

LONG-RUN NATURAL RESOURCE: To date, there is little enforcement of regulations designed to reduce damage to the natural resource base from farming operations. Current efforts in the Ministry of Natural Resources to improve land use planning might reduce this negative impact.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Consider including an environmental impact statement in all concession applications and determine how it might be weighted for resource conservation versus development objectives.
- o To assess the economic and environmental long run consequences of the trend to establish monocrop farming systems, such as sugar, citrus and banana.

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture  
POLICY CATEGORY: Regulatory

POLICY: Crown Lands Act (The Laws of Belize Chapter 147).

PURPOSE: Provides authority for sale, lease, grant, and any other disposition of all lands other than reserved forests and cayses.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Lands Department, Ministry of Natural Resources and Industry.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+1	-1	+2	+1

### BRIEF EXPLANATION OF POLICY IMPACT

**SHORT-RUN GROWTH:** Promotes the agriculture sector. Distribution of public lands and consequent shifts to more intensive uses contributes to GDP through immediate investment and longer term sale of products and services.

**SHORT-RUN NATURAL RESOURCE:** More intensive land uses associated with distribution of crown lands tends to deplete natural resources through selective timber harvesting, soil erosion and siltation from agriculture, and chemical and human waste from light manufacturing and tourism.

**LONG-RUN GROWTH:** Expansion of targeted economic activities which are land using (bananas, citrus) and are leaders in export growth driving the economy. Smaller land parcels are important in increasing domestic food production. However, the extent of benefits to the economy in the long-run is dependent upon sound land use policies. Efforts are now underway in the government to promote appropriate land use policies.

**LONG-RUN NATURAL RESOURCE:** With present lack of physical planning and excessive control by ministers, continued disposition of crown lands is dictated more by political expediency than by sound policies designed to accommodate both economic growth and natural resource conservation. Efforts are now underway in the government to promote appropriate land use policies.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Develop and implement a national land use plan based on present soils mapping project and long-term, sustainable development policy that considers natural resource depletion at an imputed value.
- o Define a land distribution policy based on consistent, long-term development and natural resource objectives removed from excessive political latitude.

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture

POLICY CATEGORY: Regulatory

POLICY: Sugar Industry (Control) (The Laws of Belize Chapter 232) and Sugar Cane Farmer's Association (The Laws of Belize Chapter 256).

PURPOSE: Regulates producer sales of sugar cane by license and quota, manufacture and sale of sugar including import and export.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Belize Sugar Board; Belize Cane Farmer's Association; Ministry of Natural Resources and Industry.

SHORT-RUN GROWTH	IMPACT ASSESSMENT		LONG-RUN NAT. RES.
	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	
----- +1	-1	+2	----- -1

### BRIEF EXPLANATION OF POLICY IMPACT

**SHORT-RUN GROWTH:** By providing stability to the industry and a market for sugar cane, agricultural output is stimulated. Sugar is the major income source for northern Belize.

**SHORT-RUN NATURAL RESOURCE:** There is deterioration associated with land clearing, annual burning of cane fields and stream pollution from manufacturing.

**LONG-RUN GROWTH:** The sugar industry has been the major economic stimulus for northern Belize and until recently was the leading foreign exchange earner.

**LONG-RUN NATURAL RESOURCE:** Extensive land clearing, farming practices and manufacturing negatively affect the resource base. However, sugar cane is not as destructive to soil and water resources as annual row crops.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Research alternative farming systems that can both increase output and conserve resources.
- o Research alternative uses for cane by-products and manufacturing residues.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture

POLICY CATEGORY: Regulatory

POLICY: Citrus (Processing and Production) (The Laws of Belize Chapter 225).

PURPOSE: Control by license the sale of citrus from producers to processor, price received by producers, processing of fruit and import and export of products.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Citrus Control Board; Citrus Grower's Association; Ministry of Natural Resources and Industry.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+1	-2	+2	-2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: This law increases producer price and market stability for citrus growers. Citrus is a large and growing component of the national export-led policy of growth and is successful in creating employment as well as foreign exchange earnings.

SHORT-RUN NATURAL RESOURCE: Continued expansion of area planted to citrus requires moving to increasingly fragile hillsides and watersheds.

LONG-RUN GROWTH: Major citrus expansion is stimulating economic growth in southern half of the country and providing added value to an agricultural product. The enterprise is also encouraging the development of a management/entrepreneurial group of growers/processors.

LONG-RUN NATURAL RESOURCE: Citrus production is becoming an environmental problem because marginal hillside land is being used, river banks are being cleared and large quantities of fertilizer and pesticides are leaching from sandy soils into streams.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Defining allowable public lands to shift from forest to citrus production according to soil type and topography in conjunction with the development of a national land use policy.
- o Continued research to increase citrus productivity with low input farming system.

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture  
POLICY CATEGORY: Regulatory

POLICY: Restricted use of pesticides (Pesticides Control Act Statutory Instrument No. 32 of 1985).

PURPOSE: To classify pesticides use into three categories: registered, restricted and prohibited; to license their import manufacture or sale and to prescribe conditions for storage and application.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Pesticides Control Board; Ministry of Agriculture and Fisheries.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
0	-1	+1	+1

### BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: No significant short-run impacts are expected although some adjustments in type of allowable pesticides used could temporarily reduce crop yields.

SHORT-RUN NATURAL RESOURCE: Immediate banning of more dangerous pesticides will reduce soil and stream pollution as well as residues. However, there has been a significant increase in the use of pesticides with the expansion of citrus and bananas and the pesticide control board lacks resources for enforcement of policy. Government does not always respond to reports of river contamination (Escalante, personal communications 1990).

LONG-RUN GROWTH: Enforcement of pesticide policy is needed to ensure sustained growth of agriculture, fishing and tourism industries. Training and licensing of pesticide applicators would permit reduced volume of pesticide use to achieve some control. Greater efficiency of pesticide use would both reduce costs and allow export sales that could otherwise be banned.

LONG-RUN NATURAL RESOURCE: If sufficient budget is provided, combination of licensing and training will result in less damage to natural resources.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Promote enforcement of regulations.
- o Cost benefit analysis of alternative levels of pesticide use on major crops with follow-up training of applicators.
- o Research on damage to national resource base in banana, citrus and rice producing regions.
- o Improved capacity to measure pesticide residues for consumer safety and export certification.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture

POLICY CATEGORY: Development

POLICY: Credit Policies of the Development Finance Corporation (The Laws of Belize Chapter 226).

PURPOSE: To finance the development of agriculture and other sectors and to promote capital investment.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Development Finance Corporation.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+1	-2	+1	-1

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Operating and investment capital is a limited resource in Belize relative to land and labor. To the extent that DFC provides economic and technically viable capital, sustainable agriculture will be enhanced.

SHORT-RUN NATURAL RESOURCE: Additional development financing will negatively affect natural resources connected with land clearing, habitat destruction and stream siltation for new lands and pesticide and fertilizer contaminants in continuing production. Past DFC lending to small farmers without land title who practice slash and burn agriculture has discouraged adoption of sustainable agricultural techniques.

LONG-RUN GROWTH: The returns to capital in Belizean agriculture are positive. However, DFC does not target sustainable agricultural activities. Some farming practices reduce long-run returns because of erosion, fertility loss and failure to use a complementary package of inputs.

LONG-RUN NATURAL RESOURCE: Extensive farming practices are generally destructive to the resource base and lead to longer term deterioration. DFC is improving its lending practices.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS:

- o Research to develop production functions for major crops under alternative levels of capital use and resource management.
- o Research to develop packages of farming practices with dual objective of improving agricultural productivity and resource conservation. Restrict DFC leading practices to producers following those supervised recommendations.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture

POLICY CATEGORY: Development

POLICY: Public Roads (The Laws of Belize Chapter 195).

PURPOSE: To provide for construction and maintenance of all public roads in Belize.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Ministry of Public Roads.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
-----	-----	-----	-----
+1	-1	+2	-1

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Employment and expenditures (including donor grants and loans) stimulate economic activity.

SHORT-RUN NATURAL RESOURCE: Destruction of wildlife habitat and forests and siltation of streams may accompany construction.

LONG-RUN GROWTH: The inadequacy of the road system is a major constraint to economic development in Belize. Removing this constraint will open new areas to agricultural development, lower transport costs to the southern half of the country and encourage more intensive agriculture in areas now poorly served.

LONG-RUN NATURAL RESOURCE: Shifting land from forest to agricultural use without reference to an appropriate national land use plan is generally detrimental to the natural resource base, depending on soil type, topography and management methods. If shifts follow a long-term plan based on sound resource management rather than the political expediency of public road development, detrimental impacts will be ameliorated.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Complete soil mapping project and a national land use plan defining areas appropriate for sustainable agriculture.
- o Within the context above, develop an analytical basis for new road construction and farm-to-market road improvement that is largely removed from political consideration. Study and support mechanisms to incorporate this technical information into the decision-making process.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture

POLICY CATEGORY: Development

POLICY: Agricultural Policy of Belize.

PURPOSE: To develop a comprehensive guideline for agricultural development and establish priorities based on the resource base and competitive marketing advantages.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Ministry of Agriculture and Fisheries; Development Finance Corporation; Belize Marketing Board; Lands Department, Ministry of Natural Resources and Industry; Ministry of Trade and Commerce.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+1	-1	+1	-1

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: This comprehensive policy statement serves as a market oriented guideline for expanded investment in agriculture generally and priority commodities specifically. Its application promotes investor confidence and enhances agricultural growth.

SHORT-RUN NATURAL RESOURCE: To the extent that commercial agriculture competes with conservation of land, water and forests, expanded commercialization of agriculture and more intensive use of purchased inputs exerts pressure on natural resources.

LONG-RUN GROWTH: An investment climate that encourages free enterprise will stimulate long-term growth and investment in commercial agriculture for domestic consumption and especially for export commodities. Strong growth potential only if policy targets sustainable agricultural practices.

LONG-RUN NATURAL RESOURCE: A comprehensive policy to stimulate commercial agriculture will compete directly with the preservation of natural resources, given the existing state of conservation practices and regulatory control of land use. However, since current agricultural land constitutes a small percent of total land appropriate for agriculture, there exists ample opportunity to rationally expand lands in agriculture without infringing on the natural resource base appropriate for other purposes.

## PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study macroeconomic trade-offs between further development of commercial agriculture and preservation of the resource base as a stimulus for ecotourism and multiple-use forestry.
- o Integrate present soil-type mapping project with agricultural commodity priorities, extension recommendations and development concessions.
- o Develop cost-effective, agricultural production methods using low input, resource-conserving practices and policy incentives to adopt such technology.
- o Resolve conflicts and overlapping between implementing organizations as a means to more effective implementation and enforcement of policies.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Sustainable Agriculture

POLICY CATEGORY: Development

POLICY: Marketing Board (The Laws of Belize Chapter 229).

PURPOSE: To purchase, store, process and sell products of Belize (and other products if needed). Belize Marketing Board is also the organization responsible for implementing Government price support activities for major grains.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Belize Marketing Board and Ministry of Agriculture and Fisheries.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+1	0	0	-1

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: In theory, BMB should reduce market risk to producers and encourage agricultural expansion. In practice, BMB has not performed well and has had only a small expansionary impact in encouraging production of rice and maize, particularly in the south.

SHORT-RUN NATURAL RESOURCE: It is unlikely that BMB has had any significant impact on the natural resource base.

LONG-RUN GROWTH: Will have a positive impact only if its scope of operations is expanded and refined.

LONG-RUN NATURAL RESOURCE: Over the long term, expansion of rice and maize in the south has encouraged slash and burn practices leading to deterioration of the natural resource base.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Expansion of efforts to develop and disseminate farming system package designed to reduce migration and use natural resource conserving practices.
- o Research to determine supply response of major food grains at alternative BMB purchase prices and impacts on natural resource base.

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## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Production from Natural Forests  
POLICY CATEGORY: Fiscal

POLICY: Royalty for cutting standing timber (rates per cubic foot), Forest Ordinance, Statutory Instrument No. 37 of 1980.

PURPOSE: Obtain government revenue.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Department of Forestry, Ministry of Natural Resources and Industry; Ministry of Finance.

SHORT-RUN GROWTH	IMPACT ASSESSMENT		LONG-RUN NAT. RES.
	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	
-1	-1	-2	-2

### BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Rate per unit volume rather than per unit area provided incentives to cut only trees with high market value. Other forest resources with marginal values are not extracted. Forest resources are undervalued.

SHORT-RUN NATURAL RESOURCE: Rate per unit volume rather than per unit area provided incentives to cut only trees with high market value. Other forest resources with marginal values are not extracted.

LONG-RUN GROWTH: Royalty rates are not differentiated across species to reflect standing tree values. Price distortions create inefficiencies in lumber market over long run. Mahogany and other valued species have been mined while secondary specie extraction is below its potential. Government revenue generated is not directly allocated to Forestry Department. Little incentive for Forestry Department to use royalty rates as a tool to optimize revenue generation and ensure sustainable timber industry.

LONG-RUN NATURAL RESOURCE: Royalty rates are not differentiated across species to reflect standing tree values. Mahogany and other valued species have been mined while secondary specie extraction is below its potential. Government revenue generated is not directly allocated to Forestry Department. Little incentive for Forestry Department to use royalty rates as a tool to optimize revenue generation and promote long run sustainable management of forest resources.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study appropriate royalty rates for various species reflecting market values and logging and transportation costs.
- o Study means to increase the budget of the Forestry Department, including mechanisms to retrieve government revenue generated from forestry activities.

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Production from Natural Forests

POLICY CATEGORY: Regulatory

POLICY: Price controls on lumber products.

PURPOSE: To prevent high consumer prices in periods of supply shortages.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Ministry of Trade and Commerce.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
0	-2	-1	-2

### BRIEF EXPLANATION OF POLICY IMPACT

**SHORT-RUN GROWTH:** Benefits consumers through below market prices, but discourages production of secondary hardwoods. Import controls eliminate potential channel to alleviate supply shortages. Price distortions create market inefficiencies: encourages use of high valued woods for inappropriate uses such as fencepost.

**SHORT-RUN NATURAL RESOURCE:** Management of forest resources is suboptimal because social value of the forest resources is not realized in the market economy. Encourages mining of mahogany and cedar.

**LONG-RUN GROWTH:** Negative impact on both consumers and producers by discourages development of secondary hardwood market.

**LONG-RUN NATURAL RESOURCE:** Management of forest resources is suboptimal because social value of the forest resources is not realized in the market economy. Encourages mining of mahogany and cedar.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study impact of releasing import restrictions (tariffs and permits) on supply.
- o Study policy alternatives of releasing controls or raising prices to encourage production of secondary woods and discourage domestic consumption of mahogany and cedar.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Production from Natural Forests

POLICY CATEGORY: Regulatory

POLICY: Forest permits and licenses for logging, Forest Rules under Forest Ordinance.

PURPOSE: Regulate private sector logging activities.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Department of Forestry, Ministry of Natural Resources and Industry.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+2	-1	0	-2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Often encourages entire removal of forest for temporary or permanent agriculture.

SHORT-RUN NATURAL RESOURCE: Terms do not restrict logging to a portion of license area. No definition of annual coupes or logging blocks. Encourages entire and immediate removal of forest.

LONG-RUN GROWTH: Positive or negative impact depends on if economic activity (i.e. agriculture production) is appropriate for the soil.

LONG-RUN NATURAL RESOURCE: Short term licenses (one, five, ten years) are not conducive to promoting long run management techniques. Terms do not restrict logging to a portion of license area. No definition of annual coupes or logging blocks. Repeated licensing of a given area does not permit a period for recuperation of resources.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study mechanisms to ensure licensing terms include annual coupes or logging blocks to promote long-run economic sustainability of timber production.
- o Develop and implement extension services for sustainable forest management.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Production from Natural Forests

POLICY CATEGORY: Regulatory

POLICY: Maximum girth for cutting timber on public and private lands ( 14" for pine), Forest Ordinance.

PURPOSE: Regulate cutting of timber to ensure natural regeneration.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Department of Forestry, Ministry of Natural Resources and Industry.

SHORT-RUN GROWTH	IMPACT ASSESSMENT		LONG-RUN NAT. RES.
	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	
+1	-1	-2	-2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Without other forest management regulations, this policy enables timber industry to log all trees as they reach their specified girth limit. No effective enforcement on private lands so owners can cut entire forest on his estate.

SHORT-RUN NATURAL RESOURCE: Girth limits for individual species are set arbitrarily, without considering it as a tool to promote optimal management of forest resources. No fines are imposed for damaging regeneration process when logging. No effective enforcement on private lands so owners can cut entire forest on his estate.

LONG-RUN GROWTH: The faster growing species are logged, some of which should have been kept as seed-bearers. Long run result is slower growing (less desirable economically) remain. Contrary to concept of long run sustainability of the timber industry.

LONG-RUN NATURAL RESOURCE: Girth limits for individual species are set arbitrarily, without considering it as a tool to promote optimal management of forest resources. No fines are imposed for damaging regeneration process when logging.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study appropriate girth limits for different species
- o Study appropriate penalty and enforcement system that protects natural regeneration of forests

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**REGULATORY:**

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## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources  
POLICY CATEGORY: Regulatory and Trade

POLICY: Licenses for mining prospecting and dredging (Mines and Minerals Act 1988).

PURPOSE: To control the amount of physical degradation, provide funding for possible damaging effects on environment associated with extraction, and provide revenue to the government for private sector use of nonrenewable resources.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Ministry of Petroleum and Mines.

SHORT-RUN GROWTH	IMPACT ASSESSMENT		LONG-RUN NAT. RES.
	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	
+2	-1	+2	-1

### BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Strong positive impact on the economy, given growth in the tourism and construction industries. Most of the mining is for construction materials. In addition, the dredging is for landfill and tourism-related development.

SHORT-RUN NATURAL RESOURCE: Disturbance of the natural habitat, either as the material being mined (dredging and sand mining) or as a result of the activity (siltation and runoff).

LONG-RUN GROWTH: Strong positive impact on the economy, given growth in the tourism and construction industries. Most of the mining is for construction materials. In addition, the dredging is for landfill and tourism-related development.

LONG-RUN NATURAL RESOURCE: Unless there are stricter controls on issuing licenses, disturbance of the natural habitat, either as the material being mined (dredging and sand mining) or as a result of the activity (siltation and runoff) will continue.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Monitor policy impact on natural resources to ensure that adverse effects are minimized.
- o Study means to incorporate zoning into overall land use plans.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources

POLICY CATEGORY: Regulatory

POLICY: Public Health Act and Water and Sewage Authority Act for waste disposal management.

PURPOSE: To prevent the contamination and pollution of surface and ground water resources through proper liquid and solid waste disposal methods.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Public Health; Water and Sewerage Authority; Fisheries Department, Ministry of Agriculture and Fisheries.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+1	+1	-2	-2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: If enforced, improvement of infrastructure supports development of industry, primarily tourism.

SHORT-RUN NATURAL RESOURCE: The effects on the natural resources in the short term are positive in that the policy tries to address problems associated with waste disposal and negative effects on water resources.

LONG-RUN GROWTH: The policy is projected to have a negative effect on the long-term development and growth of the economy under the present system of administration and implementation. Resources of material and manpower are allocated to solve short-term problems but these solutions impede long-term growth and development.

LONG-RUN NATURAL RESOURCE: Increased levels of contamination in water supplies in the long run occurs as the present management strategies become inadequate for handling increased amounts of waste.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS:

- o Develop long-term strategies designed to reduce the effects of increased organic and toxic loads on water resources, especially those adjacent to areas of human settlement.

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources

POLICY CATEGORY: Regulatory

POLICY: Potable Water Supply.

PURPOSE: To ensure that there is a potable supply of water from ground or surface source for all communities in Belize.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Public Health Bureau; Water and Sewage Authority; Care International.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
-----			
+2	+1	+1	+1

### BRIEF EXPLANATION OF POLICY IMPACT

**SHORT-RUN GROWTH:** The availability of potable water is a critical factor in determining the extent and the rate at which development takes place, especially in the tourist industry. Water quality is monitored using chemical and bacterial analysis on a regular basis throughout the country, following World Health Organization standards. The public health inspector is present at time of installation to advise on location of drilling and water sample is analyzed before hand pump is installed in rural areas. (Linares, personal communications 1990).

**SHORT-RUN NATURAL RESOURCE:** Slight benefit to the natural resource base from improved water management. The public health inspector is present at time of installation to advise on location of drilling.

**LONG-RUN GROWTH:** The availability of potable water is a critical factor in determining the extent and the rate at which development takes place, especially in the tourist industry. Because of financial constraints and political expediency, faulty systems are sometimes installed in rural area, causing financial costs and resource problems in the long-run.

**LONG-RUN NATURAL RESOURCE:** Slight benefit to the natural resource base from improved water management. However, because of financial constraints and political expediency, faulty systems are sometimes installed in rural area, causing financial costs and resource problems in the long-run.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study the possible negative effect of human habitation on natural resources due to the availability of water (e.g. problems of tourism development in San Pedro, liquid and solid waste disposal in Belize City, destruction of mangroves in coastal areas).

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources

POLICY CATEGORY: Regulatory

POLICY: Protection of aquatic fauna and flora. (The Laws of Belize Fisheries Act Chapter 174).

PURPOSE: Guarantee the continuity of commercially exploited species. Ensure the continuity of natural populations in their natural habitat.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Fisheries Department, Ministry of Agriculture and Fisheries; Ministry of Tourism; Fishermen Co-operatives; Belize Defense Force, Ministry of Defence.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
0	-1	-1	-2

### BRIEF EXPLANATION OF POLICY IMPACT

**SHORT-RUN GROWTH:** Under the present conditions, there is no growth projected for the fishing industry since it believed that stocks are near the maximum sustainable level. (Gillett and J. Gibson personal communications). However, growth in the tourist sector could increase the demand for seafood.

**SHORT-RUN NATURAL RESOURCE:** Depletion of the resource will continue and increase with the introduction of tourism and lack of enforcement of regulations on the timing and size of catches.

**LONG-RUN GROWTH:** In the long term, economic growth in the sector is expected to slow as high priced species are overfished. This is presently the case in the conch fishery.

**LONG-RUN NATURAL RESOURCE:** Negative effects of overfishing on marine resources are expected to increase in the long run.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study alternative management strategies for aquaculture resources.
- o Develop and promote multiple use policies for resources within the reef (i.e. tourism and fishing).
- o Improve allocation of material, financial and manpower and increase the resources available within the Fisheries Department to ensure effective enforcement of fishing policies.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources  
POLICY CATEGORY: Regulatory

POLICY: Shoreline maintenance along navigable waterways and prevention of destruction of mangroves (Crown Lands Act The Laws of Belize Chapter 147 and Mangrove Legislation Statutory Instrument No. 52 of 1989).

PURPOSE: Restrict development close to edge of waterways to prevent erosion, shoreline degradation and destruction of critical habitat, including mangroves.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Ministry of Natural Resources (Forestry Department), Ministry of Natural Resources (Lands Department), Ministry of Agriculture (Fisheries Department).

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
-1	+1	-2	-2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Negative effects will be due to a reduction in the shoreline development taking place, especially in the hotel industry.

SHORT-RUN NATURAL RESOURCE: Reduce the incidence of seashore and river bank erosion in areas being developed and reduce dieback of estuarine species due to increased siltation and run-off.

LONG-RUN GROWTH: Ironically this should have some negative effect on the long-term growth since little effort is being made at compliance. As development continues, degradation will increase and eventually force construction of retainment walls. However, that tends to increase land values so negative economic growth in terms of land utilization may be offset by sky rocketing real estate values.

LONG-RUN NATURAL RESOURCE: Considerable negative effects can be foreseen, the major one being erosion of hillsides and river banks. Increased run-off and siltation sedimentation are a direct result.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Enforcement of existing laws and regulations.

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources  
POLICY CATEGORY: Regulatory

POLICY: Restricted use of pesticides. (Pesticide Control Act Statutory Instrument No. 32 of 1985).

PURPOSE: To classify pesticides use into three categories: registered, restricted and prohibited; to license their import manufacture or sale and to prescribe conditions for storage and application.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Pesticide Control Board; Ministry of Agriculture and Fisheries

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
0	-1	+1	-1

### BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: No significant impact because policy enforcement is weak.

SHORT-RUN NATURAL RESOURCE: There has been a significant increase in the use of pesticides with the expansion of citrus and bananas and the pesticide control board lacks resources for enforcement of policy. The short-term effects on water resources is difficult to determine given no baseline data. Informal observations point toward deterioration in water quality and destruction of marine habitat in coastal zone.

LONG-RUN GROWTH: Enforcement of pesticide policy is needed to ensure sustained growth of agriculture, fishing and tourism industries. Training and licensing of pesticide applicators would permit reduced volume of pesticide use to achieve some control. Greater efficiency of pesticide use would both reduce costs and allow export sales that could otherwise be banned.

LONG-RUN NATURAL RESOURCE: If sufficient budget is provided, combination of licensing and training will result in less damage to natural resources.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Promote enforcement of regulations and monitoring compliance.
- o Research on damage to natural resource base in banana, citrus and rice producing regions.
- o Study means of monitoring economic and environmental cost and benefits from pesticide use.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources

POLICY CATEGORY: Trade and Development

POLICY: Port development (Belize Port Authority Act The Laws of Belize Chapter 189).

PURPOSE: Develop and maintain port facilities.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Belize Port Authority.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+2	-2	+2	-1

BRIEF EXPLANATION OF POLICY IMPACT:

SHORT-RUN GROWTH: Short- and long-term economic growth brought on by development of port facilities is expected to be substantial, especially with the private port facility in the south, which should serve to improve and increase trade.

SHORT-RUN NATURAL RESOURCE: Because of the shallow coastal waters there is usually considerable dredging associated with port construction. There is also significant destruction of mangroves.

LONG-RUN GROWTH: Short- and long-term economic growth brought on by development of port facilities is expected to be substantial, especially with the private port facility in the south, which should serve to improve and increase trade.

LONG-RUN NATURAL RESOURCE: Negative effects on the natural resources should be reduced after initial construction is complete. However, there should be some negative effects linked to port and channel maintenance.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Consider coordination of activities with other agencies concerned with alteration of seabed and coast.

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources  
POLICY CATEGORY: Development

POLICY: Duty exemptions (5% duty export tax on aquaculture products) (Supplies Control Act The Laws of Belize Chapter 221); and development concessions for aquaculture industry.

PURPOSE: Encourage private sector investments both local and foreign. Encourage development of aquaculture industry.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Ministry of Finance; Ministry of Trade and Commerce; Ministry of Economic development; Development Finance Corporation.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
-----			
+1	-1	+1	0

### BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Encourages investment in the private sector, particularly in aquaculture.

SHORT-RUN NATURAL RESOURCE: Encourages construction of infrastructure for aquaculture production which can cause siltation and other damage to surrounding natural resources.

LONG-RUN GROWTH: Encourages investment in the private sector, particularly in aquaculture.

LONG-RUN NATURAL RESOURCE: If development is uncontrolled, it could have a minor negative impact on the environment. If properly enforced, there would be no significant impact.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Promote interagency cooperation to ensure that items being imported fit guidelines for development in individual sectors.
- o Develop guidelines to prevent local contamination, and to introduce exotic species.

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Water Resources

POLICY CATEGORY: Development

POLICY: Land Development (Land Reform, Belize Land Development Authority, Crown Lands, Land Tax, Land Acquisition, Registered Land, Aliens Landholding Acts: The Laws of Belize Chapters 151, 146, 147, 47, 149-50, 157, 144).

PURPOSE: Provide land for development and administer the development of land.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Ministry of Natural Resources (Lands Department), Ministry of Natural Resources (Forestry Department), Ministry of Agriculture.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+2	-1	+2	+1

### BRIEF EXPLANATION OF POLICY IMPACT

**SHORT-RUN GROWTH:** Promotes the agricultural sector. Distribution of public lands and consequent shifts to more intensive uses contributes to GDP through immediate investment and longer term sale of products and services.

**SHORT-RUN NATURAL RESOURCE:** Land clearing leads to increased soil run-off. Conversion of land into agriculture leads to increased use of pesticides which are eventually washed into the water course. Improper slash and burn practices and draining and development of land at water's edge have immediate negative impacts on water resources.

**LONG-RUN GROWTH:** Expansion of targeted economic activities which are land using (bananas, citrus) and are leaders in export growth driving the economy. Smaller land parcels are important in increasing domestic food production. However, the extent of benefits to the economy in the long-run is dependent upon sound land use policies. Efforts are now underway in the government to promote appropriate land use policies.

**LONG-RUN NATURAL RESOURCE:** With present lack of physical planning and excessive control by ministers, continued disposition of crown lands is dictated more by political expediency than by sound policies designed to accommodate both economic growth and natural resource conservation. Efforts are now underway in the government to promote appropriate land use policies.

## PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Development and implementation of a national land use plan based on present soils mapping project and long-term, sustainable development policy that considers natural resource depletion at an imputed value.
- o Define a land distribution policy based on consistent, long-term development and natural resource objectives removed from excessive political latitude.

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## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Management of Wildlands  
POLICY CATEGORY: Regulatory

POLICY: Establishment of protected areas and forest reserves (Crown Lands Act Laws of Belize Chapter 147; National Parks System Act Statutory Instrument No. 5 of 1981).

PURPOSE: Preserve and protect important natural and cultural heritage. Regulate scientific, educational and recreational use of Belize's natural and cultural heritage.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Forestry Department, Ministry of Natural Resources and Industry, Belize Audubon Society

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
-1	+1	+1	+2

### BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Five protected areas have been declared. Significant area of country is in forest reserves. However, it limits timber production by restricting industry to selective logging, which is very costly. Local population deprived of economic benefits of hunting and gathering. Economic growth is enhanced as protected areas serve as tourism destination sites.

SHORT-RUN NATURAL RESOURCE: Protects the flora and fauna of various ecosystems.

LONG-RUN GROWTH: Economic benefits can be enhanced if additional protected areas are established in appropriate areas and managed optimally to promote nature tourism. Belize's comparative advantage in tourism with respect to Caribbean Islands is in inland ecotourism. Establishment of forest reserves promote long-term sustainable logging.

LONG-RUN NATURAL RESOURCE: Protects the flora and fauna of various ecosystems.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Determine location of forest reserves and protected areas based on: economic benefits from nature tourism or the establishment of a research station; and adequate representative sample of ecosystems needing protection.
- o Consider the long-run economic consequences of creating protected areas and forest reserves (i.e. relocating people and depriving people of forest/marine benefits of the protected area).
- o Support training of park personnel, private sector management, and funding sources (i.e. user or entrance fees).

## NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Management of Wildlands  
POLICY CATEGORY: Regulatory

POLICY: Establishment of marine reserves (Hol Chan Marine Reserve Legislation Statutory Instrument No. 107 of 1988).

PURPOSE: Protection of the marine ecosystem.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Fisheries Department, Ministry of Agriculture and Fisheries.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
+1	+2	+2	+2

### BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Enhances economic growth as marine reserves attract tourists and protect stocks of fish.

SHORT-RUN NATURAL RESOURCE: Protects a portion of marine life and provides some measure of coastal zone protection.

LONG-RUN GROWTH: Enhances economic benefits if additional reserves are established and adequately managed to promote tourism. Also evidence suggests long-run increase in available marine species for fishing.

LONG-RUN NATURAL RESOURCE: Protects the biodiversity of the marine and coastal zone ecosystems. Additional areas might be declared reserves as economic benefits are realized by the fishermen and the tourist businesses.

### PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study:
  - o Criteria and selection of sites for marine reserves.
  - o Appropriate management and administration of reserves.
  - o Promote education programs for the fishermen to demonstrate short- and long-term economic benefits of reserves.
  - o Monitor economic benefits of reserves as tourist attraction sites.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Management of Wildlands

POLICY CATEGORY: Regulatory

POLICY: Mangrove Legislation (Statutory Instrument No. 52 of 1989).

PURPOSE: To establish rules and regulations to protect mangroves.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Forestry Department, Ministry of Natural Resources and Industry.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
-1	+1	+1	+2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Government collects permit fees for alteration of mangrove. Slightly negative, limited use mostly for construction scaffolding.

SHORT-RUN NATURAL RESOURCE: Protects habitat of wildlife (nesting sites and fish hatcheries) and mangrove ecosystem. Provides some measure of coastal zone protection and management.

LONG-RUN GROWTH: Provides for future utilization of mangroves (i.e. charcoal and tannin) that is not being produced now. Provides protection from hurricane destruction.

LONG-RUN NATURAL RESOURCE: Protects habitat of wildlife (nesting sites and fish hatcheries) and mangrove ecosystem. Promotes long-run coastal zone protection and management.

PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Potential long-term economic benefits derived from mangrove protection.
- o Potential for creating a mangrove protected area under the National Parks System Act.
- o Mechanisms needed to enforce mangrove regulations.
- o Long-run environmental benefits.

NATURAL RESOURCE POLICY INVENTORY

PROBLEM: Management of Wildlands

POLICY CATEGORY: Regulatory

POLICY: Declaration of Wildlife Protection (Wildlife Protection Act, No. 4 of 1981).

PURPOSE: To protect the wildlife of Belize.

POLICY-MAKING/IMPLEMENTING INSTITUTIONS: Forestry Department, Ministry of National Resources and Industry.

IMPACT ASSESSMENT			
SHORT-RUN GROWTH	SHORT-RUN NAT. RES.	LONG-RUN GROWTH	LONG-RUN NAT. RES.
-1	+2	+1	+2

BRIEF EXPLANATION OF POLICY IMPACT

SHORT-RUN GROWTH: Restricted trading put burden on rural people who use wildlife as source of food and income. Loss of revenue from big game (jaguar) hunting.

SHORT-RUN NATURAL RESOURCE: Protects biodiversity. Specifically lists species for protection whose population status is relatively unknown.

LONG-RUN GROWTH: With adequate information on the status of the wildlife population, appropriate management plans can be developed and long-term economic use of the wildlife can occur. Wildlife can be used as an economic resource.

LONG-RUN NATURAL RESOURCE: Protects biodiversity. Allows for population studies to assess the economic benefits of the resource. Impact depends on whether studies are carried out.

## PRINCIPAL POLICY ISSUES SUGGESTED FOR ANALYSIS

- o Study the economic needs of the local community and how the law affects their livelihood.
- o Support of legislation by rural communities and effect of law on these communities.
- o Consider policies that permit culling of certain species (e.g. most abundant species of crocodiles) for economic value.
- o Support the collection of information and institutional mechanisms that consider the ecotourism and biodiversity values in setting wildlife conservation policies.
- o Evaluate the extent of enforcement of regulations and institutional capacity needed for enforcement.
- o Develop training programs and guidelines for conservation officers and park managers.
- o Study the function of the newly established Conservation Unit within the Ministry of Natural Resources.
- o Promote multilateral and bilateral international agreements for wildlife conservation.
- o Design mechanisms to retrieve government revenue generated from wildlife collection to manage this activity.

## APPENDIX B

### PEOPLE AND INSTITUTIONS CONTACTED

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Chapter 40: Development Incentives

Chapter 45: Fiscal Incentives (Industrial Enterprises)

Chapter 46: Income Tax

Chapter 47: Land Tax

Chapter 48: The Land Tax (Rural Land Utilization)

Chapter 49: Produce Export Duties

Chapter 50: Recovery of Revenue

Chapter 51: Stamp Duties

Chapter 52: Towns Property Tax

Chapter 53: Trade Licensing

Chapter 54: Banana Industry Loan

Chapter 125: Aliens (Registration)

Chapter 144: Aliens Landholding

Chapter 145: Ascertainment of Boundaries

Chapter 146: Belize Land Development Authority

Chapter 147: Crown Lands

Chapter 149: Land Acquisition (Promoters)  
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Chapter 151: Land Reform (Security of Tenure)  
Chapter 152: Land Surveyors  
Chapter 153: Landlord and Tenants  
Chapter 154: Law of Property  
Chapter 155: Prescription  
Chapter 156: Reconstruction and Development Corporation  
Chapter 157: Registered Land  
Chapter 166: Agricultural Fires  
Chapter 168: Banana Industry  
Chapter 172: Chicle Protection  
Chapter 173: Fertilizers and Feeding Stuffs  
Chapter 174: Fisheries  
Chapter 175: Forest Fire Protection  
Chapter 176: Forests  
Chapter 177: Meat and Livestock  
Chapter 178: Plant Protection  
Chapter 179: Private Forests (Conservation)  
Chapter 180: Sugar (Special Funds)  
Chapter 181: Wild Life Protection  
Chapter 189: Belize Port Authority  
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Chapter 216: Caribbean Development Bank  
Chapter 217: Monetary Authority of Belize  
Chapter 218: Savings Bank  
Chapter 225: Citrus (Processing and Production)  
Chapter 226: Development Finance Corporation  
Chapter 228: Hotels  
Chapter 229: Marketing Board  
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## APPENDIX D

### BRIEF DESCRIPTION OF TEAM MEMBERS

Ms. Theresa Bradley, Development Economist  
Abt Associates, Bethesda, Maryland

Ms. Bradley serves as econometrician and policy methodologist within the International Economic Development Area of Abt Associates and is a Ph.D. candidate at the Department of Economics, University of Pennsylvania. In addition to her work on natural resource policy issues in Central America, she has worked with USAID/Cairo under the AID/S&T funded Agricultural Policy Analysis Project, Phase II in evaluating price liberalization policies for major Egyptian agricultural commodities.

Dr. Fred Mangum, Agricultural Economist  
Raleigh, North Carolina

Dr. Fred Mangum is an agricultural economist specializing in agricultural policy and planning. He recently concluded a five-year stay in Belize, three as Chief-of Party and Agricultural Policy Advisor in The Ministry of Agriculture and two as Economic Development Advisor in the Ministry of Economic Development. He has also worked at OECD in Paris, South Korea and Italy as well as the Foreign Agricultural Service, USDA and North Carolina State University.

Dr. Victor Gonzalez, Biologist  
Belize City

Dr. Gonzalez is an expert in wildlife of Belize and is the Director of The Belize Center for Environmental Studies and President of the Belize Audubon Society. He spent six years as the Vice President of Academic Affairs, Belize College of Arts, Science and Technology after receiving his Ph.D. in Biology from Western Michigan University.

Mr. Dwight Neal, Fisheries Officer  
Belize City

Mr. Neal has worked in the Fisheries Department of the Ministry of Agriculture and Fisheries in Belize since 1978. His duties as an Assistant Fisheries Officer include conducting environmental impact assessments on water resources for proposed development projects in collaboration with the Geology and Petroleum Unit of the Ministry of Natural Resources and the Ministry of Economic Development. He has received training in aquaculture, extension methodology and project management in Canada, Japan and the US.