The Belize Debt-for-Nature Swap:
Foundations of a Framework for Program Evaluation

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A thesis submitted in partial fulfillment of the
requirements for the degree of

Master of Science

University of Washington

2004

Program Authorized to Offer Degree: College of Forest Resources

University of Washington
Graduate School

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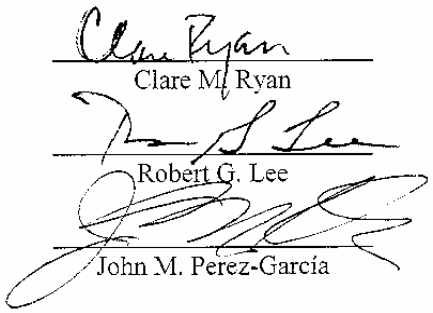

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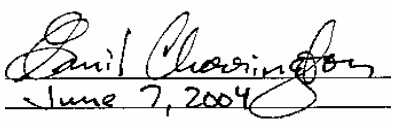

University of Washington

Abstract

The Belize Debt-for-Nature Swap:
Foundations of a Framework for Program Evaluation

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In 2001, the Central American nation of Belize benefited from a debt-for-nature swap through the U.S. Tropical Forest Conservation Act, subsidized by The Nature Conservancy. This study applied program theory to interview data and archival analysis to explore how the program translates financial inputs into desired outcomes of forest and biodiversity conservation. One of the major findings is that the use of program inputs varies across the four beneficiary organizations. Contrary to assumptions by debt swap planners, environmental outcomes are not guaranteed, particularly because of intervening factors such as government tenure policy, communities, and the occurrence of natural disturbances. Crucial to the attainment of intended outcomes is beneficiary organizations' ability to adapt their management activities to suit changing environmental conditions, yet the Belize DNS features no formalized system for such monitoring. In light of that, this study presents an evaluation framework that could be utilized to map both the environmental and socio-economic impacts of the Belize DNS, and possibly other debt-for-nature swaps.

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ACKNOWLEDGEMENTS

This study draws on the previous work of various authors and the financial support of a number of agencies. Invariably, this study would also have been impossible without the psychological support of numerous friends & family members.

First, I owe my sincerest thanks to the Division of Human Development at the Organization of American States, which has sponsored my graduate studies at the University of Washington, even providing me with a generous stipend during the summer I was conducting my research. The Protected Areas Conservation Trust of Belize must also be thanked for the financial assistance it has offered both myself and other aspiring Belizean environmental professionals studying abroad. The UW chapter of Sigma Xi, the Scientific Research Society, funded the brunt of my airfare to conduct this research through the generosity of their Grants-in-Aid of Research program.

Next, much gratitude is owed to my supervisory committee, without whose assistance this work would not be possible. Particular thanks go to Phil Hurvitz of the College of Forest Resources and Professor Mary Kay Gugerty of the Daniel J. Evans School of Public Affairs. The latter introduced me to the wonders of program evaluation, and the former both taught me how to use geographic information systems (GIS) and also provided conceptual critiquing of this work at various stages. I would also like to thank my de facto undergraduate advisors, Professors Bernadette Roche and Thomas Ward who pointed me in the direction of graduate studies.

This research would not have been at all possible without the cooperation of the various personnel interviewed at BAS, PfB, TIDE, and TNC, and who must remain anonymous for the sake of complying with UW Human Subjects Division protocols. I am also thankful to the people of Punta Gorda for welcoming me into their community.

Considerable logistical support was provided me by Mike Emch, Peter Esselman, Ken Kapinski, Jan Meerman (especially), Jay Raney, Julianne Robinson, Jessica Rosien, and Neil Stuart. The eco-historical chapter of this study borrows much from the pioneering work of Belizean legends such as O. Nigel Bolland, Evan X Hyde, Robert Leslie, Assad Shoman, and Sir Colville Young. I also owe a debt of gratitude to my former officemate Gretchen Muller, whose overview of debt swaps proved particularly insightful. Both of our works build on the legacy of WWF Senior Fellow Melissa Moye, and Robert Deacon of the University of California-Santa Barbara.

Lastly, I'd like to thank my aunt & uncle, Katherine Leacock & Stan Harris (under whose roof much of this study was written), my parents Glenn & Emelia, my aunt Carolyn Mahung, my grandparents Rita Leacock and Herman Cherrington, and my friends at the Foundation for International Understanding Through Students, particularly Carolyn Ho and Charlotte Spang.

1. INTRODUCTION

The Central American nation of Belize is one of the thirty-four nations to have participated in the forest conservation program known as the debt-for-nature swap (DNS). DNS programs have, since 1987, netted over US $3.7 billion in debt reduction for developing nations and transition economies, and consequently financed over US $1.2 billion of conservation projects in participating nations (see **Figure 1**). The DNS program essentially re-channels funds that would have gone to debt-servicing into a variety of local forest conservation programs.

The two main objectives for the DNS include a reduction of deforestation (via investment in conservation programs), and a reduction in foreign debt (Deacon & Murphy 1997, ECLAC 2001). The high external debt stocks of developing nations was largely seen as providing incentives for deforestation, particularly through logging and land conversion (Gullison & Losos 1993, Kahn & McDonald 1995).

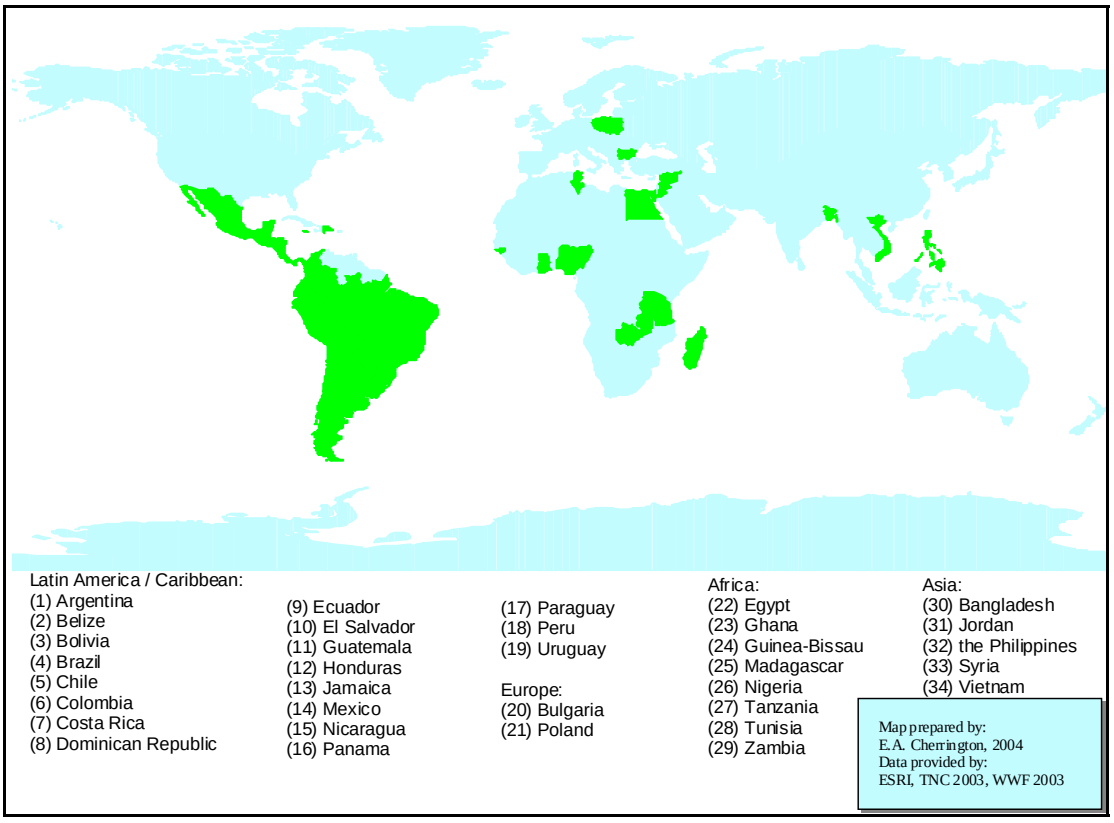

Figure 1: Global Geographic Distribution of Debt-for-Nature Swaps

Central America

Nations & Leonard (1986) estimated that from the 1960s through the mid-1980s, over two-thirds of Central America's lowland tropical broadleaf forests had been decimated. The Central America Ecosystems Mapping Project conducted in 1999 under the auspices of the World Bank and the Central American Commission on Environment & Development illustrated using satellite image analysis that 63,554,639 acres – amounting to 49.14% of Central America's area – was now agriculture (Vreugdenhil et al. 2002, World Bank & CCAD 2001).

The alarming part of such statistics is that the Central American land bridge, representing only 1% of the world's landmass, is estimated to be home to 7% of the different species in the world (Barry 2003). Conversion of natural ecosystems to agriculture and urban areas, and the further fragmentation of existing habitat endanger the future of those species (Barry 2003, Meerman & Sabido 2001, Sader et al. 2001, Vreugdenhil et al. 2002).

Table 1: Population Pressure & Remaining Central American Ecosystems (1999)

Nation	Acreage of remaining ecosystems	Land cover developed[1]	Population	Population density (per square km)
Belize	4,578,361.9659	16.52%	243,390	10.7
Guatemala	13,881,338.4676	48.54%	12,336,000	113.8
Honduras	13,089,159.3251	53.15%	5,997,000	53.6
El Salvador	1,630,484.4528	68.64%	5,839,000	281.8
Nicaragua	16,748,857.1921	47.49%	4,717,000	39.2
Costa Rica	3,875,737.8257	69.45%	3,674,000	72.5
Panamá	11,958,735.6184	37.52%	2,779,000	36.6
Central America	**65,762,674.8476**	**49.14%**	**35,585,390**	**67.0**

Sources: CSO (2001), Pearson Research (2003), World Bank & CCAD (2001)

As illustrated in **Table 1**, one nation is outstanding both in terms of its percentage of its remaining ecosystems and its low development pressure – Belize. This may represent an opportunity to save what still remains.

[1] Based on figures from the GIS database created by World Bank & CCAD (2001), this expresses the percentage of land in urban areas and under agricultural cultivation, in contrast to the column to the left of it, which indicates the acreages of non-developed land (forests, grasslands, wetlands, etc.).

Belize DNS

With more ecosystem cover in absolute and relative numbers than even eco-friendly Costa Rica, and with the highest protected areas cover in Central America, Belize has demonstrated a commitment to the conservation and sustainable use of its natural resources by placing over 40% of its land in ecological reserves – one of the highest rates in the world (Márquez 2003). Possessing the largest barrier reef system in the Western Hemisphere – second in the world only to Australia's Great Barrier Reef – the nation is also home to the world's only jaguar and whale shark reserves (Heusner 2003, Rabinowitz 2004).

Besides being big on conservation, Belize is also big *in debt*. In 1980, the year before the nation became independent from Great Britain, total external debt stood at only US $63 million (BZ $126 million). Twenty years later in 2000, Belize's debt had grown to a staggering US $0.506 billion (BZ $1.012 billion), almost doubling the debt to GDP ratio in that period from 32.3% to 61.6% (World Bank 2001). Where Deacon & Murphy (1997) identify high debt and high forest stocks as key factors in being selected for participation in debt-for-nature swaps, Belize was a prime candidate. In 2001, U.S.-based The Nature Conservancy brokered a bilateral DNS between Belize and the United States, canceling half of Belize's debt to the USA – US $8.6 million (Egolf 2001, MBMIT 2001, Laurance 2001, TNC 2001).

Problem Statement

While the literature is particularly replete with references to the amounts of conservation financing generated by market-based mechanisms like the DNS, it is also particularly scanty on what these huge amounts of funding have actually accomplished in environmental terms. DNS programs in particular have been pegged with (i) being complex in their operation, and (ii) generally lacking monitoring & evaluation of the environmental outcomes they are designed to achieve (Deacon 2003, Moye 2000, Muller 2003). In other words, the general question could be posed of what was accomplished with the over US $1.2 billion that DNS programs have funneled into forest conservation programs since the late 1980s.

In addition, in terms of lessons learned, the body of scientific literature has

generally benefited from the publication of a number of studies on the first generation of swaps, with particular attention on the first swap, which occurred in Bolivia in 1987 (Deacon & ECLAC 2001, Murphy 1997). While studies have also been done of the debt-for-nature swaps initiated through the Enterprise for the Americas Initiative launched by the U.S. Government in the early 1990s, the recent timing of debt swaps through the U.S. Tropical Forest Conservation Act (TFCA) of 1998 has perhaps limited their contribution to the literature (Putney & Galán-Sarmiento 2003, Quijandría-Acosta & Shores 2003). Egolf (2001), for instance, constitutes the only published study of the Belize DNS, which was executed through the TFCA.

Research Focus & Questions

Based on the above considerations – largely the dearth of information fueling the mystique around DNS in general – this study utilizes program theory to analyze the Belize DNS. As such, the program's *modus operandi* is examined in detail, with close attention to program goals, the resources being utilized to reach those goals, and the factors seen as adversely impacting the attainment of those goals. Using program theory, a graphic depiction of the rationale behind the program is also presented.

This study revolves around specific research questions ingrained in program theory:

- How does program theory represent the Belize DNS?
- What are the program's economic effects?
- What are the program's environmental effects?
- What are the factors influencing the program's implementation?
- How can program outcomes be adequately assessed?

Ultimately, this study relies heavily on institutional information possessed by the non-governmental organizations implementing the swap to construct the analysis of the swap. As the Belize DNS is yet in its third year of implementation, this study also acknowledges that, in reality, only an outlook can be provided in lieu of a comprehensive evaluation. This is also necessitated by confirmation of a lack of outcome monitoring & evaluation, which fueled the last of the research questions.

This study briefly presents a relatively inexpensive monitoring & evaluation system that could be implemented to capture those outcomes.

Thesis Outline

Chapter 2 reviews the national context into which the Belize DNS fits, while **Chapter 3** reviews the broader theoretical context of conservation financing mechanisms into which debt-for-nature swap programs fit. The chapter also examines the field of program theory, drawing the conceptual framework that frames this study's research questions. Drawing on the framework presented in the previous chapter, **Chapter 4** reviews the methodology employed by this study to analyze the Belize DNS. **Chapter 5** presents the primary layer of analysis by filtering the study's findings through the underlying research questions, while **Chapter 6** represents the secondary layer of analysis by presenting a thoughtful reflection of the broad implications of those findings. **Chapter 7** concludes the study by making recommendations for future research based on the findings. The list of **References** and the **Appendices** mark the study's close.

2. BELIZE'S ECO-HISTORICAL CONTEXT

This chapter introduces the various contexts into which the Belize DNS fits. The first context presented is the general Belizean social, economic and environmental climate within which the program was introduced in 2001. The second section backtracks to the eco-history that has given rise to the current state of affairs, while the last focuses on the major conservation players in Belize – local and international – which became instrumental in the implementation of the Belize DNS.

National Climate at the Opening of the 21st Century

Cut out of the Yucatán peninsula and gaining independence from Great Britain in 1981, Belize – Central America's northernmost nation – is bounded to the north and northwest by the Méxican state of Quintana Roo, to the west by Guatemalan department of Petén, to the south by the Guatemalan department of Izabal, and to the east by the Caribbean Sea (see **Figure 2**). Slightly larger than nearby El Salvador and possessing a land area of 8,867 square miles – including the over 1,000 islets or "cayes" which dot its Caribbean coast – the country is approximately 280 kilometers long (from north to south), and 109 kilometers wide at its widest point. To put the nation's size into a Western context, Belize is just slightly larger than the U.S. State of Massachusetts. (CZMAI 2000, GOB 1999, LOC 1992)

In addition to cayes, spanning the length of Belize and lying just off the coast is what Charles Darwin himself referred to as "the most remarkable reef in the West Indies," the largest barrier reef in the Western Hemisphere, second in the world only to Australia's Great Barrier Reef (CZMAI 2003, Wells 1996). The 220 km-long 'Belize Barrier Reef Complex,' as it is referred to, is a part of the larger Mesoamerican Barrier Reef System, which includes Belize's three coral atolls[2] (Glovers Reef, Lighthouse Reef and Turneffe Atoll), as well as the less spectacular reefs off the coasts of México, Guatemala and Honduras (Wells 1996). The mainland is divided into two main topographic regions, one flat and the other not. The northern lowlands are a part of the Yucatán Platform and are mostly flat, along with Belize's entire coastal plane, which is marshy. The other region includes the Maya Mountains

[2] Belize is home to three of the four coral atolls in the Caribbean (Wells 1996).

and their associated basins and plateaus which dominate most of the southern half, rising to a maximum of 1,124 meters above sea level. (GOB 1999, LOC 1992)

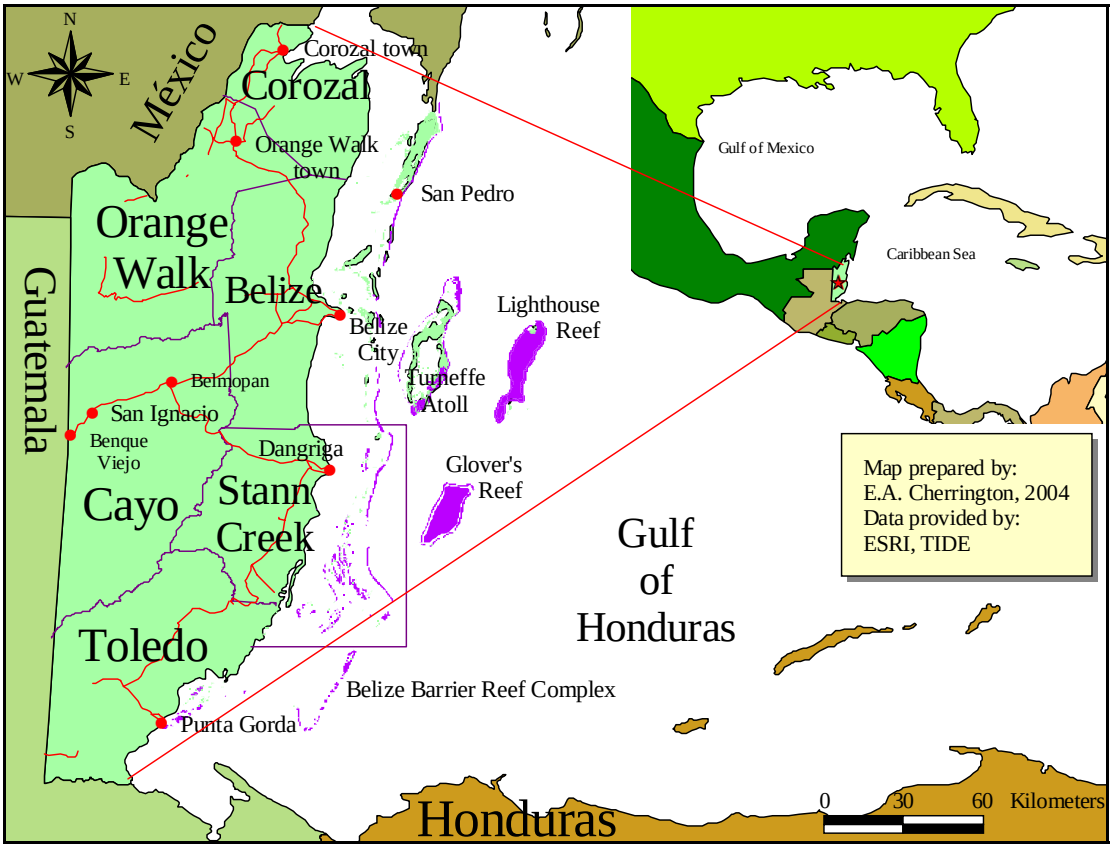

Figure 2: Districts, Towns and other Features of Belize

Home to 240,204 inhabitants at the time of the last census (47.68% of which inhabited urban areas, which occupied only 49.13 square miles of Belize's total area), the country is divided into six administrative districts: Corozal in the north, Orange Walk in the northwest, Belize in the middle on the coast, Cayo in the middle on the western border with Guatemala, Stann Creek below the Belize district, and Toledo in the south (**Figure 2**). Each district is home to at least one city or town and several villages, while various cayes (e.g. Ambergris Caye, Caye Caulker) are also inhabited. The nation's capital, Belmopan, lies nestled in the foothills of the Maya Mountains, in the center of the country. (CSO 2001, LOC 1992, Meerman & Sabido 2001)

Belizean society is characterized by a high degree of multicultural diversity, ranging from the modern-day descendants of the ancient Maya – the Mopán, Q'eqchi

and Yucatéc – to the Mestizo (descendants of the Spaniards and the Maya), the Creoles (admixtures of British buccaneers and their African slaves), and the Garinagu (descendants of the now-extinct Arawaks and Carib Indians for whom the Caribbean Sea is named, mixed with runaway African slaves). Belize is also home to Mennonites (originally of Dutch and German extraction), the descendants of East Indians originally imported to the British Caribbean as indentured servants, Arabs mostly of Palestinian and Lebanese extraction, expatriate whites, Chinese and Taiwanese, the last two groups having come to Belize in relatively large numbers in the two decades since Belize's independence. In 2000, Mestizos made up 48.7% of the population, while Creoles and Maya made up 24.9% and 10.6% respectively. Garinagu, Mennonites, East Indians, whites, Chinese / Taiwanese and "other" followed, with 6.1%, 3.6%, 3%, 0.8%, 0.7%, and 1.6% of the population respectively. (Amandala 2001, Bolland 1997, CSO 2001, LOC 1992, MOE 1984, Shoman 2000)

Belize is considered a middle-income developing nation, with an economy based largely on tourism, and the export of agricultural & marine products. In 2000, the year prior to the initiation of the Belize DNS, GDP stood at US $820 million, while total external debt also stood at US $506 million.[3] This was in contrast to 1980, the year before independence, when GDP stood at US $190 million and total external debt stood at only US $63 million.

The significance of the high debt relative to GDP is that the servicing of such debt represented 22.5% of government revenues in 2000, steadily climbing to 46.7% two years later (IMF 2004). The most recent Article IV consultation report by the International Monetary Fund stressed that a high debt service ratio might lead to an eventual balance of payments crisis (i.e. the Government of Belize having to default on its debts) (IMF 2004). Additionally, studies of deforestation in Latin America such as Gullison & Losos (1993) have suggested that high external debt provides governments with incentives to encourage deforestation via logging of forest reserves, and the conversion of forests to commercial scale agriculture, in order to produce exports to gain foreign exchange.

[3] The Belize dollar is pegged to the US dollar, effecting an official exchange rate of BZ $2 to US $1.

While in 2000 Belize's per capita Gross National Income (GNI) stood at US $2,920, compared with GNI per capita averages of US $1,140 in lower-middle income countries, and US $3,680 in the Latin America / Caribbean region, poverty is certainly an issue. The national poverty assessment report commissioned by the Caribbean Development Bank (and reproduced in the 1998 UN-sponsored National Human Development Report) indicated that in 1995, 33% of the population was below the absolute poverty line, with 13.4% of individuals in extreme poverty. There were strong differentials geographic and ethnic lines, with 42.5% of rural inhabitants being poor – more than half that of urban residents. The southern districts of Cayo and Toledo were the poorest areas of Belize, with poverty rates of 19.7% and 47.2% respectively, while more than half of the rural people in each of these districts were poor. The Maya were disproportionately represented among the poor, as were immigrants. (NHDAC 1998) [4]

Belize's poverty assessment and human development reports both noted that the poor were more likely to depend heavily on farming and fishing for subsistence. Furthermore, the Human Development Report states that rural poverty in particular exerts a negative impact on the environment:

> *First, poverty is often a result of environmental degradation. Soil erosion, deforestation, and water pollution all have adverse consequences on the production capacity of individuals and societies, resulting in varying degrees of poverty. For society as a whole, poverty is equivalent to a reduction in the stock of natural resources and to an increase in the cost of alleviating the adverse effects. Secondly, poverty is often a cause of environmental degradation. Extreme poverty often means limited knowledge and lack of resources to make the investment required to protect the environment.* (NHDAC 1998)

In 2000, it was estimated that 59.1% of Belize's total land area was covered by forests, compared to 47.1% in Latin America and the Caribbean. The total land area under agricultural cultivation was estimated to be 6.1%, compared to 37.9% in Latin American and the Caribbean. The nation was also home to at least 125 known

[4] While this section aims to present a portrait of Belize at the opening of the Millennium, the analysis of poverty utilizes data from the mid to late 1990's as that is the most recent data available for the timeframe in question. It should not be expected that the situation changed too drastically to 2000/01.

species of mammals (4 of which were threatened), and 356 known species of birds (2 of which were threatened). 21% of the nation's land was under some form of protected status.[5] (FAO 2000, World Bank 2001)

Eco-History

Belize's history can be divided roughly into three distinct phases: a pre-Columbian past largely shrouded in mystery, a colonial past characterized by the exploitation of the territory's resources, and the post-colonial period extending to the present. Meerman & Sabido (2001) sum up the first phase:

> *For at least 2000 years the Maya civilization was thriving in the Belizean lowlands. The complexity of the society and high population figures led to massive forest clearing for agriculture. Only after the collapse of the Maya civilization around 900 AD were the forests were able to recover their lost territory. To what extent the returning forest resembles the original forest will probably be unknown.* (Meerman & Sabido 2001: 17)

The second phase begins with the arrival in the mid-17th Century of shipwrecked buccaneers – "Baymen" as history now knows them – who founded a colony north of the Bay of Honduras on the export of wood to their motherland, Great Britain (Leslie 1995, MOE 1984, Shoman 2000). These settlers first set their sights on the extraction of logwood (*Haematoxylon campechianum*) but dwindling stocks and the price shocks of the late 18th Century later shifted their gaze to mahogany (*Swietenia macrophylla*). History will also show that for almost three hundred and fifty years, the Baymen's selective logging kept British Honduras – as the territory was known – green with trees, even as the already-independent neighboring republics had begun their phase of agricultural development (Bolland 1997, Leslie 1995, Patch 1985). Agriculture was suppressed, for as Shoman (2000) puts it:

> *The mahogany lords were also determined to monopolize land and labour for timber production; the merchants were happy importing food, and little agricultural activity was taking place.* (Shoman 2000: 99)

The 20th Century finally saw a gradual decline of forestry due to depressed prices on the world market, and the rise of a national economy founded on the export

[5] For an exhaustive list of the types and definitions of the protected areas, see **Appendix B**.

of agricultural and marine products. Passage of the Land Reform Ordinance in 1962 transformed the land-holding system previously above by Shoman (2000), and its effects on the national landscape were wide-reaching. Between 1971 and 1982, 525,000 acres of land were transferred to Belizean farmers – 58.1% of Belize's total agricultural conversion to this date. (Leslie 1995, Meerman & Sabido 2001)

While the Ordinance helped maintain the momentum of agriculture as the major contributor to economic development and bring large numbers of subsistence farmers to worship at the altar of large-scale commercial agriculture, it had other undeniable effects on the physical landscape, such as the runoff into waterways of copious amounts of fertilizers and pesticides (Shoman 2000). Consequently, the plummeting prices for Belize's agricultural exports starting in the late 1970s exerted the effect of making once-independent subsistence farmers extremely dependent "upon economic forces far beyond the borders of Belize" (MOE 1984: 59).

Morphing from 'British Honduras' to 'Belize' in 1973, and moving toward independence in 1981, the nation began to diversify the uses of its natural resources. Despite Aldous Huxley's 1934 statement that "if the world had any ends, British Honduras would surely be one of them," the mid-1960s saw the spawning of a tourist industry based on the territory's offshore attractions. Ultimately, the industry did not truly take off until the post-Independent 1980s, following the creation of a Ministry of Tourism & the Environment whose efforts centered on marketing the nation as a Caribbean tourist destination (McMinn & Cater 1998). By the late 1990s however, tourism would finally displace agriculture as the major engine of economic growth, averaging 20.2% of GDP per year between 1997 and 2001 (GOB 2002). Even before tourism's meteoric rise, the irony of an economically disappointing past and the promise of tourism which that past had created were expressed in a speech by the then tourism minister (Egret & ARA 2001):

> *We are so far behind, we are ahead in ecotourism.* (Hon. Glenn D. Godfrey, 1990)

Local Influence of International Conservation Organizations

To recap, at the turn of the century Belize was the quintessential tropical

nation with large stocks of forest and other natural resources, but economically underdeveloped, and extremely vulnerable to shifts in the world market. Independence had brought the not only the reins to national sovereignty, but also well-funded foreign environmental groups that saw promise in the tiny nation.

Coral Caye Conservation, EcoLogic, Fauna & Flora International, the Global Environment Facility, The Nature Conservancy, the Wildlife Conservation Society, the Wildlife Trust and the World Wildlife Fund all currently have operations in Belize (Beletsky 1999, DeVries et al. 2003). Others like Birds without Borders, Conservation International, the Rainforest Alliance, the Rare Center for Tropical Education and the World Conservation Union have collaborated sporadically with local partners (BAS 2004, TIDE 2002).

Even the rise of tourism described in the previous section has been due in part to the work of International Conservation Organizations (ICOs) which have introduced into the local parlance the concept of "sustainable use" in lieu of "extractive uses" (Rosien 2001). The following traces the influence that specific ICOs have exerted across the national landscape – mainly through the use of local partners that they in many cases helped to found, and which they continue to provide financial & technical assistance to.

Audubon Society

The Society founded in honor of American naturalist and wildlife painter John James Audubon has had a profound effect on the landscape of Belizean conservation, through two organizations founded through its chapters' auspices, the Belize Audubon Society and the Programme for Belize. The preeminence of both organizations was also a deciding factor in their being selected to play a part in the debt-for-nature swap program at the core of this study. (BAS 2004, Egolf 2001)

Belize Audubon Society

ICOs have primarily fostered the development of a conservation consciousness in Belize through encouraging development of local counterparts. The first of these was established in 1969, twelve years prior to Independence when the Florida Audubon Society established a chapter in British Honduras. By 1973, the

group had established itself as the Belize Audubon Society (BAS), and after Belize's independence, BAS became the first NGO allowed to manage some of the public protected areas that had been established.[6] By 1999, BAS' co-management agreements with the government had expanded its organizational portfolio to the administration of eight public protected areas – a combined area of approximately 150,000 acres. (BAS 2004, Botnick et al. 2000, Lindberg & Enríquez 1994)

Influential in the BAS' sway has been its connection to political power. The group's founding president was James A. Waight, brother-in-law of the then-Premier George Price, regarded by many as the "father of the nation."[7] While Waight inevitably passed on, and Price eventually left the political sphere, the organization has kept the association with the Waight family – mainly through the latter's representation to this day on the organization's Boards of Directors and Trustees – and Waight's relatives have by and large remained active in the political sphere.[8] Each year, BAS awards the James A. Waight Conservation Award, one of Belize's few environmental accolades. (BAS 2004, Botnick et al. 2000)

Programme for Belize

The Programme for Belize began in 1988 as a proposal by the Massachusetts Audubon Society to purchase 112,000 acres in northern Belize, to be protected in perpetuity. In giving a presentation on their proposal to the Belizean prime minister at Belize's Washington, DC embassy, Audubon representatives caught the interest of a consular officer, who became the first executive director of the Programme for Belize, the local organization that was created to manage and receive title to the 112,000 acres bought from Gallon Jug Agro Industries. This area was designated the Rio Bravo Conservation & Management Area, and by 1997, with technical and financial assistance from The Nature Conservancy and other groups, its area had been expanded to approximately 259,000 acres, or about 4.5% of Belize's total land area.

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[6] This is done through co-management agreements, but as echoed in DeVries et al. (2003), co-management seldom brings financial support from the agencies of the Government of Belize, and the co-managing NGO is in effect left to fund the protected area's management on its own.

[7] In addition to Waight, two of the Premier's sisters were founding members of the Society.

[8] Price's party, the People's United Party (PUP) has been out of power only twice (1984-1989, 1993-98) since independence.

(Dushku et al. 2002, Knight 2003)

The Nature Conservancy (TNC)

The Nature Conservancy had the enviable task of brokering Belize's first and only debt-for-nature swap with the U.S. Government in 2001, a task that will have channeled over US $9.3 million into local conservation by 2027 (Egolf 2001). TNC has Conservation Partnership Agreements with four Belizean NGOs, namely the Belize Audubon Society, Programme for Belize, and the Friends of Nature (FoN), and the Toledo Institute for Development & Environment, three of which are beneficiaries of the Belize DNS. The formal agreements between these groups and TNC offer assistance in the areas of "institutional development, ecotourism and enterprise development, fundraising, protected areas planning and management, land purchases, and stewardship of properties" (DeVries et al. 2003: 221).

Belize Center for Environmental Studies & Toledo Institute for Devt. & Environment

TNC's relationship with Belize predates the Belize DNS to 1993 when it partnered with the Belize Center for Environmental Studies (BCES), a Belize City-based NGO that was founded just a few years prior (DeVries et al. 2003, Rosien 2001). By early 1997, however, BCES had folded, and a few months later, a former BCES staffer emerged at the helm of a new NGO, the Toledo Institute for Development & Environment (TIDE), which was formally incorporated in September of 1997 (DeVries 2003, Rosien 2001). TIDE is also the largest single beneficiary of the Belize DNS (Egolf 2001).

As groups like PfB and TIDE are said to be heavily financed by TNC, such relationships have certainly undoubtedly the suspicions (and possibly the ire) of the locals (Rosien 2001). An unpublished report from the Inter-American Development Bank-funded Environmental and Social Technical Assistance Project (ESTAP) comments on the relationship between TNC and the now-defunct BCES:

> *TNC reportedly justified itself [using] BCES as its local NGO and in essence, TNC…controlled the affairs at BCES from behind the scene…When BCES went defunct, TNC's "puppeteering activities" were no longer concealed.* (ESTAP 1997: 2)

Regardless of the extent of TNC's influence on its partners, it purports to

maintain close working relationships with them to uphold "channels of communication that permit the creation and exchange of information as well as scientific, technical, financial, and institutional collaboration in the area of biodiversity conservation" (DeVries et al. 2003: 221). In addition to a Belize program office based out of their Arlington, Virginia headquarters, TNC currently has a local office in the town of Punta Gorda, located only a short walk down the shore from TIDE's headquarters. That office is involved primarily with research involving and technical assistance to TIDE and FoN. TNC staffers are also posted indefinitely at Programme for Belize's Rio Bravo facilities where both organizations are collaborating on a multi-million dollar Climate Action Project involving the sequestration of 1,665,083 tons of carbon between 1993 and 2035 (DeVries et al. 2003; Dushku et al. 2002).

World Wildlife Fund (WWF)

In contrast to TNC's almost-exclusive partnership with local environmental organizations, the World Wildlife Fund by contrast has applied its conservation strategies largely to the governmental sector. In 1991 WWF provided the funding & technical assistance for the establishment of a Conservation Department within the Ministry of Natural Resources and Environment, and more significantly assisted the government with the establishment in 1996 of a national environmental trust fund, the Protected Areas Conservation Trust (Spergel 1996).

Protected Areas Conservation Trust (PACT)

PACT is endowed by the small departure taxes (US $3.75 per person) paid by the more than 150,000 tourists visiting the nation annually, and re-distributes these through a grant application process, to local NGOs (PACT 2002). WWF's activities in Belize fit into the organization's broader global goals for 'Target Driven Programmes' consisting of "activities…aimed at policy change, either through existing instruments (e.g. conventions, legislation), market forces (certification, buyers groups), or voluntary commitments (e.g. Gifts to the Earth, Climate Savers)" (WWF 2001).

PACT's establishment addresses the dearth of local funds for conservation.

Governments such as Belize's often do not have the resources themselves (neither human nor financial) to carry out conservation work (Beletsky 1999). The necessary resources can be huge:

> *A recent study estimated the cost of "basic services" for the protected area management system at U.S. $6 million in one-time capital expenses and $2.0 - $2.5 million in annual recurrent costs. These sums are well in excess of current expenditures.* (Spergel 1996)

Hence the establishment of local non-governmental entities which can acquire the adequate human and economic resources to protect the nation's natural resources. The association of local environmental groups with foreign backers, however, inspired the following quote from a local environmental professional:

> *[Local] NGOs are…everywhere and they are [usually] affiliated with a group outside – owned may be too strong a word, but…controlled by NGOs from outside. Where would Programme for Belize be without TNC, or YCT without FFI, SATIIM without EcoLogic, TIDE without TNC…?* (DeVries et al. 2003: 106)

Even where ICOs and their local partners have sought to encourage Belize's economic growth through ecotourism, these groups are not seen as completely beneficent, as illustrated by the earlier comment regarding TNC, TIDE and BCES. For some, the actions of ICOs call to mind issues of sovereignty in a nation just freeing itself from the exploitative legacy of colonialism. A few years ago, the publisher of Belize's most widely circulated newspaper had the following thoughts on the global conservation movement:

> *Out there in the world of the white power structure, they have no doubt that their children will survive for many centuries to come, so what they are taken up with is how they "culture" planet earth for the future with gardens and national parks and so on for the use and recreation of their master races*. (Hyde 2002)

3. LITERATURE REVIEW & CONCEPTUAL FRAMEWORK

Where the previous chapter examined the context into which the Belize DNS specifically fit, this chapter continues the contextualizing effort by stepping back to examine the larger DNS concept itself – its origins as well as its challenges. The chapter closes by presenting how program theory can be used to appraise the Belizean iteration of the DNS.

Inadequacy of Funding as an Environmental Indicator

Launched in 2002 following the annual meeting of the Society for Conservation Biology, the Conservation Measures Partnership (CMP) is a joint venture of the African Wildlife Foundation, Enterprise Works Worldwide, and major ICOs Conservation International, The Nature Conservancy, Wildlife Conservation Society, World Wildlife Fund, and coordinated by Foundations of Success (Christensen 2003, CMP 2003). The CMP seeks to "develop a set of mutually acceptable standards for designing, implementing, assessing, and auditing conservation projects," because "to-date, an effective, broadly accepted mechanism for measuring success and promoting the adoption of best practices does not exist" (CMP 2003).

CMP highlights that monitoring & evaluation are necessary to conservation programs, as these processes "can be powerful tools for continuous learning and improvement" (Christensen 2003). Such adaptive management allows organizations to "invest in research to determine whether [their] activities actually do help to mitigate the problems" (Sawhill & Williamson 2001: 104) and to "[abandon] unproductive strategies" (Christensen 2003).

Even though CMP is based on the realization that the money spent on conservation is not a particularly adequate indicator of conservation achieved, such thinking still permeates the conservation sector. A review of the literature on conservation financing seems to confirm this, where the "mechanisms" that fund conservation projects are dissociated from the on-the-ground activities they fund, and the results they were designed to achieve. Such programs are deemed effective or successful not on the conservation they accomplish, but on the money they raise.

The above seems particularly evident in the case of debt-for-nature swaps. Even though DNS programs have been described variously as programs whose dual aim is to curb deforestation and lower nations' external debt (ECLAC 2001, Deacon & Murphy 1997), Muller's (2003) interviews with the ICOs planning swaps "revealed that debt swaps should not be confused with the programs that they support as DNS's are a mechanism to generate money for conservation and the spending of the money is a separate entity" (Muller 2003: 81-82). In spite of such statements however, "the majority of interviewees stated that success is also measured based on the effective implementation of the programs that DNS's fund" (Muller 2003: 82). In light of this decoupling, a review of the conservation financing field is in order at this point.

Financial Emphasis of Conservation Finance

Financing conservation in cash-strapped developing nations continues to be problematic (CFA 2003). Hence the emergence of a myriad of market-based strategies intended to provide such funding, including (CFA 2003, Landell-Mills & Porras 2002):

- Biodiversity enterprise funds
- Bioprospecting
- Eco-certification (e.g. certified coffee and wood products)
- Environmental trust funds
- Debt-for-Nature Swaps
- Fiscal instruments (e.g. conservation easements)
- Funding through the Global Environment Facility
- Payment for ecosystem services (e.g. watershed services)
- Trading of offsets (e.g. carbon sequestration)
- User fees (e.g. resource extraction fees and tourism user fees)

In 2002, a conservation finance retreat even culminated in the establishment of the Conservation Finance Alliance (CFA), a collaborative effort between agencies like the United Nations Environmental Programme and the World Bank, and prominent ICOs such as CI, TNC, WWF, the Wildlife Conservation Society (WCS), and the World Conservation Union (IUCN), among others (CFA 2003). As its

namesake suggests, the CFA seeks to assist nations with financing conservation projects (CFA 2003). Still, the myriad options for conservation financing have led to more emphasis on the revenues such schemes generate and less emphasis on how much "conservation" is generated.

It is no doubt easier to measure the dollar amounts raised through the operation of the various conservation financing mechanisms. But money is not exactly equal to conservation on the ground. For instance, while a 1999 Global Environment Facility report states that "[conservation] trust funds have generated substantial financial resources that would not otherwise have been available to conservation" (GEF 1999: 4), it shortly thereafter counters that:

> *Uncertainty remains, however, about trust funds' ability to demonstrate long-term biodiversity conservation impact. In part, this is due to the difficulty of measuring biodiversity impact, and of attributing impact to a particular intervention, especially over the short term. It is also true that trust funds generate relatively small amounts of resources in relation to national conservation needs. However, most of the funds studied have not defined or established measures of the biodiversity conservation impact they intend to achieve, and do not include analysis of biodiversity impact in their monitoring and evaluation activities.* (GEF 1999: 5)

The GEF report illustrates the ease with which agencies cite the economic impacts of conservation financing mechanisms – while ignoring the environmental results that they were designed to bring about. At least the GEF personnel recognize the disparity between revenue generated and actual on-the-ground environmental impacts. As shall be demonstrated shortly, the lack of attention to the environmental side of the conservation financing equation is particularly evident in the case of the mechanism known as the debt-for-nature swap.

Background on Debt-for-Nature Swaps

In 1973 and 1979, the Organization of Petroleum Exporting Countries (OPEC) instituted price shocks by raising the price of oil, with particular impacts on both developing and industrialized oil-importing nations (ECLAC 2001, Moye 2000). Industrialized nations largely dealt with the price shocks by increasing the prices of their exports, but developing nations – largely dependent both on oil and the imports

from industrialized nations – were soon facing mounting debts caused by the deterioration of trade (ECLAC 2001, Moye 2000). This turn of events is thought to have contributed significantly to the international debt crisis, born in 1982 when México (albeit an oil-producing nation) declared its inability to meet its debt servicing, after which many other developing nations also fell (ECLAC 2001, Moye 2000). Conservationists in the developed nations paid close attention to the debt crisis because it served to weaken environmental protections in developing nations, which while tending to struggle economically, also stand on a wealth of natural resources (Kahn & McDonald 1995, Resor 1997).

Not only were the overall economic conditions of such nations of concern, but also the debt. Debt's contribution to tropical conservation is viewed as inspiring governments of debt-laden developing nations to slash budgets for nonessentials like park management and encouraging development vis-à-vis the conversion of huge acreages of tropical forest to farmland to feed the export market (ECLAC 2001, Kahn & McDonald 1995, Moye 2000, Resor 1997). Conservationists were hence concerned because, as stated by Resor (1997), "much of the world's biological diversity is harboured in the same countries that face the greatest financial strain from foreign debt burdens." Tropical nations harbor disproportionately large shares of the world's biodiversity (Kahn & McDonald 1995).

Two years into the debt crisis, Dr. Thomas Lovejoy, a scientist working for the World Wildlife Fund, wrote an op-ed piece in the *New York Times* suggesting the creation of a mechanism known as a debt-for-nature swap[9] (Lovejoy 1984). Based on the concept of debt-for-development swaps which were created to convert external debt into local investment, the proposed debt-for-nature swap would convert external debt into currency obligations to local environmental projects, thus addressing both external debt and deforestation in one fell swoop (Deacon & Murphy 1997, ECLAC 2001, Moye 2000).

Issues with Debt-for-Nature Swaps

As illustrated in **Figure 3**, the first such debt-for-nature swap was

[9] This mechanism is also sometimes referred to as a debt-for-environment swap.

implemented in 1987 (in Bolivia), with the most recent (as of this publication) occurring in Colombia in early 2004 – a total of one hundred thirteen individual swaps, funneling over US $1.2 billion into conservation[10] (TNC 2003, TNC 2004, WWF 2003a, WWF 2003b). Analyses of swaps have highlighted a number of issues, notably: (i) a complex mechanism of operation, which can complicate implementation, and (ii) a lack of monitoring & evaluation to ensure that environmental outcomes have been achieved (Deacon & Murphy 1997, ECLAC 2001, Moye 2000, Muller 2003).

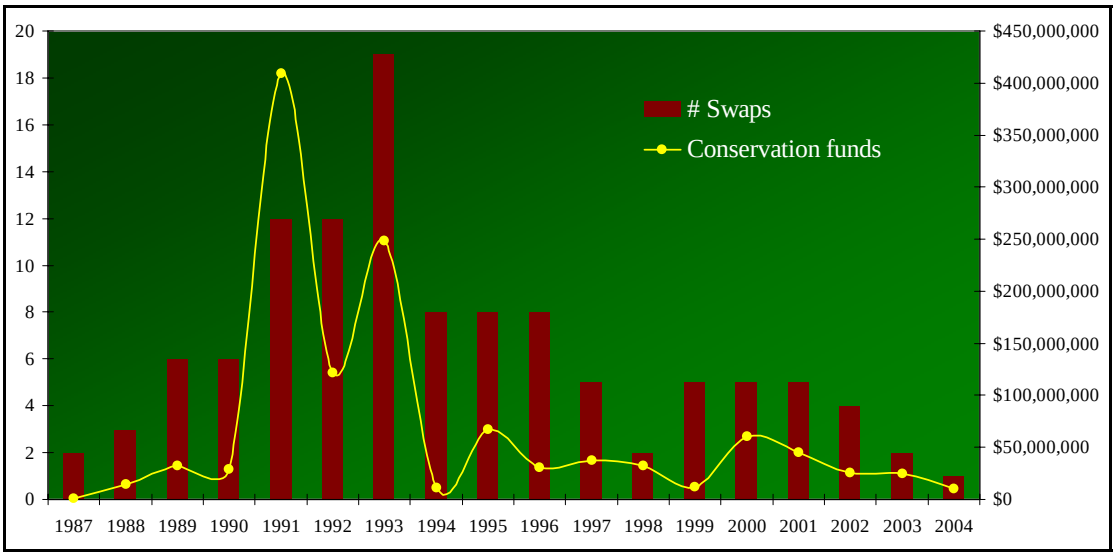

Figure 3: Conservation Funds generated and Swaps initiated (1987-2004)

Sources: TNC 2003, TNC 2004, WWF 2003a, WWF 2003b

While the one-hundred thirteen individual debt-for-nature swap programs are all based on the same mechanism proposed by Lovejoy in 1984, as noted by Resor (1997), no two swaps are identical, in either planning or implementation. Debt swaps are generically divided into those swaps which cancel commercial bank debts acquired on secondary markets (commercial swaps), and those in which bilateral (government to government) debt is cancelled (bilateral swaps). These have also tended to differ in the number of parties involved (see **Table 2**).

The main parties involved in debt are the creditors and the debtors.

[10] Also see **Appendix A** for the complete list of nations benefiting from debt swaps, and amounts of debt swapped and conservation financing raised.

Commercial swaps involve third party ICOs purchasing commercial debt on secondary markets, and have also been referred to as 'three-party' swaps (CFA 2003, Deacon & Murphy 1997, ECLAC 2001, Moye 2000, Resor 1997). Bilateral swaps on the other hand have tended to be negotiated directly between debtor and creditor nations, without the input of third parties, though this has changed with the inception of the US Tropical Forest Conservation Act, following which ICOs have been involved in brokering such bilateral swaps (CFA 2003). The Belize DNS was the first such bilateral swap to involve a third party, The Nature Conservancy (Campbell 2004, TNC 2001). The economic contributions of such swaps to debt reduction and conservation financing are illustrated in **Table 2**.

Table 2: Economic Contributions of DNS Programs to Debt Reduction & Conservation Financing[11]

# Debt-for-Nature swap programs	External debt cancelled	Conservation funds raised	Time-frame	# Nations benefiting
50 commercial swaps	$167,787,650	$112,618,682	1987-2000	15 countries
+ 63 bilateral swaps	$3,561,073,951	$1,098,864,443	1990-2004	26 countries
113 debt swaps total	**$3,728,861,601**	**$1,211,483,125**	**1987-2004**	**34 countries[12]**

Sources: TNC 2003, TNC 2004, WWF 2003a, WWF 2003b

In any event, debt swaps – both bilateral and commercial – are generically executed as follows, illustrating their complexity[13]:

> *1. An indebted country establishes general guidelines for a debt-for-nature programme and invites participation from conservation organizations.*
>
> *2. An international conservation organization and local private and public organizations reach agreement on a conservation programme.*
>
> *3. The participating conservation organizations verify that sufficient funding will exist for the debt purchase or that debt donations or partial forgiveness may be possible.*

[11] Funds listed are in USD.
[12] Some nations such as Bolivia have benefited from both commercial and bilateral debt swaps, hence the number of nations benefiting is thirty-four and not forty-one.
[13] These execution steps have been excerpted directly from Resor (1997).

> *4. The partners request government approval for the swap, usually from the central bank and the Ministry of Finance, and often from the government ministry that has jurisdiction over the relevant sector where the proceeds will be used.*
>
> *5. Specific terms of the swap are negotiated, including the exchange rate from foreign currency to local currency, the redemption rate and the local investment instrument. The purchase price depends on the secondary market price of the debt, which is determined by the market's view of the credit history and repayment expectations for the particular country. The amount of conservation funds generated depends on the redemption rate, which is the percentage of the face value debt that is redeemed in local currency. The redemption rate is sometimes 100 percent of the face value debt, but it is often less depending on negotiations among the parties involved. The redemption rate must exceed the purchase price of the debt by a large enough margin to make the transaction worth while.*
>
> *6. The debt is acquired and is presented to the central bank of the indebted country which cancels the debt and provides funds in local currency, either in the form of cash or bonds.*
>
> *7. The conservation projects are implemented over the life of the agreed programme.*

The steps outlined above also entail varying levels of detail. In particular, the implementation phase (#7) may involve several activities, and the particular terms of debt swaps (#5) tend to vary. While initial debt swaps such as the 1987 Bolivia swap tended to directly fund individual national parks, later swaps tended to channel funding into national environmental trust funds whose grants could serve broader aspects of forest protections, such as environmental education activities aimed at buffer zone communities (ECLAC 2001, Muller 2003, Resor 1997).

In addition to the complexity of swaps' planning & implementation, another outstanding issue is their overall lack of outcome monitoring (Deacon 2003, Moye 2000, Muller 2003). The lack of monitoring makes it difficult to substantiate claims that such programs actually produce positive environmental effects:

> *The development impact of debt-for-development swaps is difficult to assess since there has been almost no monitoring and evaluation (M&E) of debt-for-development and debt-for-nature swaps.* (Moye

2000: 12)

In any event, the lack of monitoring & evaluations of debt-for-nature swap programs betrays a key assumption being made, namely that after funding is secured through the signing of contracts, and money starts to flow, a swap is "successful." It is not considered a high priority to ensure that the conservation the swap was intended to create is actually achieved, because it is easier to assume that implementing agencies are doing their jobs than to actually monitor. In essence, because money is input, it is assumed that "conservation" is automatically an outcome. While simplifying the planning phase of DNS programs, **Figure 4** depicts the "black box" thinking being engaged by debt swap planners.

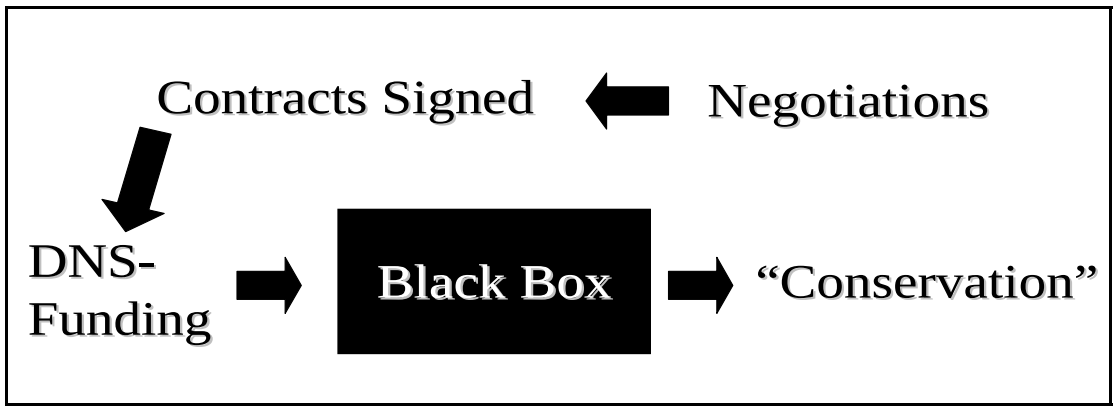

Figure 4: Black box model of Debt-for-Nature programs

Source: Adapted from World Bank & Carleton University (2003: 2.8)

Many of the points raised earlier regarding DNS programs are the domain of program theory. As such, this study focuses on unraveling the "black box" by which funding is thought to generate the environmental outcome of "conservation."

Program Theory

Emerging in the 1980's, program theory[14] or 'theory-based evaluation' is, quite generally, the field of study dealing with the 'analyzing' / 'appraising' / 'evaluating' of programs, and as stated aptly in the evaluation module developed through a joint initiative of Carleton University and the World Bank:

[14] A distinction must be drawn between the field of program theory, and the program theories that can be constructed for individual programs, such as the theory developed for the Belize DNS in **Chapter 5**.

> *Its focus is to understand the nature of the problem and the relationships between the problem, intervention and expected outcome.* (World Bank & Carleton University 2003: 2.9)

Program theory thus conceptualizes the operation of programs in terms of resources (**inputs**), services generated by those resources (**activities**), the products in turn generated by those services (**outputs**), the benefits that may result from those products & services (**outcomes**), and the changes that would not have occurred without the program's existence (**impacts**) (World Bank & Carleton University 2003). The program outcome model depicted in **Figure 5** indicates program theory's focus on the relationship of these attributes in moving from inputs to impacts.

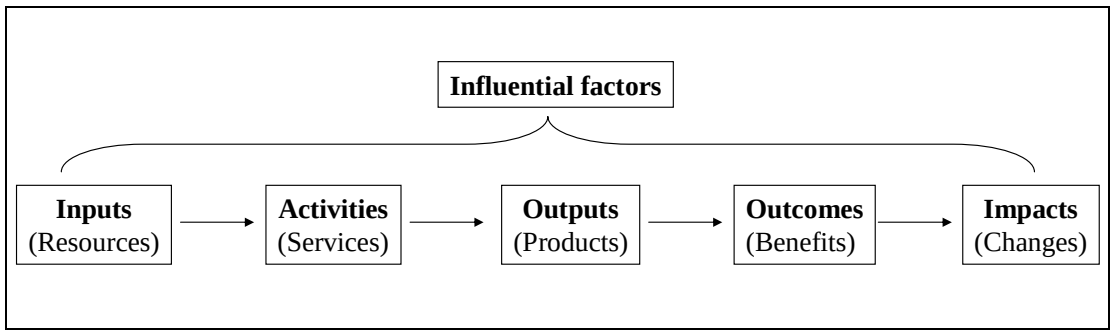

Figure 5: Program Outcome Model

Source: Adapted from World Bank Group & Carleton University (2003:2.7-2.8)

It must also be noted that beyond the general concerns of program theory, in understanding how inputs are translated into outcomes, there is no one-size-fits-all program evaluation (McNamara 2002, Roche 2002, Weiss 1998). Programs differ as well as the scopes of various evaluations. McNamara (2002) divides program evaluations into the particular attributes they evaluate.

Based on the earlier statements that debt swap programs have neglected monitoring & evaluation, there is reason to believe that such programs could benefit through the appraisal of program theory. The argument of Lovejoy (1984) was that the debt-for-nature swap could mitigate a nation's deforestation by funneling money that would have gone to debt servicing instead into terrestrial conservation programs. However, as expressed by Gullison & Losos (1993), there are key assumptions there:

1. That swapping debt mitigates deforestation through lowered pressure to clear

tropical forests for commercial agricultural development.

2. That the projects funded directly mitigate deforestation.

A demonstration of the latter, for example, is funding patrols in national parks where previously budgets had been slashed indirectly due to high debt servicing. This is directly related to deforestation-mitigation through *guaranteeing* the park's future existence with the funds provided.

As acknowledged in program theory, however a variety of factors can influence the attainment of program objectives (i.e. outcomes and impacts), and these may be external or internal to the program. As shown in **Figure 5**, however, particular emphasis is placed on the influence of those factors external to the program (World Bank & Carleton University 2003). Even in the case of paying for park patrols, deforestation within the park's boundaries might still occur if individual patrols are only sporadic, or if funding does not provide for enough staffing.

Conceptual Framework

As emphasized in the previous section, program theory presents a way to conceptualize the operations of programs. *Inputs* are converted into *activities*, which themselves have quantifiable *outputs*, which are then converted into *outcomes*, which may or may not translate into *impacts*. In asking "what is the program theory of the Belize DNS?" a series of questions are actually being asked, namely "what are the program's inputs / activities / outputs / outcomes / impacts?" and "what is the relationship between these?" Such questions are re-presented in **Figure 6**.

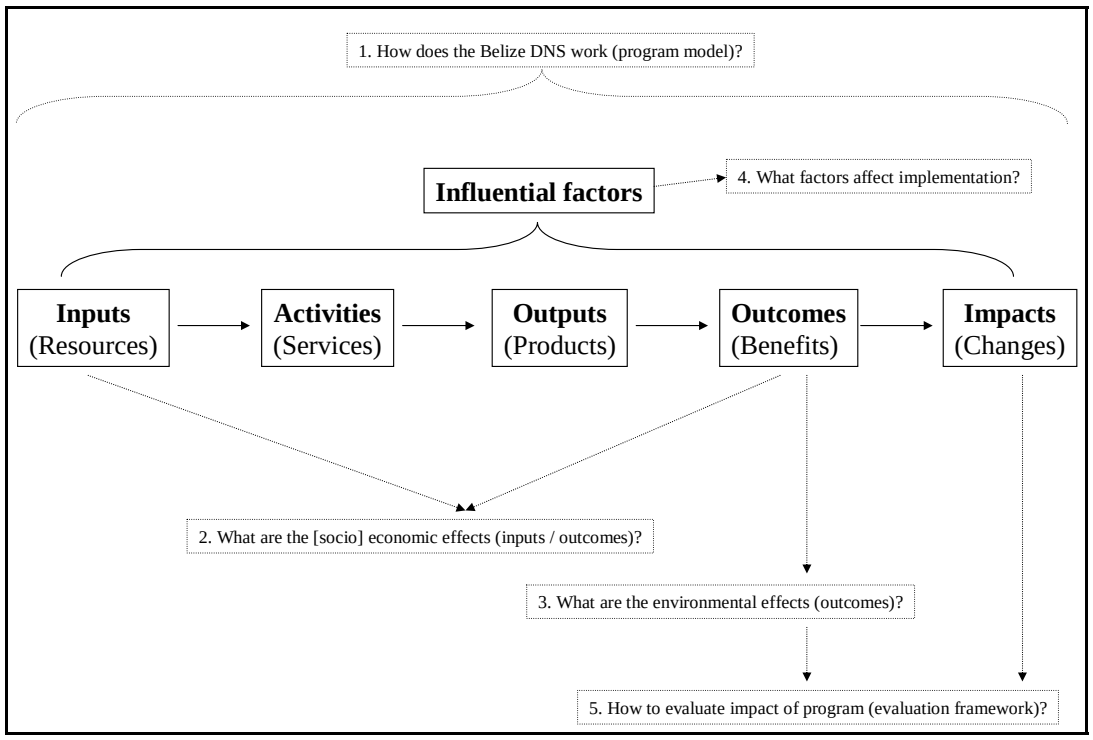

Figure 6: Framework Used to Guide Research

A program analysis can rarely address all of those issues because of time and resource constraints (McNamara 2002, Roche 2002, Weiss 1998). Furthermore, visual depiction of the program theory does not particularly concern itself with the exact answers to the above, and the depiction itself can aid in determining the features that warrant examination by the program analyst:

> *If an evaluation find that a program is not achieving its expected outcomes, program theory can help disentangle where the breakdown is occurring.* (World Bank & Carleton University 2003: 2.9)

The program theory later constructed in **Chapter 5** takes the form of a 'logic model,' one of two principal management tools utilized in the field of program theory. The logic model "is an attempt to provide a visual way to depict program theory," in contrast with the other tool, the logical framework or 'logframe' which has less of a visual emphasis (World Bank & Carleton University 2003: 2.9). The logic model also presents a particular mode of filtering the data.

In addition to obvious financial & temporal constraints which limit the scope of this study – the Belize DNS is yet in its early years of inception – it may not be

feasible to answer the question of ‘impacts’ if we define these as the long-term results which will only be evident near or after the program’s termination (Roche 2002). In fact, Roche (2002) reserves the term “impact assessment” for program evaluations which focus on assessing such ultimate effects of programs. Because of the sheer variety of program analyses possible, neither Roche (2002) or others preclude the possibility of conducting pre-termination program analyses (McNamara 2002, Weiss 1998). This study focuses on those questions which *can* be answered in the interim, while also providing some suggestions of how to eventually address the issue of impacts (at the ecosystem level) when the Belize DNS reaches completion in 2027.

4. METHODOLOGY

Following on the conceptual framework elaborated in the previous chapter, this chapter presents the methodology utilized in conducting this study. The overall research design and research questions are reviewed, as are the methods for data collection, sampling and data analysis. The interview guide created for this study is also described in some detail. This chapter closes with acknowledgement of the various limitations of this study, particularly those factors which can possibly affect this study's validity.

Research Design

The original focus of this study was to reach an understanding of the Belize DNS, beyond the little that had been written on the program (i.e. the Egolf 2001 and the press releases). In line with the conceptual framework elaborated in the previous chapter, this study seeks more specifically to appraise the implementation of the Belize DNS, describing it in the parlance of program theory. The following research questions were conceptualized for this study:

1. *How does program theory represent the Belize DNS?*
2. *What are the program's economic effects?*
3. *What are the program's environmental effects?*
4. *What are the factors influencing the program's implementation?*

After research indicated (i) that answering question 3 might not yet be feasible, and (ii) that the program's scope might go beyond the economic and the environmental, an additional research question was formulated:

5. *How can the program outcomes be adequately assessed?*

As the first four questions were the primary focus of this study – based largely in the interview questions – answers to these (findings) are presented in **Chapter 5**. The fifth question is more of a conceptual matter, and is hence addressed both in the discussion chapter (**Chapter 6**) and the concluding chapter (**Chapter 7**).

Yin (1994) suggests that for scenarios in which the investigator does not have control over behavioral events, and in which the research focus is on contemporary events, the case study method is justified. Yin (1994) also explains that the case study

method is in effect an umbrella of multiple research methods, thus the design of this study entailed a combination of interviews, in-depth archival analysis of available program documentation and to a limited extent, some GIS analysis. Furthermore, the case study method also emphasizes the reporting of findings in a coherent, story-like fashion (Frankfort-Nachmias & Nachmias 2000, Yin 1994).

Data Collection & Sampling Method

This study utilized multiple sources of evidence to establish its findings. As mentioned in the previous section, the primary sources of data were interviews, archival data (including available program documentation and journal articles), and various GIS databases. As acknowledged in both Frankfort-Nachmias & Nachmias (2000) and Yin (1994), the use of multiple sources of evidence allows for a more robust sampling of information, as sources can be cross-checked across one another – 'triangulation.'

A variety of agencies helped orchestrate the ongoing Belize DNS, in addition to the organizations currently implementing the program. The scope of this study is to examine not the planning, but rather the operation of the Belize DNS. As such, the operation – or more properly implementation – of the program concerns the four organizations which receive funding through the program (Egolf 2001):

1. Belize Audubon Society (BAS)
2. Programme for Belize (PfB)
3. Protected Areas Conservation Trust (PACT) Foundation
4. Toledo Institute for Development & Environment (TIDE)

Preliminary research indicated that each agency was assigned a "point person" responsible for coordinating their respective organization's swap program implementation.[15] Thus, including the swap's broker, TNC, interviews were sought from these point personnel at the agencies implementing the swap. Purposive sampling – the intentional selection of point persons to interview – also became

[15] Originally, the group of point personnel consisted solely of the executive directors of the various organizations, but staff turnover altered this dynamic, even within upper management, some of whose members also participated in the planning of the swap, though not as point personnel.

snowball sampling, as the key informants would refer the principal investigator to consult with other key informants (Babbie 2002, Frankfort-Nachmias & Nachmias 2000).

On various grounds, an interview with the PACT Foundation point person was not sought. Underlying this study is the desire to examine the relationship between inputs (i.e. funding) and actual environmental outcomes. As a grant-making entity, PACT is not tied to actual on-the-ground implementation of the Belize DNS, and is hence a sphere removed from the production of outcomes. Also, and perhaps more importantly, two years into the swap, the PACT Foundation was still not fully operational, precluding the experiences being afforded the other beneficiary organizations. PACT, the Foundation's parent agency, receives the Foundation's swap funding in trust it until it becomes operational (PACT 2002).

In addition to the swap's specific beneficiaries, an interview was sought from The Nature Conservancy's point person because while TNC was actually the swap's broker, supplying US $1.3 million to subsidize the program, it is indirectly involved in the program's implementation through the technical as well as financial assistance it supplies the implementing agencies (Egolf 2001, DeVries et al. 2003). In addition, TNC's position as broker made its perspective on the goals of the swap valuable.

A two-month internship with TIDE in the summer of 2003 facilitated a level of organizational penetration not accomplished with BAS, TNC or PfB. Contact went beyond just the TIDE point person to informal interviews with different support staff and one of the three rangers responsible for patrolling the DNS-acquired lands. Besides formal interviews with DNS point people, comments on the swap were also solicited from two personnel at a pair of TIDE's partner organizations not directly connected to the swap.

In total, eleven people were interviewed. While this sample size seems exceedingly small, from the perspective that all the implementing agencies and all but one of the beneficiary organizations were represented in the sample, this is justified. Besides the PACT point person, the only other point persons that could have potentially been interviewed are the respective representatives of the Belizean and

U.S. governments who both sit on the program's oversight committee. But as these are not actually involved in the swap's implementation, this did not warrant interview.

All the study participants agreed to be interviewed, though not all of these could be conducted in person. The majority of interviews were conducted at organizational offices, while one interview was conducted via long-distance telephone call and another took the form of a survey via email.

Interview Guide

The interview guide was administratively approved by the Human Subjects Division of the University of Washington. Rather than utilizing simple 'yes' / 'no' questions, interviews featured open-ended questions to allow respondents to elaborate at length on the questions that struck resonance with them (Babbie 2002). The overall rationale behind the appended interview guide (see **Appendix C**) was the gathering of data pertaining to the Belize DNS. Specifically, the interview guide serves multiple purposes:

a. to learn about the overall rationale behind the program's operation, including its objectives,
b. to assess both the inputs, activities and outputs already effected by the program, and those envisioned
c. to assess organizations' perceptions of conditions affecting the program's implementation, and
d. to assess what evaluative criteria each organization had to define whether the program is / was the successful / effective or not.

The thirteen-question interview guide was divided into three sections. The first five questions were aimed at getting an overall idea for the goals of the program and the activities being accomplished. The next four questions were geared toward fleshing out the point persons' perceptions of the conditions affecting the program's implementation. The last four questions examined what specific evaluative criteria and benchmarks (if any) the individual organizations had to indicate whether the program was being effective or not.

While interview questions are listed *in English*, the Belizean cultural context in some cases necessitated the simplification and translation of such questions into the vernacular – *Creole*[16] as was the case. As Young (2002) states, while English is the nation's official language[17], other languages such as Creole, Garifuna, and Spanish are characterized as national languages for their utilization across the national landscape. Where the preference of some TIDE staff members was to speak in the Creole vernacular, it proved important to be sensitive to such issues. Creole is, coincidentally, the first language of principal investigator.

Data Analysis

With the exception of the emailed survey (for which an electronic transcript existed), interviews were written by the investigator by hand during the interviews. Interviews with the TIDE support staff and DNS ranger were conducted using a subset of questions contained within the interview guide, as some of the questions held no relevance to such personnel (e.g. asking staff that were not involved with the program's development to speak about aspects of the planning).

Because of the extremely small number of interviews, the interviewer's written notes were repeatedly visually inspected for the presence of various key words and other themes related to the framework, such as "biodiversity," "community," and "illegal logging," which were later categorized into:

- inputs (resources)
- activities (services)
- outputs (products)
- outcomes (benefits) and
- impacts (changes)

Attention was also paid to the frequency of similar or identical responses to

[16] In **Chapter 2**, it was mentioned that Creole is a Belizean ethnic group. Creole (or 'Kriol' as it is also written), is also a language based on English and very similar to the patois spoken in the rest of the Anglophone Caribbean – not to be confused with the French Creole spoken, for instance, in Haiti (Young 2002).

[17] A 2000 report on the Belize Education Sector Improvement Project stated that although the language of instruction in classrooms across the nation, English is only spoken in an almost negligible 0.32% of the homes of elementary school children (DFID 2000).

different questions. The same themes identified in the interview data were also sought in the project documentation materials, to cross check. Some of the program documentation (and one of the interviews) was available in electronic format, so key word searches could be performed using search functions. In some cases, presence of information gaps necessitated further contact via email with study participants to solicit more information, where available.

The emergence of common themes forms the basis of the program theory presented in the following chapter. The development of the logic model of the Belize DNS' program theory forms the basis of answering the first of the research questions, and is actually in line with the "explicit causal model" that the Conservation Measures Partnership advocates each program develop:

> *Having a conceptual model was essential. It forced people to articulate their intuitive understanding of their projects as an explicit set of causes and affects that could be shared and analyzed critically with others.* (Christensen 2003)

Study Limitations

A variety of limitations may have affected the validity and reliability of this study. Yin (1994) reviews how concerns about validity (construct, external and internal) and reliability can be addressed. In some cases, the study limitations should merely be acknowledged from the get-go, as some factors cannot be avoided. For this study, instrumentation was seen as possibly affecting the internal validity, and was addressed largely through appropriate data analysis, including pattern-matching and explanation-building, as suggested by Yin (1994).

Instrumentation refers specifically to the ability of the test instrument to accurately capture those factors it is intended to measure (Babbie 2002, Frankfort-Nachmias & Nachmias 2000). Regarding this, a perceptible instrumental flaw of the interview guide is that three of the thirteen questions interpret "impact" in terms of "effectiveness." The decision to focus the study on swap impacts rather than swap effectiveness was made after conducting the interviews. Effectiveness actually addresses "the degree to which a project has achieved what it set out to do" (Roche 2002: 22). From the standpoint of program theory, assessing effectiveness only

occurs after program impacts are estimated. The impact is defined as the changes that the program brings about which would otherwise not have occurred in its absence. Needless to say, the two concepts are related and the interviews did furnish observations of program impact.

A key factor affecting the ability of the instrument (i.e. the interview) to reliably assess the program is staff turnover. With regards to this, it is acknowledged that staff turnover may affect the validity of the information supplied through the interviews. For instance, the TIDE Operations Manager interviewed did not join the organization until 2002. Other support staff also joined and left the organization between the initiation of the Belize DNS in 2001 and mid-2003 when the interviews were conducted. In addition, PfB's initial point person was replaced when she left to take up an upper management position at TNC.

Reliability of data, which Yin (1994) states can be accounted for in the sampling design, refers to whether or not the interviews would have yielded sufficiently different answers if conducted at different times. This is certainly a possibility since, given the complexity of the program, the answers provided by the point people in particular, probably depend very much on their mindsets at given times. As such, there is no way to know whether interviews were done at the best possible times, although these were certainly done at respondents' leisure.

Regarding the sampling design itself, as stated earlier, all point persons of the implementing organizations were interviewed. There is little reason to believe that such data could be gathered from staff other than the designated point persons, but review of program documents nevertheless allows for gathering of information that might not have been presented during interviews.

Finally, in terms of external validity, or the ability to generalize this study to other debt-for-nature swaps, it is acknowledged that since sampling was only done of this one program, it may indeed be difficult to say whether or not the practices being followed in the Belize swap also hold true for swaps elsewhere. Representing a snapshot of a unique environmental program, this study generalizes its conclusions only to the Belize DNS.

5. FINDINGS

This chapter presents a descriptive analysis of the study data, focusing analysis of the Belize DNS on the targeted program attributes of the research questions. Of particular concern is how the program works (i.e. how the conversion is effected), its economic and environmental aspects, and the factors perceived by the program's planners & implementers to affect those aspects and the program as a whole, addressing the four principal research questions outlined in **Chapter 4**.

Program Theory of the Belize DNS

This section explains **Figure 7.** As a caveat this section uses currently available data to elaborate a particular theory of how the Belize DNS functions, and as a program theory may therefore constitute more of how the program is perceived to function than how it actually functions. Weiss (1998: 62) concedes that "who shall settle on the final version of program theory is a matter of contention among evaluation authors" – whether the program analyst or the program personnel and stakeholders get the final say.

The program theory elaborated here is informed not only by interviews with program personnel but also analysis of program documents and other archival material, assuring validity via triangulation (Frankfort-Nachmias & Nachmias 2000, Yin 1994). Graphic depiction of the program theory also aids program personnel to understand the program in ways that they might not have understood it before (World Bank & Carleton University 2003). The recently initiated Conservation Measures Partnership also recommends that all conservation programs utilize such conceptual models (Christensen 2003).

As illustrated in **Figure 7**, funding from the Government of Belize (GOB) is utilized differentially by the four beneficiaries of Belize DNS. This utilization occurs in three main capacities: (i) endowment funding (which all four organizations receive), (ii) land management funding (which only BAS, PfB and TIDE receive), and (iii) land purchase funding (which only TIDE receives). TIDE also receives an additional input of land from GOB in the form of a donation of 11,000 acres of land (Crown Block 127, and segments of Crown Blocks 123 and 127).

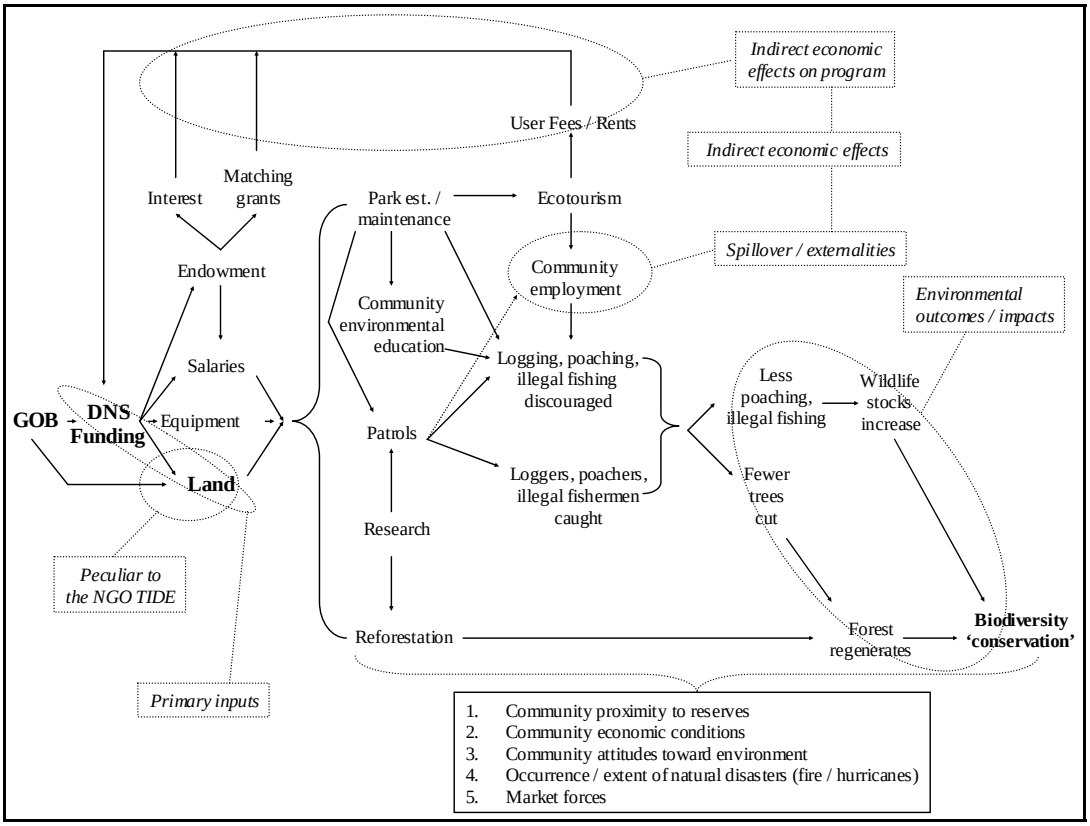

Figure 7: Program Theory of the Belize DNS

TIDE is also the only of the NGOs to receive land through the Belize DNS, as BAS and PfB already manage substantial areas totaling roughly 150,000 and 259,000 acres respectively. The Debt Swap and Forest Conservation Agreements signed in August and September of 2001 stipulate that TIDE will use its land purchase funds to acquire a total of 12,000 acres of privately-held rain forest to add to the lands donated it by GOB. Along with the land management funds provided the three implementing organizations, the land they already manage constitutes the platform by which the Belize DNS acts to obtain the goal of "tropical forest conservation" outlined in the U.S. Tropical Forest Conservation Act which authorizes the program.

In essence, the Belize DNS funds activities on protected areas selected by the three implementing organizations. The fourth beneficiary, the PACT Foundation, is also slated to use its funding to issue grants for forest conservation activities when it comes online in 2011. The protected areas currently funded through the program include the Rio Bravo Conservation & Management Area managed by PfB, Blue

Hole and Guanacaste National Parks and Tapir Mountain Nature Reserve / Actun Tunich Hil Muk Na Cave managed by BAS, and in addition to the lands TIDE acquired through the DNS, Payne's Creek National Park, which TIDE also manages on behalf of the Government of Belize (see **Figure 8**). (USDS 2001a, USDS 2001b)

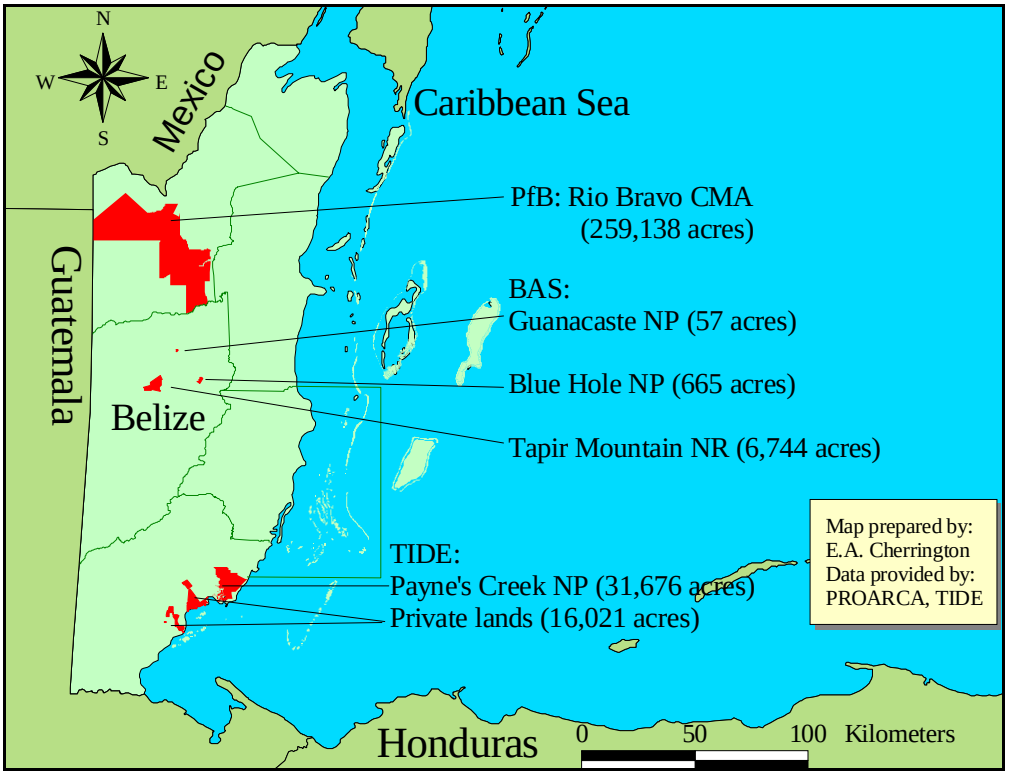

Figure 8: Parks funded through the Belize DNS

Implementing organizations convert financial inputs into environmental outcomes through a broad set of activities funded by the Belize DNS. These include: (i) the establishment and maintenance of protected areas, (ii) environmental education efforts targeted at communities near protected areas, (iii) patrols, (iv) reforestation, and (v) research. Such activities do not represent the full cohort of activities allowed under the FCA and the TFCA. As outlined within the FCA, debt swap funds are "approved for following purposes":

> *i. the establishment, restoration, protection, and maintenance of parks, protected areas, and reserves;*
>
> *ii. the development and implementation of scientifically sound systems of natural resource management, including land and ecosystem management practices;*

iii. *training programs to increase the scientific, technical and managerial capacities of individuals and organizations involved in conservation efforts;*
iv. *the restoration, protection, or sustainable use of diverse animal and plant species; and*
v. *research and identification of medicinal uses of tropical forest plant life to treat human diseases, illnesses, and health-related concerns.* (USDS 2001b: 7-8)

A sixth stipulation present in both the TFCA and the Debt Swap Agreement, "development and support of the livelihoods of individuals living in or near a tropical forest in a manner consistent with protecting such tropical forest" is absent from the Forest Conservation Agreement (TFCA 1998: 3d, USDS 2001a: 14).

The program generates financial outputs beyond the direct contributions of the Government of Belize to the four beneficiaries. The endowment funds created for each organization generate interest, which creates additional funding for the program, while the program's funding can also be leveraged for matching grants, as was demonstrated in the case of BAS. Small portions of the endowment can be drawn down annually to pay for salaries, equipment, land and the various activities outlined. Additionally, through investments in park infrastructure, organizations seek to recoup their investments through various user fees, or in the case of TIDE which do not yet have tourist facilities on its DNS-funded protected areas, rents from usage. These financial outputs create additional funding for management activities.

One outcome of ecotourism activities is the employment of members of communities buffering protected areas, through demand generated for the services of tour guides, hotels and restaurants. To a limited extent DNS funding has also provided for direct employment of community members, through the hiring of park rangers directly from their ranks, as in the case of TIDE (TIDE 2003d, TIDE 2003e). In addition to providing such economic incentives for local community members to use protected areas in a sustainable manner, the implementing organizations also engage, to varying degrees, environmental education efforts of local communities.

In the case of PfB, poaching of "yellow headed parrots and the harvesting of palmetto seeds have been the major issues" on the RBCMA, which prompted

dialogue between the manager of its Hill Bank field station and nearby communities of Rancho Dolores and Lemonal (PfB 2003a). The organization's most recent DNS budget proposal stated that it would continue a "targeted PR campaign to enhance the public's knowledge on areas of illegal activity not allowed on RBCMA primarily for buffer zone communities and by extension the country" (PfB 2003b). In comparison, TIDE also proposed using its funding to "develop a public awareness program to educate the surrounding communities as to the value and importance of maintaining the DNS lands" (TIDE 2003d). Its weekly broadcast, the Rising Tide, is used to "educate the people of Toledo about the DNS lands" (TIDE 2003c: 2), for which it received financial support from PACT in 2003 (Cherrington et al. 2003).

The *expected* outcome of community employment and the environmental education initiatives is that logging, poaching and illegal gillnet fishing will be discouraged. From the program documents and interview data, the latter factors are implied to be the major threats to the viability of protected areas. This outcome is also effected by establishment of protected areas and more significantly, the patrols that such establishment allows. By securing legal title to over 16,000 acres – title it did not have prior to the inception of the Belize DNS – TIDE has the right to conduct patrols to discourage illegal activities. Patrols stem illegal activities not only through discouraging such activities, but also through the apprehension of those conducting illegal activities. In the case of PfB, use of areas of the RBCMA for illegal cultivation of marijuana and the narcotrafficking had resulted in arrests in 2002-03, subsequent to which threats were made on the lives of staff, persuading management to reorganize its patrols (PfB 2003a).

The expected outcome of the discouragement of logging, poaching and illegal fishing and the apprehension of those engaged in such activities is less logging, poaching and illegal fishing, with the ultimate consequence of rebounding tree and wildlife stocks. TIDE's private lands were heavily logged prior to their being acquired by the organization, making reforestation a high priority (Bowen-Jones & Pop 2000, TIDE 2003c). Reforestation efforts were also necessitated by the destruction caused by the category four hurricane which devastated the organization's

properties in October of 2001, less than a month after the signing of the Forest Conservation Agreement (TIDE 2003c). The reforestation done by TIDE and fire management activities engaged by all three implementing organizations also adds to the regeneration of tropical forest and savanna, which along with the rebounding of wildlife stocks, the interviews and program documents reveal, should lead to an end goal "biodiversity conservation"(PfB 2003b, TIDE 2003b).

Logic models provide the benefit of visually assessing the various factors which might help or hinder the implementation of a program (World Bank & Carleton University 2003). Each of the arrows depicted in **Figure 7** represent a hypothesis as to how the Belize DNS works. These are elaborated in further detail in the final section of this chapter. It should be noted, however, that market forces will ultimately affect both interest rates on the endowments and tourism trends, and the occurrence of natural disasters such as fires or hurricanes might also destroy tropical forests & wildlife. Community access to reserves, their economic conditions and their attitudes toward nature are also crucial.

One noteworthy assumption elaborated in the interviews and the program documents is that community employment as a result of the program will discourage people (i.e. members of nearby communities) from conducting illegal activities such as logging and poaching within the protected areas. Other factors acknowledged to affect the program, but which are not listed as external factors at the bottom of **Figure 7** include government policies, seen largely as external to the program and to a certain extent beyond the control of the implementing agencies.

Economic Effects

The legal agreements executing a DNS designate the financial *outputs* expected of debtor governments, which in turn constitute the financial *inputs* for the particular DNS program (Deacon & Murphy 1997). As such, GOB's outputs constitute the program's main inputs, and the Forest Conservation Agreement outlines GOB's obligations to the swap's beneficiary organizations (see **Table 3**).

Table 3: Direct Economic Contribution of GOB to Belize DNS

Organization	Use	Series A (2001-11)	Series B (2001-27)	Sub-Total	Total
TIDE	Land Purchase	$801,000	$0	**$801,000**	$3,176,572
	Endowment	$916,842	$0	**$916,842**	
	Land Mgt.	$426,842	$1,031,888	**$1,458,730**	
PACT Foundation	Endowment	$1,362,000	$0	**$1,362,000**	$1,362,000
PfB	Endowment	$916,836	$0	**$916,836**	$2,375,494
	Land Mgt.	$426,822	$1,031,836	**$1,458,658**	
BAS	Endowment	$916,836	$0	**$916,836**	$2,375,494
	Land Mgt.	$426,822	$1,031,836	**$1,458,658**	
Total		**$6,194,000**	**$3,095,560**		**$9,289,560**

Sources: Compiled from USDS 2001a & USDS 2001b

The major themes to emerge include that (i) extensive terms guide the financial operation of the program, (ii) the program's total economic value exceeds the government's US $9.3 million outlay, (iii) the program's effects are exerted differentially across groups, (iv) economic effects are dispersed across the national landscape, (v) benefits are thus not wholly internalized to designated beneficiaries, (vi) financial sustainability is attempted through the establishment of endowments, and (vii) the program does not financially support all forest conservation needs of the beneficiaries. These are explained in detail in the following sections.

1. Extensive terms guide the financial working of the program.

In addition to stipulating the activities that can be funded through the program, Article III of the Forest Conservation Agreement also specifies how the funding is to be handled by the beneficiaries. Each of the implementing agencies is provided with land management and endowment funds twice per annum, deposited into separate accounts, with no co-mingling of funds allowed. PACT receives endowment funds on the same schedule, to be held in trust for its subsidiary Foundation. (TNC 2002a, USDS 2001b)

The endowment funds are to be disbursed from GOB to the implementing agencies and the PACT Foundation until 2011, while land management funds will be

disbursed through to the swap's completion on March 31, 2027. In addition, from September 2002 through to March 2004, TIDE received land purchase funds (in a separate account) to be utilized in purchasing 12,000 acres of privately-held forest in southern Belize. (USDS 2001b)

The purpose of the endowment funds allotted the organizations is to allow them to manage their lands in perpetuity. These endowment funds (including that of the PACT Foundation) cannot be utilized until after completion of the "build-up period" at the end of March 2011. To provide for investment security, the Forest Conservation Agreement states that endowment funds must also be invested in CDs issued by international banks in Belize. (TNC 2002a, USDS 2001b)

After the build-up period, the beneficiary organizations can annually disburse only up to 5% of the amount held in their endowment accounts in the previous year. Also, after the endowment build-up period, TIDE, BAS and PfB may only spend up to 15% of the disbursement from their endowment on overhead expenses. The 15% cap on overhead expenses also extends to the land management funds granted each of the three agencies. (TNC 200a, USDS 2001b)

Where representatives from TIDE, BAS, PfB and GOB sit on the committee overseeing the PACT Foundation, in addition to these organizations, government departments and for-profit organizations will also ineligible for grants from the Foundation. Each of the swap's beneficiaries has a single representative on the Oversight Committee, as does TNC and the US government. GOB has two, one voting, and one non-voting. In the event any of the NGOs forfeits their right to swap funding (e.g. through misuse of funds or insolvency), those funds are to be equally apportioned to the remaining NGO's (TNC 2002a, USDS 2001b). To control for the possibility of a devaluation of Belize's currency, the payments specified in **Table 3** are pegged to the U.S. dollar (USDS 2001b).

2. The economic value of the program exceeds GOB's US $9.3 million outlay.

The figures listed in **Table 3** represent only GOB's direct outlay to the Belize DNS, but these do not capture the program's total economic value, which will be affected by a variety of factors. As illustrated in **Figure 7**, endowment funds generate

interest, which creates additional financial outputs, and the BAS point person also indicated that the debt swap funding was used as leverage to secure matching grants to aid their current activities. The organization had secured US $60,000 of funding from the Wildlife Conservation Society for research activities at its [DNS-funded] Blue Hole National Park in 2001-2003.

Additionally, interviews and program documents indicate that all three implementing organizations intend to generate additional financial inputs by using the Belize DNS funding to augment their revenue-generating capacities. Each of the organizations differs, however, in capacity to reap such returns.

PfB, being "committed to the goal of earning sufficient revenue from its economic activities to support the conservation of the RBCMA," had in FY 2000-01 generated 60% of its operating revenues through its ecotourism operation (PfB 2001). By contrast TIDE and BAS depend to a large extent on grant funding. Where PfB derived 40% of its operational revenues from grant funding and donations in FY 2000-01, BAS had, according to its point person, attained 82% of its budget from grant funding in FY 2002-03, with the other 18% of its funding coming from donations and user-fees. TIDE, on the other hand, without even a source of user-fees in previous years, has depended almost completely on grants and donations, with a minuscule proportion of its revenues being generated from its for-profit TIDE Tours subsidiary (TIDE 2003e).

While both interviews and TIDE's "DNS Lands Implementation Schedule" indicate the organization's desire to invest its funding in its acquired properties through ecotourism-related investments, there have been obstacles (TIDE 2003a). By mid-2003, the organization had constructed a ranger station on the Starcher property it had bought with its land purchase funds, though prior to that and shortly after the Belize DNS had been initiated, a category four hurricane had destroying the little ecotourism infrastructure the organization had. Its ranger station in Payne's Creek National Park (PCNP) had been completely decimated, and the few accommodations on its nearby DNS-acquired Morski and Starcher properties were also blown away.

BAS and PfB, with a longer history than TIDE, already have infrastructure on

their lands in the form of trails, accommodations, and wildlife-viewing stations. While the Belize DNS represents for BAS and PfB ongoing investments in income-generating enterprises, TIDE is just edging down that path, and furthermore, the geographic location of the latter's protected areas sets it at a disadvantage. The Toledo district where TIDE is headquartered has traditionally been isolated from the rest of the nation, limiting the number of tourists traveling to region, and in turn the region's general economic development options (Maheia & Markward 2001). Belize Tourism Board (2003) statistics indicate that for 2001, 2,755 and 2,952 people visited the respective Toledo archeological sites of Nim Li Punit and Lubantuun – only 5.7% of nation-wide visits compared to Lamanai (located near PfB's RBCMA) which received almost seven times either of the Toledo ruins, with 18,274 visitors and almost 20% of nation-wide visits. Xunantunich, located near BAS' DNS-funded parks, received the most visitations of any Mayan archeological site – 31,697 visitors (almost one-third of nation-wide visits).

TIDE's ability to generate revenue from ecotourism will depend on the ability of the Toledo district to attract more tourists (Maheia & Markward 2001). TIDE has partnered with a local ecotourism resort to make use of its properties. In October 2002, it signed a Memorandum of Agreement with Belize Lodge & Excursions (BLE), the owner of Boden Creek Ecological Reserve (located near TIDE's Crown Block properties) for the use of the Port Honduras Marine Reserve (BLE 2002). In mid-2003 BLE also expressed interest in using trails on TIDE's Crown Block properties, at rates as specified in the MOA for PHMR. For an organization such as TIDE which does not yet have the ecotourism infrastructure, but owns substantial parcels of land that could in essence be rented to other organizations, the strategy represents one viable means of income generation.

3. Effects are exerted differentially across groups.

From the surface, its US $3.2 million benefit from the Belize DNS seems to set TIDE apart as the program's major beneficiary, when compared to the US $2.4 million that BAS and PfB will each get. TIDE's prominence in the swap is due in part to the fact that the Belize DNS program itself was capitalized with use of some of the

funds raised for TIDE by TNC's Adopt-an-Acre[18] program, as well as financial contributions of TNC's Maryland and Ohio chapters (TNC 2002b). While these funds had been originally intended for land purchase, they ultimately became leverage for the swap, benefiting not only TIDE but three other organizations.

The program's value exceeds GOB's outlays, and returns are expected to vary by organization. Besides the returns themselves, **Table 4** below illustrates how the organizations are spreading their funding, with BAS concentrating its funding on the smallest absolute area, and PFB on the largest.

Table 4: Per Acre Program Investments

Organization	Total Land Mgt. Funding	Avg. Annual Land Mgt. Funding	Funded Acreage	Average Investment
BAS	US $1,458,658	US $56,102.23	7,466	US $7.51
PfB	US $1,458,658	US $56,102.23	259,138	US $0.22
TIDE[19]	US $1,458,730	US $56,105.00	16,021 - 47,697	US $1.18 - US $3.50

Source: Compiled from USDS 2001b

While these figures may seem small, in some cases these are not the only investments the particular protected areas are seeing. PfB is pooling its DNS investment with its other funding sources for the Rio Bravo, thus it has been able to hire a total of ten rangers to patrol the area (PfB 2002b, PfB 2003a, PfB 2003b). In contrast, the above funding is thus far the source of only source of financial support for TIDE's Private Lands Initiative, for which has maintained a ranger force of only three, although it has plans to expand that ranger force to five (TIDE 2003c, TIDE 2003d). As TIDE's private lands are slated to increase to 23,000 acres within the decade, however, per acre funding will be spread even more thinly. The different economic effects of the program are also exerted in the different returns on ecotourism activities, as elaborated in the previous section.

[18] Prior to the Belize DNS, the Programme for Belize's Rio Bravo Conservation & Management Area had been extended through land purchases funded by TNC's Adopt-an-Acre program (TNC 2002c).

[19] In addition to the 16,021 acres acquired through the DNS, TIDE also uses some of the program funding for the management of the 31,676 acre Payne's Creek National Park (TIDE 2003c, TIDE 2003d).

4. Economic effects are dispersed across the national landscape.

This occurs through expenditure and investment. Transaction costs are represented by the legal & financial counsel that the organizations have had to secure to assist them with the swap. Most of the legal & accounting firms representing the organizations are located in Belize City, creating employment opportunities beyond the Cayo, Orange Walk and Toledo districts where DNS operations are concentrated. The substantial equipment purchases of the implementing organizations also extend the program's effects further across the national and global landscapes.

Investment also disperses the program's effects with the financial entities the organizations choose to do business with (i.e. which banks have their accounts, and where endowment funds are invested). While the DNS-related activities of BAS, PfB and TIDE are localized to the Cayo, Orange Walk and Toledo districts respectively (see **Figure 8**), the eventual coming online of the PACT Foundation will also further disperse the operations and economic effects of the program across the national landscape through the various agencies that will be eligible to receive funding (BAS, PfB and TIDE, by contrast, being ineligible for such funding).

5. Benefits are not wholly internalized to the designated program beneficiaries.

In addition to the dispersion described previously, investment and expenditure ensures that the benefits of the program are not wholly internalized to the four designated beneficiaries. The program also exerts direct & indirect economic effects on the communities near to the funded protected areas. The BAS point person suggested that the program's investment in protected areas would draw more tourists, who would in turn depend on the communities for guiding and lodging services. Similarly, TIDE's strategy is to facilitate community employment through their TIDE Tours subsidiary, which contracts with local guides, hotels and restaurants for nature-based tours they arrange with foreign tourists (TIDE 2003e).

Besides the economic benefits that DNS-encouraged ecotourism brings to hotels, resorts and tour guides in communities adjacent to the lands managed by the program's implementing organizations, the DNS exerts more direct albeit limited effects on communities. The program has generated employment for park rangers

(some of them recruited from adjacent communities), and a few temporary positions (e.g. local carpenters employed in the construction of TIDE's ranger station on the DNS-purchased Starcher property in 2003). Outside of the local communities, the DNS also generates economic benefits for the banks, lawyers, auditors and consultants contracted to assist with the program's implementation.

6. Financial sustainability addressed through establishment of endowments.

The annual financial reports of the implementing organizations show that these organizations expend about *all* of their allotted land management funds each year (BAS 2002, PfB 2002a, PfB 2003c, PfB 2003d, TIDE 2003b, TIDE 2003d). While this could have repercussions on the program's sustainability since the last land management funds will be disbursed in March of 2027, the program's endowment promises to extend the program's effects beyond the completion of the swap.

As endowment funds must be invested, rates of return on such investments will directly determine the extent to which their effects extend into the future (USDS 2001b). Despite the stipulation that endowment funds must be invested in CDs, depending on the market, investments might only result in small returns.

7. Program's financial injection does not fund all forest conservation needs.

Two of the three implementing organizations carry out forest conservation activities beyond that which the Belize DNS funds. BAS' DNS funding is targeted at only 5% of the area of terrestrial protected areas it manages, with another roughly 140,000 acres (Cockscomb Basin Wildlife Sanctuary, Crooked Tree Wildlife Sanctuary, Shipstern Nature Reserve, and Victoria Peak Natural Monument) having to find funding elsewhere, in addition to the two MPAs the organization manages (Blue Hole and Half Moon Caye Natural Monuments).

Beyond such observations, personnel at both BAS and TIDE stated that while they were thankful for the funding, it was short of their management needs. Stating that the DNS "meshes rather well with [PfB]'s mission, which is to conserve the biodiversity and promote the sustainable development of Belize through the proper management of the Rio Bravo Conservation & Management Area and other lands entrusted," PfB's point person expressed the contrary opinion that the organization's

goals could be achieved without the program's financial input, although the allowing for capitalization on such goals in a shorter timeframe. Unlike BAS and TIDE, PfB only focuses its funding on a single albeit extremely large property.

In line with the TNC point person's later statement about a possible debt swap through the proposed Coral Reef and Coastal Marine Conservation Act (H.R. 1721 of 2003), the BAS point person expressed the hope that Belize's remaining bilateral debt to the U.S. Government could be applied to a marine debt-for-nature swap to help finance BAS' management of its MPAs. As TIDE also manages an MPA on behalf of GOB (the Port Honduras Marine Reserve), the TNC point person indicated that a marine debt-for-nature swap for Belize could possibly involve a few of the beneficiaries of the current terrestrial swap. In such a case, PfB would be ineligible to receive funding since it does not manage any MPAs.

The BAS point person indicated that in considering how to allot DNS funding across its management portfolio, it has decided to fund the three protected areas most in need of funding because spreading the money any thinner would not, in BAS' estimation, have been effective. Additionally, the decision was made to invest in the three parks for five years, after which it was hoped the parks would be more self-sustaining, and the DNS funding could be spread to the other parks.

Interviews with TIDE personnel and the TNC point person indicated that one goal both organizations had for the Belize DNS was the overall protection of the Maya Mountain Marine Area Transect (MMMAT), an almost one-million acre corridor in southern Belize, defined by six watersheds which empty directly into an embayment in the Gulf of Honduras (Heyman 1996). As **Figure 9** illustrates, however, the MMMAT is a mosaic of public & private land, public & private protected areas, Mayan reservations and various settlements.

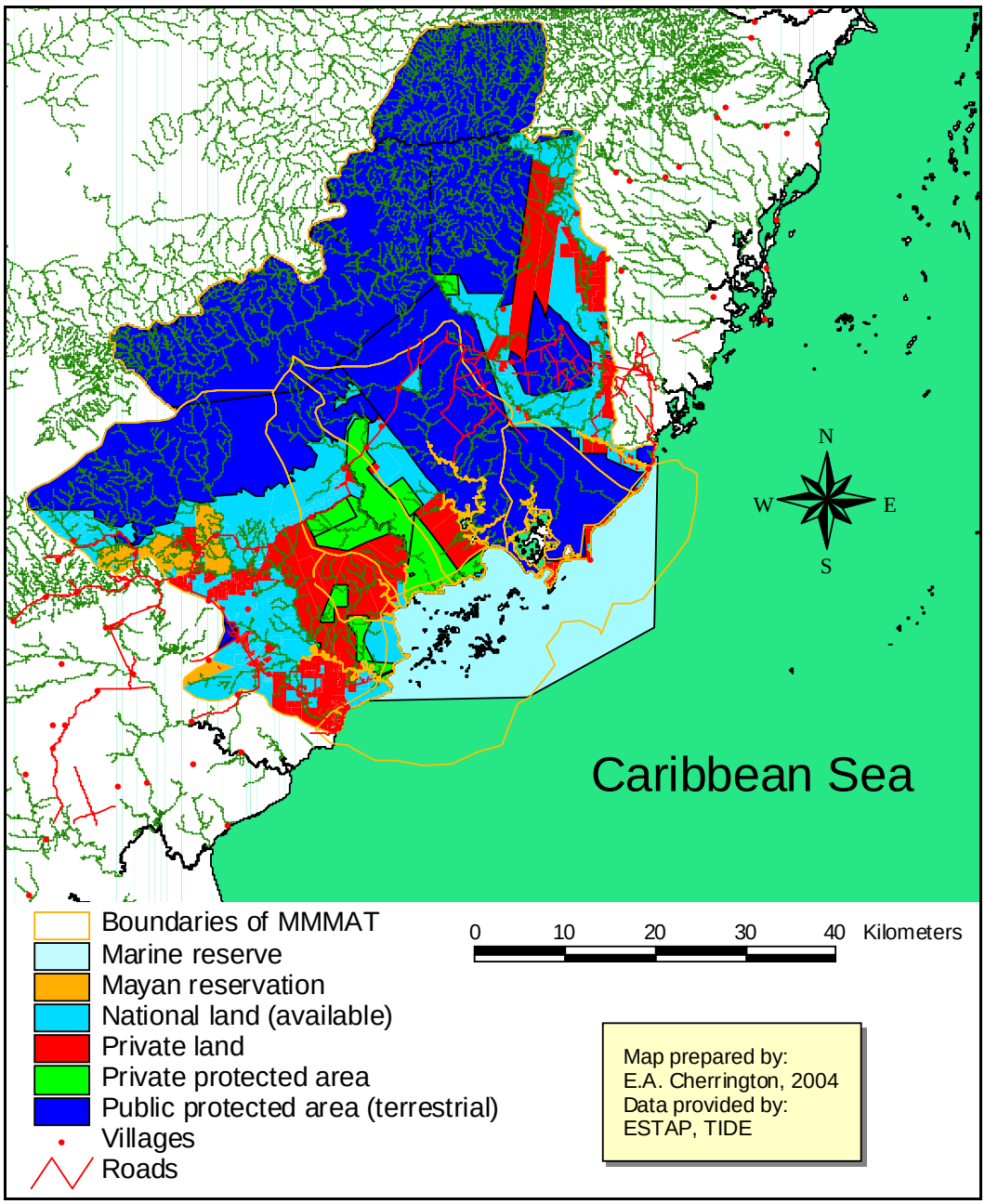

Figure 9: Land use within the MMMAT

Where GIS analysis indicates that 65.97% of the MMMAT's 683,211.814 terrestrial acres are under some protected status, another 248,527.521 acres were unprotected national and private land prior to the Belize DNS, which only provides for the acquisition of 23,000 of those acres by TIDE. Almost half of the land TIDE is acquiring title to – roughly 11,000 acres – was donated to the organization through

the swap, while the program provides the organization with US $800,000 to acquire 12,000 additional acres, or $66.67 per acre. Provided that this figure is the average value of an acre of land in southern Belize, TIDE would require a total of US $16,569,329.83 to purchase all the unprotected lands in the MMMAT.

Thus far, however, the lands acquired by TIDE display a high degree of fragmentation in the location, despite statements by the TIDE point person that the lands were acquired not only on the basis of availability on the market, but also on the basis of strategic importance. **Figure 10** illustrates his point, that three of the five parcels of land acquired lie along the unlabeled Rio Grande River. The TIDE point person had indicated that land along the river is suitable for aquaculture development. The point is perhaps made clearer by the fact that land which could have connected the isolated northern Morski parcel to neighboring Boden Creek Ecological Reserve was purchased by a developer with plans to log the parcel and develop an aquaculture facility there (BLE 2003).

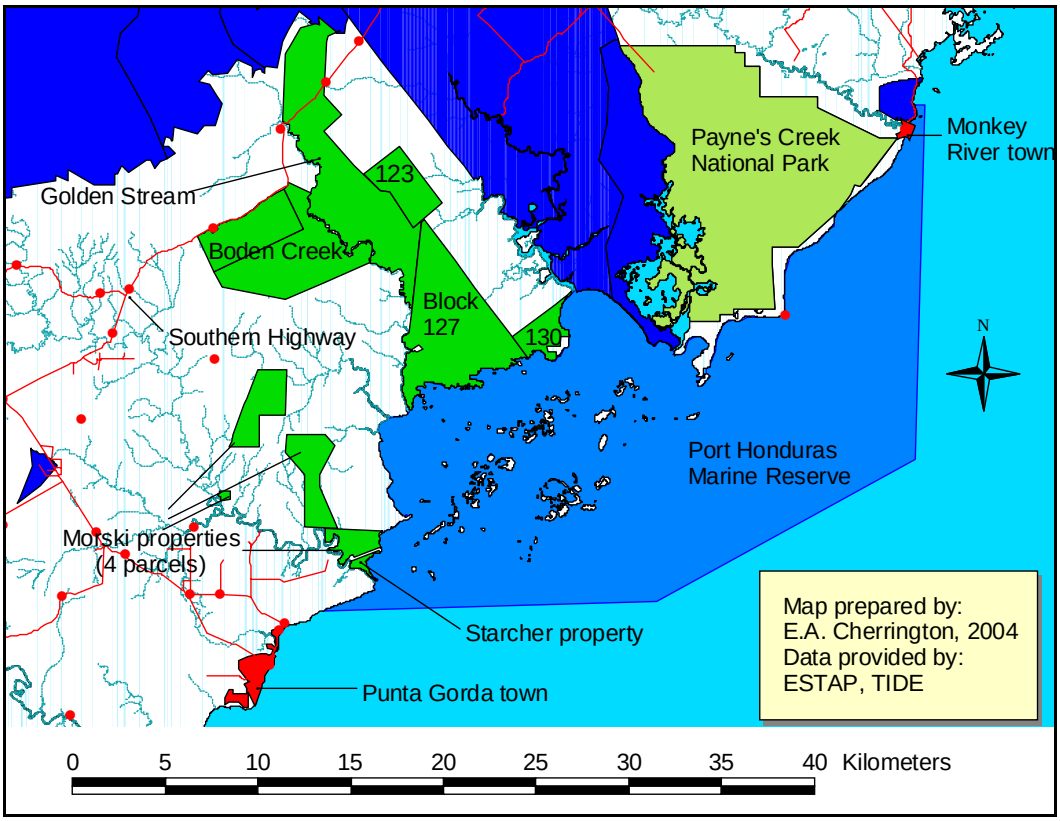

Figure 10: Location of TIDE's DNS Parcels

Environmental Effects

This section is consigned mainly to the environmental monitoring policy of the Belize DNS as the program's environmental effects cannot be characterized. This is due to the fact that while a mandatory financial monitoring regime is in place, there is no counterpart environmental monitoring framework.

The major themes to emerge from the study data include that (i) there is no requisite environmental monitoring component of the program, but (ii) a limited degree of monitoring is occurring, though largely at the baseline level, and (iii) an overall 'bucks and acres' approach is being taken toward program monitoring. These are explained in detail below.

1. **Unlike mandatory financial monitoring, the program does not require environmental monitoring**

The TNC point person stated flatly that there was "no quantifiable environmental data" on the swap, and that there was no short- or long-term monitoring of the program. These were followed up by statements that via TNC's conservation partnership agreements with each of the implementing organizations, the latter were using site conservation planning (SCP) by which to evaluate their overall conservation activities, even if independent of the Belize DNS.

SCP is a system of qualitatively assessing the status of select conservation targets (from species through ecosystems) vis-à-vis four distinct attributes – size, condition, landscape context and overall viability rank, ranked on a scale of "poor," "fair," "good," and "very good," culminating in a site biodiversity rank. SCP also delineates targets' stresses and sources of those stresses. The TNC point person stated that environmental monitoring had not been required for the swap because his organization was "standing back" to allow BAS, PfB and TIDE some level of independence in their implementation of the swap. (TNC 2000, TIDE 2002)

2. **Limited monitoring is occurring, though mainly at the baseline level.**

While the Belize DNS does not require an environmental monitoring component, the implementing organizations are all engaged in some degree of monitoring of the protected areas funded by the program, in line with overall

organizational monitoring efforts. BAS and TIDE were just conducting inventories of their DNS-funded properties.

BAS' point person stated that because the Belize DNS relies largely on contributions of public funds from the Belizean government, beneficiary organizations have an obligation to publicly demonstrate the program's tangible benefits. By that token, BAS was gathering data to inform its conservation activities, because it was BAS' view that management should be "data-driven versus emotion-driven," though the latter statement was not explained in detail.

In comparison, TIDE's Operations Manager stated that while his organization intended to monitor the environmental status of the properties it had received through the Belize DNS, such monitoring would first have to start with the baseline study slated for 2004-05. In the mean time, TIDE was using SCP to monitor the broader MMMAT into which its DNS parcels fit. This is represented in **Table 5**.

Table 5: SCP Indicators for the MMMAT

Systems (Target) Viability	**Size**	**Condition**	**Landscape Context**	**Viability Rank**
Upland forest	Very Good	Very Good	Good	Very Good
Coastal plain pine savanna	Fair	Fair	Fair	Fair
Coastal plain broadleaf forest	Fair	Fair	Good	Fair
Riparian terrestrial communities	Good	Good	Good	Good
Aquatic communities	Fair	Fair	Fair	Fair
Jaguar	Good	Good	Fair	Good
Estuaries & Nearshore	Very Good	Very Good	Good	Very Good
Coral reefs	Fair	Fair	Good	Good
Site Biodiversity Rank				**Good**

Source: TIDE (2002: I-20)

Additionally, TIDE conducts monitoring via Stream Visual Assessment Protocol (SVAP). According to the organization's Freshwater Scientist, the Freshwater Initiative (FWI) is a larger program of TNC being engaged not only in the MMMAT, but also on PfB's Rio Bravo. TIDE's component of the FWI involves the use of SVAP, through which visual cues are used in assessing, on a scale of 1-10, the condition of streams and small rivers (Esselman 2001, Gómez 2002). This is not,

however, a measure of overall land cover change.

In contrast to the nascent monitoring activities of the other two implementing organizations of the Belize DNS, PfB is actively engaged in adaptive management through [an limited degree of] environmental monitoring. According to the organization's point person, "short and long term monitoring occurs within our protection programme to ensure that the RBCMA remains intact at all times."

The organization's DNS narrative reports also state that "information and data being collected continues to be compiled and used for future work being done by the ranger unit and serves as effective material for the coordination of protection activities and plans" (PfB 2002b: 3). PfB also engages monitoring through annual over-flights of the RBCMA. These have "resulted in the discovery of a number of open [marijuana] fields both on the Rio Bravo and nearby the San Felipe community" which were later destroyed (PfB 2002b: 2).

3. The 'bucks & acres' approach characterizes current program monitoring.

'Bucks and acres' is an informal system formerly employed by The Nature Conservancy in which programs were evaluated on the basis of the money raised and the acres of land purchased (Christensen 2003, Sawhill & Williamson 2001). In essence, it was being assumed that once properties were purchased, they were conserved. The utility of 'bucks and acres' came into question when it was revealed that "species were declining even within [TNC's] protected areas" and activities outside the protected areas were affecting the ecological cycles within those properties (Sawhill & Williamson 2001: 101).

While TNC officially abandoned 'bucks and acres' in 1996, in favor of a new system called site conservation planning, (i) bucks and acres still permeates the monitoring of the Belize DNS, and (ii) its replacement SCP – being employed by the Belize DNS' implementing organizations – is as questionable as its predecessor (Christensen 2003). Evidence of the former is that both the TNC releases and the organization's point person emphasized the program's results in terms of the money raised and the acreage of land purchased (Campbell 2004, TNC 2001).

Regarding the second point, it became exceedingly difficult to ascertain the

sources for the rankings in **Table 5**, leading to the implication that these are perhaps the results of experts' "guesstimates." The MMMAT site conservation plan does not itself indicate where the data for the rankings came from, and repeated efforts to contact those who drafted the site conservation plan proved fruitless. Describing the conditions which led TNC to revise its monitoring and collaborate with other ICOs on the Conservation Measures Partnership, Christensen (2003) questions the utility of SCP or "mouse-based monitoring," in which assessments of ecosystem health are "entered into the spreadsheet simply by clicking on one of the categories without providing an underlying scientific rationale or data." TNC's own review of its use of SCP later led to the recommendation that program personnel should "[document] the scientific evidence and rationale behind" assessment decisions (Christensen 2003).

Factors Influencing Implementation

The possibility of the Belizean government defaulting on its payment obligations, the security of tenure of funded protected areas, the centralization of program information and high staff turnover, and ability to adaptively manage comprise the major factors affecting implementation of the Belize DNS. Other factors affecting the program's implementation include, but are not limited to, market forces, natural disasters & disturbances, proximity and consequent access of communities to protected areas, the economic conditions within communities, and the attitudes of members toward the environment. The following sections elaborate these.

1. Possibility of Government Default

The first step in **Figure 7** is GOB's financial outlay, which creates the financial input for the swap. The point persons interviewed all agreed that the program would fail should GOB decide to default on its obligations. The point persons at BAS, TIDE and TNC expressed the view, however, that it was unlikely GOB would default, because as stated in the swap's legal agreements, the US $9.3 million of debt to the U.S. Government that had been cancelled would become immediately payable. The TNC point person stated that should GOB default either in the form of seizing debt swap lands, or not making payments on the agreed-to

schedule – not only would it be liable to the Government of the USA for the full sum of $9.3 million, without consideration of the funds it has already paid to the local agencies, its ability to borrow from not only the USA would be compromised, as would its creditworthiness with the rest of the international community. Thus, the incentives for compliance are extremely high.

2. Lend Tenure Security

An initial debt swap proposal from GOB was that the Ministry of Natural Resources would declare the Crown Blocks reserves, over which they turn control to TIDE (PACT 2000). According to both TIDE's Operations Manager and TNC's Belize program director, the tenure security of such an arrangement was in question, leading them to press for GOB instead giving legal title of the Crown Blocks to TIDE. As pointed out in both interviews, Belize's Forests Act allows for the Minister of Natural Resources to de-reserve (partially or entirely) any terrestrial public protected areas without consultation (GOB 2000, MNR 2002). TIDE feared that co-management could result in such a case, and a recent BAS Newsletter also questions GOB's policy regarding de-reservation (Wade-Moore 2004).

If TIDE feared the lands it managed might be de-reserved, such fears were brought to a head in mid-2003 when it was announced that a portion of Payne's Creek National Park was going to be de-reserved, supposedly for the creation of a deep water port. In late January of 2004, at the long-awaited signing of PCNP's co-management agreement between TIDE and GOB, it was indeed declared that PCNP's boundaries were to be "re-aligned," though the re-alignment process actually made the park larger by de-reserving coastal portions of the park and adding more area to its western side (Wade-Moore 2004).

Concerns over PCNP being partially de-reserved were voiced not only by TIDE, but also by TNC and BAS (Wade-Moore 2004). These organizations all expressed fear that de-reserving one national park might set a precedent of a wave of de-reservations of other national parks and reserves. The significance of the PCNP issue was also that TIDE was investing DNS funding into management of the park (TIDE 2003c). For both TIDE and its partner TNC, PCNP represents an integral part

of their efforts at managing the MMMAT, since PCNP is the only national park within the MMMAT that TIDE has stewardship rights to. Control of Payne's Creek and the also co-managed Port Honduras Marine Reserve brings the total acreage of properties being managed by TIDE to approximately 155,630 (TIDE 2002, TIDE 2003d, Wade-Moore 2004). TIDE's Operations Manager further stated that where the TIDE lands acquired through the swap are "secure," his vision was that, due to growing development pressures, such lands would be among the only virgin forest remaining in the Toledo district at the program's completion in 2027, and that TIDE would never have to worry about GOB de-reserving its private lands to make way for expanding populations.

The BAS point person also indicated that his organization had experienced some tenure security issues with a proposal a few years earlier to put logging roads through its Tapir Mountain Nature Reserve. The organization had to demonstrate to the Minister that the reserve was more valuable intact as an ecotourism attraction. Where BAS manages the majority of its ecological reserves through co-management agreements with the Government of Belize, the tenure security of these reserves remains perpetually in question. The Programme for Belize is the only of the debt-swap beneficiaries which does not co-manage any lands for the GOB. In addition, its efforts are concentrated on a single parcel of private property, the RBCMA.

Private ownership may not necessarily mean secure land tenure, either. In interview, an administrator at one of TIDE's partner agencies stated flatly that the Crown Blocks TIDE had acquired from GOB were rightful property of the Maya of southern Belize, who had a case pending against GOB. He indicated that the Maya were dissatisfied with their treatment by the government and were strongly considering re-opening their case, which is lodged with the Inter-American Commission for Human Rights. Frustrated at insecure land tenure, the Maya have been requesting title to one million acres of Government-owned lands in southern Belize, the implication being that TIDE's Crown Blocks constitute some of that land (Litterer 1997). In early 2004, the Maya Leaders Alliance (MLA) representing the Maya of southern Belize went public with their frustrations, stating that they were "no

closer to reaching an agreement than we were when we started" (GBP 2004). This was in light of a "Ten Points of Agreement" document signed between GOB and the MLA in 2000 in which both parties had agreed to forego litigation to look for other solutions to the issue of insecure indigenous land tenure. Beyond that, Belize does not engender any particular indigenous rights issues with the protected areas funded through the DNS, thus the program does not locked people out of protected areas.

3. Centralization of Program Information & Staff Turnover

One observation gleaned from interviews of TIDE staff members is that detailed information on the debt swap program is centralized to the program's point person, and this may also be the case with the other organizations, though conditions did not permit interviewing a wide spectrum of staff at PfB or BAS. For instance, the TIDE ranger interviewed stated that the lands TIDE had acquired through the debt swap were in fact property of the Government of the United States of America, even where it is quite clear that TIDE in fact has deed to these properties (USDS 2001a/b).

This is startling in light of the literature, which indicates that other debt swaps have experienced problems with incorrect perceptions by citizens that their lands were being sold to cancel debt (Deacon & Murphy 1997, UN ECLAC 2001). This is further exacerbated by a staff turnover at the organizations consulted. The original PfB point person could not be interviewed since she had actually relocated to TNC, and as such, there were central questions about planning that the current point person could not answer because of joining the organization just around the inception of the Belize DNS. His consequent statement that he could not elaborate on the planning indicates a loss of institutional knowledge.

Furthermore, while the BAS point person who was interviewed was that organization's original point person, and did seem quite knowledgeable about the program, he left that organization in early 2004. In general, beyond the point person, the TIDE staff members that were consulted were unaware of the details of the Belize DNS, even where they inevitably play a role in its implementation. In addition to the other organizations' loss of program personnel, two of TIDE's key staff who had been involved in the planning of the Belize DNS left the organization to take up

positions within other conservation agencies.

4. Adaptive Management

Implicit in the statement by the BAS point person that the Belize DNS' implementing organizations need to make their management activities "data-driven versus emotion-driven," is that the activities implemented should be responsive to data that is collected. This seems to be a hallmark, in fact, of the activities of all three implementing organizations. As stated earlier, PfB uses its over-flights to locate suspicious activities so that its rangers can be deployed to those areas. And in response to deforested areas, TIDE rangers plant hardwood seeds.

In lieu of environmental monitoring, the organizations' ability to capitalize on adaptive management is in question. One criticism leveled by the executive director of one of TIDE's partner organizations (who sits on the management committee for PCNP), was that TIDE must supply empirical evidence of the efficacy of its management efforts. Speaking about PCNP, the executive quoted a member of TIDE's management as saying they knew their management activities were working because "[our] rangers see jaguar there all the time." The executive's response was that should be "scientific studies" to back up such "anecdotal" evidence.

5. Additional Factors

Beyond the factors elaborated above, there are external factors which will also affect the program's implementation, one being the occurrence of natural disasters, such as the 2001 hurricane which deforested some of the areas funded by the Belize DNS. Others acknowledged in interviews are the proximity of communities, the attitudes of members towards nature, and community economic conditions, which may provide incentives for conducting illegal activities. "Market forces" also impact the rates of returns on the investments of endowment funds, as well as the visits of tourists to protected areas.

Summary of Findings

1. The Belize DNS is a program by which converts financial inputs into land cover change, via the platform of specific, funded protected areas which represent the diversity of the national terrestrial landscape.

2. While yet in its third year of implementation, the program will funnel over US $9.3 million into tropical forest conservation projects in Belize between 2001 and 2027, to be sustained long-term vis-à-vis the endowments created.
3. While the amounts of swap funding are relatively consistent between beneficiary organizations, because of differential strategies, the investment of funding differs substantially across organizations. Despite the relatively large amount of funding, some organizational priorities still go unmet.
4. Returns on swap funding differ across organizations, with returns going to organizations with existing ecotourism infrastructure on their protected areas. Leveraging of swap funding to secure matching grants also generates returns.
5. Although the end goal of the Belize DNS is a reduction of tropical deforestation through increased patrols and the creation of new parks, most environmental monitoring is currently within the phase of baseline data collection.
6. Because environmental monitoring is not required – as is the opposite case of financial monitoring – the program's environmental effects remain unknown.
7. Overall, the current monitoring & evaluation of the Belize DNS is characterized by TNC's outdated "bucks and acres" approach which measures success by the amount of money raised and the amount of land purchased, where the latter is assumed as "conserved."
8. The attainment of the end goal of the Belize DNS will be constrained by a variety of external and internal influences, including turnover of personnel key to the program's formulation within whom reside vital information about program goals and implementation.
9. The largest set-back to the program would be a default by the Government of Belize, even as this is perceived as unlikely.
10. Security of land tenure is an issue with respect to publicly owned parks funded through the program, but the majority of acreages being invested with swap funding are privately-owned lands.
11. Protected areas funded through the DNS do not lock people out, even as the program aims to curb unsustainable & extractive uses.

6. DISCUSSION

As the descriptive analysis of interview data and program documents yielded an extremely large volume of findings, this chapter focuses the discussion of such findings more deliberately. This chapter represents an effort to step back somewhat from the Belize DNS and offer some broad reflections on the planning not only of the Belize swap itself, but also on debt-for-nature swap programs in general.

Some of the findings are self-explanatory, while others stand out. Examples of the latter include the perception that funding amount is not adequate, the localization of program information, lack of environmental monitoring, and the means of reaching end goals. All in all, however, the findings speak volumes to the program planning.

Discrete from the program planning, program implementation constitutes the domain of program theory, even as adaptive management represents the case of planning happening within implementation. The exercise of constructing a causal model of a program's theory allows one to understand how a program operates, without providing particular insights into the program's planning. While examination of the program theory may delineate potential problem areas, program theory does not particularly ask if inputs and goals are legitimate. Rather, the program analyst's task is merely to represent the program theory as expressed by program personnel, stakeholders, and program documents.

The causal model depicted in **Figure 7** illustrates the somewhat circuitous route by which the goal of biodiversity conservation is achieved. Furthermore, while the debt-for-nature swap is described in the literature as a forest conservation program, **Figure 7** also illustrates that program participants' goals for the program extended beyond "forest conservation" to "biodiversity conservation / protection" (Deacon & Murphy 1997, ECLAC 2001). As such, the following sections focus largely on the program's inputs and the program's intended outcomes and impacts. The issues that do emerge seem to have a greater basis in the program's planning than in its implementation.

Adequacy of Funding

A major issue is the amount of funding allocated each organization. BAS and

TIDE, the organizations which rely on debt swap funds as the major source of income for their protected areas (the Cayo parks of BAS, and the Private Lands Initiative of TIDE) are also the ones in which the amount of funding is perceived as inadequate. These, by coincidence perhaps, also manage protected areas beyond that which is funded by the Belize DNS.

One explanation for why the Belize DNS does not satisfy their needs is the amount of debt swapped. It was not until after negotiations with the Belizean Ministry of Finance and the U.S. Department of Treasury (USDT) that the parties became aware of how much funding was at stake, and it was USDT that got to decide how much funding would be swapped (Egolf 2001). Still, the USDT is the gate keeper, thus it would seem the financial viability of such swaps will depend in large part on the amount of debt allowed to be swapped.

Another reason swap funding may not be adequate for all of the organizations' needs is the terrestrial basis of the swap. Both BAS and TIDE manage marine protected areas, and swaps through the U.S. Tropical Forest Conservation Act are for tropical forest conservation, and not marine conservation, even though as expressed earlier, the parties are mulling the possibility of a marine debt swap through the proposed Coral Reef and Coastal Marine Conservation Act (H.R. 1721 of 2003).

In addition, the number of entrants to the negotiations divided the potential funding pie. PACT constituted the most recent entrant to the negotiations, without which the three implementing organizations would have received greater amounts of funding. PACT's participation also means, however, that more organizations than just BAS, PfB and TIDE can benefit from the program, since the PACT Foundation will be distributing funding to other organizations on a competitive basis (USDS 2001b).

As is, the Belize DNS represents a departure from the prevalent model of implementation in which funding is channeled into a trust, from which organizations compete for funding (ECLAC 2001, Resor 1997). The participation of the PACT Foundation still assures some competitive bidding, but BAS, PfB and TIDE receive 26 years of guaranteed funding from the program, more than competitive bidders can expect, especially since the PACT Foundation does not come online until 2011 (TNC

2002a, USDS 2001b).

The competitive bidding issue also engenders quantity versus quality. If the funding supplied by the Foundation constitutes the only funding to particular protected areas, their viability comes into question. Furthermore, there is a level below which funding will be ineffective – for example, doling out a hundred $1,000 grants each year versus ten $10,000 grants.

Fragmentation of protected areas funded through the program also affects economies of scale. For PfB, 10 rangers may represent an optimal number for patrolling the RBCMA's almost 260,000 acres. Were the RBCMA divided into ten 26,000 acre parcels, or a hundred 2,600 acre parcels, one could easily imagine that the organization would have to increase the size of its ranger force. Yet with a number of parcels between then, BAS and TIDE grapple with exactly that concern. This will affect the number of rangers that will have to be hired, particularly important where for each of the implementing organizations, salaries represent the bulk of land management costs (BAS 2002, PfB 2002a, PfB 2003c, TIDE 2003b).

Lack of Program Monitoring

On the issue of the planning of the Belize DNS, one has to wonder whether, in terms of program goals, the reduction of stresses to forests and associated species will be sufficient to cause an increase in biodiversity, as projected. TIDE's Crown Block properties seem to be the only degraded parcels of the protected areas funded through the program, but in absence of baseline data, it is difficult to comment.

The utility of monitoring of program outcomes goes beyond program reporting. As stated in Christensen (2003), monitoring & evaluation provides vital data for how to adjust program activities. As stated by the BAS point person, that organization is now just gathering data on the status of their properties to inform them on how to proceed. As such, the model depicted in **Figure 7** in the previous chapter is likely to change with time. Furthermore, program monitoring allows for the assessment of whether or not goals have been obtained:

> *Without objective measurement, conservationists can not claim successes, learn from failures, nor truly work effectively and efficiently*

> *toward the conservation of the remaining biological diversity of the planet.* (Parrish et al. 2003: 851)

Program theory advocates that baseline data is collected at the inception of a program, and not years into it, as BAS and TIDE are just doing (Roche 2002). One might question how much ecological attributes have changed in the few years since the program's inception, but surely the hurricane which swept over TIDE's properties in southern Belize hardly a month after the signing of the Forest Conservation Agreement had an impact on the landscape (Meerman 2001).

If TIDE were concerned with the status of individual species at the inception of the swap, collection of baseline data post-hurricane Iris would certainly be expected to skew the data. Furthermore, if the organization were concerned with restoring declining stocks to their pre-hurricane status, the lack of baseline data certainly represents a lost opportunity. Ultimately the timeframe for conducting baseline assessments may be negotiable depending on the pace of ecological change, but Weiss (1998) and Roche (2002) emphasize the need for baseline data prior to program implementation.

Staff Turnover & Information Centralization Issues

In addition to the shifting of strategies after the gathering of baseline data to inform decisions, goals may also change with time because of the localization of program information in point persons. Each of the three implementing organizations has had turnover in management positions associated with the program's planning, and more significantly, two of those three organizations have had their point persons replaced due to turnover. Depending on how institutional memory is retained, and how roles are transferred from outgoing to incoming point persons, this likely exerts some impact on program implementation.

While point persons are the official points of contact for the program and are responsible for seeing that their respective organizations implement the debt swap, these do not constitute the only important people in terms of implementation. A large part of the program's funding goes toward ranger salaries, but as elaborated in the previous chapter, those rangers – as well as other organizational staff – do not seem to

be kept in the loop as it were on important aspects of the program. This too may have impacts on how the program is implemented. It would seem logical that the personnel actually implementing the program should be thoroughly knowledgeable about that program. With regard to this study, that centralization of program information in the point persons became a complicating factor in staff's ability to elaborate basic program goals.

Adequacy of Program Goals

The Belize DNS is reactive, with activities focused mainly on limiting some anthropogenic disturbances (i.e. illegal logging, poaching), even as (i) the program encourages other anthropogenic uses (i.e. nature tours), and (ii) not all land cover change is human-related (FAO 2000, Meerman & Sabido 2001, Meerman 2001). Carried too far even nature-based tourism can have negative environmental and social impacts on protected areas and surrounding communities (Belsky 1999). Additionally, land cover changes 'naturally' with disturbances such as fire, wind, and the occasional hurricane (Meerman & Sabido 2001, Vreugdenhil et al. 2002).

In seeking to curb only human activities, the implication of the program's focus is that the only harmful changes are the ones brought about by people. Yet the program's goal of biodiversity conservation will also be impacted by natural disturbance. And what constitutes 'natural' anyway? Do we even know what it is?

> *What is "natural" is difficult to define, given limited knowledge of many species and systems, and given the extent of human involvement in and disturbance to biodiversity around the globe.* (Parrish et al. 2003: 851)

The Tropical Forest Conservation Act through which the Belize DNS is executed focuses on the protection of tropical forests. While the TFCA allows for funding of activities beyond the scope of just forests to the species inhabiting those forests, the Act places a greater emphasis on tropical forests than the protection of the species within those forest ecosystems (TFCA 1998). Hence the name "Tropical Forest Conservation Act" rather than something like the "Jaguar Conservation Act." The study data indicate the focus of the Belize DNS to be ecosystems, with the implication that protection of forest habitat will also conserve individual species.

Refocusing on the TFCA – and its consequent iteration in Belize – a prime concern is whether curbing *just* deforestation is adequate. That is, will the focus on forests be to the exclusion of other ecosystem types? In addition to forests, the protected areas funded by the Belize DNS are home to grasslands, mangrove, savanna, wetlands as well as developed land in the form of agriculture – though the latter is largely because of encroachment due to imprecise boundaries (Meerman & Sabido 2001, Dushku et al. 2002).

It seems obvious that the program would not seek to preserve developed land, as these do not represent what was there 'naturally,' and were in fact created from the conversion of other ecosystem types. But the question remains whether forest conservation will take precedence over savanna & grassland preservation or wetland preservation. Wetlands in Belize – 'swamps' in the vernacular – are particularly in the danger of being drained (Meerman & Sabido 2001). Particularly important is the role of fire management (TIDE 2002). Some, but not all, of the savanna in Belize are the result of natural fire regimes in absence of which pine forests would proliferate (Vreugdenhil et al. 2002). Thus, fire suppression would cause the loss of some of this savanna. Is the presence of forests preferable to that of savanna and grassland, or are the original land cover distributions relevant? Further, when the original land cover distributions are unknown and land cover changes constantly, what then?

A crucial issue needs to be addressed. Is success simply the prevention of logging, poaching and illegal fishing in protected areas, or is it more than that? More concretely, will the program be successful if it has stopped 25% of the incidence of such activities, or 50% of 75%? It is evident that "biodiversity conservation" cannot be achieved merely by preventing the above activities (or other anthropogenic activities), and this is evidenced by natural disturbance which the program cannot largely control. But without a system in place to assess the conditions of DNS-funded protected areas, how will organizations know when the program's goals have been achieved? Further, none of the organizations – at least not in interviews or program documents – indicated specific benchmarks for the program. While these organizations are beginning to collect environmental data on possible effects of the

swap, there is little actually *obliging them to*. And they are certainly not obliged to share the results of their activities' environmental effects.

Beyond whether program goals are adequate (i.e. whether these speak to actual on-the-ground problems) or whether program activities are adequate (i.e. whether these can curb anthropogenic disturbances), the more significant issue is how explicitly program goals are stated. This is also relevant to how the organizational staff themselves understand how their programs effect environmental changes. In other words, do the organizations implementing the program have a good conceptual grasp of the situation? **Figure 7** in the previous chapter – and overall this study – represents a concerted effort to make explicit the logic of the Belize DNS, particularly where program documents and even interview data largely imply – but do not actually state – the justifications for the program or why it should work.

Viability of Protected Areas

Granted, rather than seeking to address national deforestation as a whole, the Belize DNS concentrates on ensuring the viability of specific protected areas which receive funding through the program. However, are such interventions sufficient to secure the viability of funded protected areas? It appears this is not so for a variety of reasons, from political and ecological standpoints. The first issue touches on the root causes of deforestation, which it becomes evident that DNS programs on a whole may not truly address. While the literature has been clear that poverty provides buffer communities with incentives to extract resources in an unsustainable manner from protected areas, DNS programs may do little for poverty alleviation despite environmental education and income generation components (Deacon & Murphy 1997, Gullison & Losos 1993, NHDAC 1998).

Further, DNS programs are not poverty reduction programs. They are conservation programs, though one wonders whether for the sake of achieving forest conservation, DNS funding might not be better allocated toward poverty reduction. The environmental education component of the Belize DNS in particular is minuscule, and despite the program's financial monitoring, there is no monitoring of community economic health, despite acknowledgement from at least one point person

that community well-being is a factor in the viability of protected areas.

Traditionally, a causal relationship has been drawn between external debt and deforestation, which is why DNS programs were also targeted at reducing external debt (ECLAC 2001, Gullison & Losos 1993). The empirical relationship drawn by Kahn & McDonald (1995) can be expressed as:

1. *Deforestation = f (external debt)*

But since poverty is also believed to drive deforestation, the question then becomes whether high debt stocks actually drive deforestation or merely coincide with other factors like poverty (Deacon & Murphy 1997, NHDAC 1998). If poverty is the root cause of deforestation, the relationship can be expressed as:

2. *Deforestation = f (rural poverty)*

But another point raised in this study is that poverty may be less of a factor in the viability of protected areas than government policies toward such protected areas:

> *Furthermore, factors other than poverty and debt may be more important in causing the use of marginal lands. For example, the lack of productive, available land in Latin America results largely from the land tenure system and inequitable land ownership.* (Gullison & Losos 1993: 144)

Where the Belize's Forests Act affords the Minister of Natural Resources the legal right to de-reserve (wholly or partially) any public terrestrial protected area without any consultation, the tenure of such areas will *always* be an issue (Forests Act, TIDE 2002a). This came to a head with Payne's Creek National Park, when coastal portions of the park were de-reserved in the process of 'realignment.' It was rumored that the property was possibly de-reserved to make way for construction of aquaculture farms and a deep water port (Wade-Moore 2004).

The implication is that TIDE may have been justified in its rejection of earlier proposals to have GOB merely cede it control of the Crown Blocks through co-management agreements (PACT 2000). As highlighted in interviews with TIDE staff and the TNC point person, doing so would have meant the possibility of de-reservation, where the organization's having title to the land makes its tenure more secure. TIDE's approach is to acquire title to 23,000 acres of forest in the MMMAT

rather than seeking stewardship of the area through co-management agreements with the government. BAS' DNS-funded protected areas are, however, all under co-management agreements, making their tenure a potential issue.

Even with secure land tenure, ecological forces outside the bounds may still affect their viability. This has particular implications for Belize's entire protected areas system, which has been established more on the basis of land availability than ecological concerns (Zisman 1996). This reflects planning. Grumbine (1994) reviews basic considerations for the establishment of protected areas, such as either ensuring habitat for the area's largest carnivore, or encapsulating entire watersheds.

According to TNC's point person, jaguars – the largest carnivores in Central America – are present on all of the funded protected areas, and according to Beletsky (1999) they require huge expanses to roam. At almost 260,000 acres, the Programme for Belize's RBCMA seems to represent the only truly large expanse of the DNS-funded protected areas that could accommodate jaguar entirely within its bounds. By contrast, BAS' Guanacaste National Park is only about 57 acres large, while TIDE also possess a few small parcels. And aside from the ability to represent large enough jaguar habitat, none of the protected areas represents large intact watersheds, either.

The MMMAT concept espoused by TIDE and TNC represents an effort to manage for larger ecosystems and the processes occurring therein – which may not be represented within small protected areas (Groves et al. 2002, TIDE 2002a). However, because of the number of parties involved in the MMMAT's management, as well as the possibility of gaining stewardship of the entire corridor when almost half of its terrestrial acreage is privately held land, DeVries et al. (2003) question the feasibility of TIDE / TNC's ability to manage it in any meaningful fashion. In addition to stewardship of Payne's Creek, the Belize DNS will ultimately provide TIDE with control of about 60,000 of the MMMAT's roughly half a million terrestrial acres.

In closing, there are several factors which affect the ability of the Belize DNS to achieve its end-goal of biodiversity conservation. Many of these are artifacts of the program's planning process. The following provides recommendations for helping the program to address such issues.

7. Conclusions & Recommendations

Over US $1.2 billion and almost seventeen years later, the debt-for-nature swap concept represents a particularly expensive experiment, the results of which we are still unaware. While it is arguable whether or not ecological change is apace with human interventions (i.e. whether the impacts of debt swaps can yet even be envisioned), at some point the public will need to be aware of whether the well-intentioned program has achieved or is on track to achieving the results it was designed to. Debt-for-nature swap programs do not represent blind investments to unaccountable NGOs, and future swaps should reflect this. The following sections outline basic policy recommendations that might be reflected in legal frameworks like the U.S. Tropical Forest Conservation Act. In addition, a simple framework is elaborated by which finally the question, 'did it work?' can be answered.

Recommendations

This study recommends policy-level changes that might improve the overall experience with debt-for-nature swap programs. While major concerns seem to be related to the amounts of funding received by individual organizations, it is not a feasible suggestion to assert that funding amounts need to be increased when the funding available is in fact based both on the amount of debt owed and, more importantly, the amount the U.S. Treasury Department is willing to forgive. Thus, recommendations pay closer attention to how program information is made available to the public, and how programs are monitored & evaluated.

Improved Dissemination of Program Information

Although legally required to publish their annual financial and narrative reports on the swap, none of the Belize debt swap's four beneficiary organizations have chosen to do so via the medium suggested within the Forest Conservation Agreement they were party to – the Internet. This effectively controls the flow of information, and limits its public availability if the general public must either visit the respective offices of these organizations, or otherwise contact them directly.

Evidence was also provided of the implementing organizations' own staff not being aware of crucial details of the program. The obvious suggestion then is that

more needs to be done not only to educate implementing agency personnel about the program, but also the general public. With regards to keeping the general public informed, it is highly recommended that the beneficiary organizations merely append their websites to provide the entire backlog of narrative & financial reports on the progress of the Belize debt swap. This is not an enterprise that would cost the organizations much in terms of resources or time, since the organizations already have World Wide Web infrastructure.

There are perhaps more direct ways of keeping program personnel (e.g. rangers) in the loop. This might include point personnel simply sitting down with rangers (particularly new hires) to explain what the program does. Rangers should also be invited to accompany point personnel to the twice-yearly oversight committee meetings, where perhaps they could also benefit from learning about the strategies employed by their counterparts at the other implementing organizations.

Alternative DNS Implementation Models

The legal framework of the Belize DNS effectively states that conflicts will be resolved through termination of the contract (USDS 2001b). It is basically an "either comply or lose your funding" model. While this model conceptually provides incentives for compliance, this may also provide incentives over the long course of the swap for *avoiding* conflict in the sense that organizations may overlook transgressions in order to simply keep the process going. The way the system works, if after making 25-years of timely payments the Government of Belize is unable to make its final year of disbursements on time, the contract would become void and it loses the investment it has already made – the debt that was 'canceled' in 2001 is owed in full, both principal and interest.

As an alternative to such long-term debt swap planning, which inevitably has flaws, Deacon & Murphy (1997) suggest an alternative implementation model. The model they propose is one in which debt is cancelled "step by step," with a yearly review of progress as the basis for future debt re-negotiation. Thus, rather than the current model in which beneficiary organizations are virtually guaranteed funding without necessarily having to demonstrate progress in terms of environmental goals,

this model might provide more incentives for groups to actively put funding to optimal uses. It would be difficult to assess whether those would be any more efficient than currently, but such options might be worth exploring for future swaps.

Outcome Evaluation as the Missing Link

In what other directions should debt-for-nature swaps evolve? Drawing on comprehensive reviews of such programs, and on the limited experience of the Belize DNS as it has so far progressed, this study has shown that although DNS programs have ultimate environmental goals in mind, the monitoring of those goals is not occurring. With regard to the Belize DNS, current requisite monitoring & evaluation only seeks to ensure that inputs and activities are being provided. These do not particularly follow the inputs and activities through to their outcomes and impacts, however. Needless to say, in the case of ongoing programs, it may not be feasible to speak of impacts if we define these as changes that are seen near or after the completion of DNS programs.

Based on the above, this study strongly recommends that future debt swaps integrate outcome monitoring & evaluation as one of their components, because the monitoring & evaluation merely of inputs and activities effectively short-changes the capacity for learning from debt-for-nature swap programs, whether that learning be institutional or otherwise. In the next sections, this study goes beyond merely reiterating a general need for outcome monitoring & evaluation to suggest specific outcome measures to be examined. The following seeks to address this study's final research question:

How can the outcomes of the Belize DNS be adequately assessed?

In other words, program theory seeks to elaborate the causal link between inputs and outcomes / impacts. The following addresses the data that should be collected to verify the extent to which debt swaps contribute to environmental outcomes, i.e. the causal link between not only swap funding and land cover change but also the link between these and the economic conditions of buffer communities.

Proposed Framework for Monitoring & Evaluation

In the previous chapter, a simple conceptual model was introduced, that

deforestation may be a direct function of rural poverty:

1. *Deforestation = f (rural poverty)*

rather than the commonly cited model:

2. *Deforestation = f (external debt)*

As this is a rather unsophisticated conceptual model, the previous chapter also explored how the viability of public protected areas may hinge less on rural poverty and more on bureaucratic decision-making processes.

Based on the above, where it would be expected that DNS programs would engender both environmental outcomes (in the form of modifications of land use patterns) and socio-economic outcomes (in the form of increased prospects for employment), it would prove useful to collect data on both deforestation and rural poverty. Even if the model in equation # 1 does not prove true, policy makers would still be concerned with the extent to which debt swaps aid communities, irrespective of communities' contribution to deforestation. The following sections outline the monitoring & evaluation systems that could be set up to capture those effects.

As a short caveat, the general model is that, to deal with the issue of attribution (i.e. whether perceived changes are due to the implementation of the program), monitoring & evaluations (M&E) of the Belize DNS would involve time-series analysis of data from around the time of implementation (i.e. baseline data) to data just after the swap. As such time-series analysis would inevitably be subject to general trends prevailing in the country[20], the study should not only involve such a pre-test and post-test scenario, but also a cross-comparison with national data to examine whether national trends rather than the program are responsible for observed changes, whether these be in income level or land cover.

Community-Level Socioeconomic Outcomes

Based on the simple conceptual model elaborated above, which assumes that

[20] If, in 2017 there is a sudden deforestation of the study area compared to the previous year, one might leap to certain conclusions. Framing that occurrence within the larger national context allows us to examine, for instance, whether or not such deforestation is characteristic for the entire nation – maybe contextual information is not available to reveal that a hurricane was responsible for the sudden deforestation of large areas.

the outcomes and impacts of the Belize DNS (providing there are any) will be expressed in both economic conditions and land use patterns, the following compound questions set the stage for a general monitoring & evaluation of socio-economic conditions of buffer communities:

1. *What is the economic state of communities surrounding DNS target areas just prior to the inception of the swap and at its termination, and how does local 'economic health' change over the term of the swap?*
2. *What is the overall economic state in Belize prior to the inception of the swap and at its termination, and how does national 'economic health' change over the term of the swap?*
3. *How do pre-swap and post-swap economic states in communities surrounding DNS target areas compare with the national economic state, and how do economic changes compare between such communities and the nation over the term of the swap?*

With regard to this economic data on both communities and the nation as a whole, available income data could be solicited from relevant government agencies and ministries (e.g. Central Statistical Office or the Ministry of Human Development). Where baseline data do not exist for the gross incomes of communities, available data could merely be extrapolated (i.e. back-casted) to produce such baselines. It is expected that the economic status of communities will be compared on a case-by-case basis to the nation.

As such a study will inevitably be concerned with how the Belize DNS has fostered 'sustainable livelihoods,' which in turn should reflect positively on encroachments within protected areas funded through the DNS, the major issue will merely be the selection of 'buffer communities' believed to impact specific protected areas. Another issue is that the 'socio-economic' effects of the Belize DNS can probably be measured in more than changes in income level, particularly where it is conceded that conceptually, 'poverty' may be more complex than income.

While it might be useful to survey community members at regular intervals regarding how their overall situations are changing, the utility of relying on economic

data is that (i) baselines either already exist or can be constructed relatively easily, and (ii) such efforts would be less intrusive, and perhaps less subject to bias. For instance, if it were the implementing organizations themselves implementing surveys of communities, reported results can be expected to differ than if such surveys were conducted by external analysts. In short, third-person economic data removes *some* of the spin of interpretation.

Environmental Outcomes

While the ultimate goal of the Belize DNS is "biodiversity conservation," i.e. conservation of the ecosystems and the species therein, the program's focus is the prevention of particular land conversion patterns (e.g. clearing of broadleaf forest for agriculture). Thus, the issue of concern is how land cover has changed over the life of the program from 2001 through 2027. It can be argued that remote sensing is the most inexpensive means of accomplishing such a study, particularly because of the large areas to be studied, which negates the feasibility of sole ground or aerial surveys.

Based on the fact that the different types of features covering the land reflect different wavelengths of light, which can in turn be captured by satellite sensors, remote sensing is used to interpret, at varying scales, the information contained within satellite imagery (Short 2003). Specific research questions of interest would include:

1. *What is the land cover of DNS-funded reserves just prior to the inception of the swap and at its termination, and how does that land cover change over the term of the swap?*
2. *Over the term of the swap, how do financial inputs and outputs differ across DNS-funded reserves?*
3. *What is the land cover of the national landscape prior to the inception of the swap and at its termination, and how does that land cover change over the term of the swap?*
4. *How does pre-swap and post-swap land cover status in DNS-funded reserves compare with the national landscape, and how do land cover changes compare between DNS-funded reserves and the national landscape over the term of the swap?*

While question # 2 is not specifically land-cover related, in concert with the other research questions, this allows for some inferences into how funding allocation may influence environmental effects. While conceptually a land-cover study is sound, it entails a certain level of complexity, due to financial and technical concerns, to be discussed in the following sections, after which this study will close.

Financial Feasibility

The cost of acquiring imagery for a comprehensive remote-sensing study will vary depending on the level of detail required. This is expressed in the spatial resolution of the satellite imagery, or the area that each pixel represents. **Table 6** outlines the cost of the various imaging options, from moderate resolution (MODIS) to high resolution (Landsat), to very high resolution images (Ikonos and Quickbird).

Table 6: Satellite image attributes[21]

Image type	Multispectral resolution	Cost per image[22]	# Images needed	Imaging cost	Fieldwork cost[23]
MODIS	250 m	$0	1	$0	$32,120
Landsat ETM+	30 m	$600 ($250)	3	$1,100	$32,120
Ikonos	4 m	$27 - $83	22,800	$615,600-$1,892,400	$0
Quickbird	2.44 m	$35 - $70	22,800	$798,000-$1,596,000	$0

Sources: Short 2003, Tomppo & Czaplewski 2002, USGS 2003

Thus, program monitoring & evaluation will be constrained largely by the costs of data collection & interpretation, and the availability of adequate satellite imagery. The cost of using remote sensing to monitor the Belize DNS will also vary by the particular satellite images purchased (see **Tables 6-7**). The cost of acquiring one set of images annually from Ikonos & Quickbird satellites will far exceed the

[21] All costs listed in following tables are in USD

[22] Landsat: First figure is cost of first image while figure in parentheses is cost for each additional image; Ikonos/ Quickbird: range listed is cost per km^2.

[23] Based on Tomppo & Czaplewski (2002)'s estimate of US $440 per field plot, and 100 field plots per Landsat image. While Belize's national grid is composed of 3 Landsat images, as the country occupies 22,800 of the 93,330 km^2 (24.43%) of the 3 Landsat images, it was calculated that there should thus be 73 field plots. Because of accuracy of very high resolution images reported in Tomppo & Czaplewski (2002), assumes that no fieldwork would be done to verify images.

program budget of the Belize DNS, thus these are not feasible options, provided that huge inputs of additional funding are not received. As the use of very high resolution imagery far exceeds the cost of the entire program (**Table 7**), the use of high resolution Landsat images thus seems the most feasible option, since the scale of MODIS is too large, even though the images are free.

Table 7: Projected costs of DNS M&E using RS and field verification[24]

Image type	Monitoring cost: 1 year	Monitoring cost: 26 years[25]	Percent of program budget
MODIS	$32,120	$835,120	8.99%
Landsat ETM+	$33,120	$861,120	9.30%
Ikonos	$615,600 - $1,892,400	$16,005,600 - $49,202,400	172.30 – 529.65%
Quickbird	$798,000 - $1,596,000	$20,748,000 - $41,496,000	223.35 – 446.69%

Technical Feasibility

There are a number of technical feasibility issues that could complicate a remote-sensing based land cover study. One is that a high degree of processing would be needed. Images have to be corrected for atmospheric effects of path radiance and emissivity, which obscure spectral values. They also have to be corrected for topography, because shadows on shaded slopes also obscure spectral values. Some of these corrections can, for additional fees, be requested from the data brokers.

Another technical issue that has to be confronted is at what level land cover will be examined – at extremely coarse scales or at fine scales of specific ecosystem types. While Belize is home to 85 ecosystem types, these may not be particularly spectrally distinct (Meerman & Sabido 2001, White et al. 1998). In other words since the same types of broadleaf forest on two different types of soil would undoubtedly look similar in Landsat, a remote sensing study at the scale of those ecosystems would probably not be feasible. The fairly recent remote sensing study of central Belize by White et al. (1998), for instance, aggregates the land cover types of central

[24] This figure does not account for cost of computer hardware & software, and assumes that high cost of fieldwork will also include cost of GIS specialist.

[25] This assumes that the current cost of satellite imagery and fieldwork will remain constant over the 26-year span. Landsat TM costs plummeted from a few thousand to a few hundred following the introduction of Landsat 7 (Short 2003, Sinclair 2003).

Belize into fourteen land cover types. With remote sensing, however, clouds and cloud shadows present a daunting predicament since the data beneath these are essentially lost (DiFiore 2002, White et al. 1998). Cloud-free images of Belize are not always available, particularly for the rain-laden southern region. Additionally, because Landsat only flies over the country every 16 days, this also shortens the span of available clear days (Short 2003).

Besides having to acquire relatively cloud-free images, there is also the issue of temporal accuracy. Traditionally, images are acquired, followed by field verification of training sites (to tell the computer that *x* site represents *y* land cover type). This assumes that in the time between the image's acquisition by the satellite and ground truthing, there are no changes in land cover. White et al. (1998) did ground truthing of a March 1996 image in March and August of 1998. This increases the likelihood that the classification may be incorrect. Additionally, post-classification accuracy assessments of random coordinates usually need to be done.

A strong benefit of remote sensing is the back catalog of Landsat images that have been taken since the early 1970s. While accuracy assessments cannot particularly be done on old images (it would be impossible to travel back in time to see if the classification was done properly), if the necessary atmospheric and topographic corrections are done, older images can be inter-calibrated against images for which one does know the land cover classes. For instance, if land cover classification was done of a 2004 Landsat ETM+ image, this could then be used to classify a 1999 image (and other older images), even if ground truthing data is not available for the latter year. (Short 2003)

It might not be possible to ascertain the accuracy of classifying older images, but such classifications would likely be the only baseline data available. Also, the implication of being able to classify older images using current images and field data is that one could possibly extract baseline data for DNS programs that have occurred all over the globe, but for which baseline data does not yet exist, as is the case of the Belize DNS. In essence, because of the back-catalog of Landsat images, remote sensing could be used to quantify the impacts of all of the debt swaps that have ever

been initiated.

Finally, the issue of pixel size also presents a problem. If Landsat ETM+ images are to be used, their limitations must be recognized. With a 30m × 30m pixel size, this effectively means that for deforested areas (e.g. forest clearings) to be picked up, they have to occupy a large proportion of that pixel. In essence, if one clears an area of forest only 15m × 15m, there is an extremely high likelihood that such deforestation will not register. (Short 2003)

While there are other technical issues that perhaps warrant exploration, the general idea is that remote sensing, while not particularly simple, seems to be a generally useful tool for accomplishing what aerial and ground surveying cannot accomplish inexpensively. Based on the classification system developed by White et al. (1998), a land cover change matrix like the one depicted in **Table 8** would be filled out for each protected area and used to track land cover changes during the implementation of the Belize DNS.

Table 8: Land Cover Change Matrix

Land Cover	**Area**				
	DNS-Funded PA (2001)	Belize (2001)	…	DNS-Funded PA (2027)	Belize (2027)
Broadleaf forest			…		
Pine forest			…		
Riparian / bamboo			…		
Natural thicket and secondary growth			…		
Low 2° regrowth, herbaceous and scrub			…		
Savanna and other grasslands			…		
Mangroves, tall to medium height			…		
Mangroves, dwarf			…		
Marsh, swamp			…		
Coastal broadleaf & strand vegetation			…		
Coastal savanna			…		
Farmland			…		
Residential & commercial development			…		
Barren			…		
TOTAL			…		

In line with the time-series analysis that is being suggested, the acreages of the various land cover types would be plotted into the matrix for both the protected areas receiving funding through the Belize DNS and Belize as a whole. Besides showing how certain land cover classes are represented in the protected areas system relative to the nation, the matrix' usefulness is also comparison of land cover change rates. It would allow for seeing whether deforestation in DNS-funded protected areas is less than in the rest of the nation, as would be expected. Separate matrices would also be developed for each DNS-protected area, to compare land cover changes between individual protected areas. Use of 2001-2027 as the timeframe for the model will be constrained by cases of those DNS-funded protected areas which have not received funding consistently throughout the 26-year period (e.g. BAS' parks which are initially being funded in 5-year phases).

Data Interpretation

Aside from issues with processing and technical interpretation of data, because of the lack of specific benchmarks associated with the Belize DNS, after land cover classification is accomplished for each set of images, there are still issues with what constitutes acceptable levels of change. For instance, it can be expected that without human intervention, certain ecosystems will by natural processes be converted into others. The question is whether a premium will be placed on some ecosystems (e.g. lowland broadleaf forest) rather than others (e.g. grassland), which are seen as having resulted from anthropogenic disturbances.

Within the constraints of the Belize DNS, it may seem logical, for instance, that certain conversions will not be preferable (e.g. the conversion of forest to agriculture or savanna). Post image classification, distinctions will have to be made between which processes – natural conversion, restoration, natural disturbance, and encroachment – are responsible for the changes being seen, as well as the extent to which each contributes. For example, if analysis reveals that some lowland savannas have regenerated into pine forests, to what extent will one be able to state that this was due to DNS-funded patrols which stopped encroachment?

Synopsis of Proposed Program Evaluation Framework

In order to assess how community income levels and land cover are affected by the Belize DNS, for a fraction of the program's budget, a comprehensive national system of monitoring & evaluation could be launched. Furthermore, Belize is party to various agreements and organizations such as the Mesoamerican Biological Corridor, which is concerned with ecosystem mapping of Central America. Involvement in the FAO's Forest Resource Assessment also necessitates that the country provide data on the status of forest cover.

Thus, where M&E of the Belize DNS would inevitably involve conducting national-scale land cover mapping, collaboration for instance, between the government, the implementing organizations of the Belize DNS and CCAD (implementing agency of the MBC) could enhance such efforts. In the final analysis, national-scale land cover mapping would benefit not only the three NGOs implementing the Belize DNS, but also other environmental NGOs, government agencies, and perhaps even the private sector.

Summary

The most significant finding of this study is the confirmation that the Belize DNS, like other debt-for-nature swap programs, is delinquent regarding monitoring & evaluation of both environmental and socio-economic outcomes, even as the program is particularly aimed at fostering particular environmental outcomes. As a suggestion for future research, what is ultimately being proposed is a comprehensive national land cover study which would simultaneously assess how economic conditions of buffer communities change over the course of the swap. Inevitably, the validity of such a study will be subject to the accuracy of data collection – and in the case of the remote sensing component of the study, data interpretation. While some may dispute the utility of remote sensing-based land cover studies to measure the environmental effects of debt swaps in general, this is a step beyond the current ignorance of promised outcomes, which in effect, short-changes the public which foots the bill for such programs.

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APPENDICES

A. Debt-for-Nature Swaps Worldwide (1987-2004)

	Debtor	Year(s) of Swap Initiation	Debt swapped	Conservation funds
1	Argentina	1993	$38,100,000	$3,100,000
2	Bangladesh	2000	$31,301,857	$8,500,000
3	Belize	2001	$8,584,692	$9,289,560
4	Bolivia	1987,1991,1993 (2),1997, 2000	$105,415,795	$30,581,400
5	Brazil	1992	$2,192,000	$2,192,000
6	Bulgaria	1995	$16,200,000	$16,200,000
7	Chile	1991, 1992	$186,000,000	$18,700,000
8	Colombia	1992, 1993, 2004	$332,800,000	$64,400,000
9	Costa Rica	1988 (2), 1989 (2), 1990, 1991, 1995, 1996, 1999	$115,822,302	$67,500,594
10	Dominican Republic	1990	$582,000	$582,000
11	Ecuador	1987, 1989 (2), 1994, 2002 (2)	$75,989,473	$20,830,643
12	Egypt	1995	$121,000,000	$18,000,000
13	El Salvador	1992, 1992, 1993, 2001	$659,500,000	$62,300,000
14	Ghana	1992, 2000	$1,120,000	$1,120,000
15	Guatemala	1991, 1992	$1,400,000	$1,390,000
16	Guinea Bissau	1995	$8,400,000	$400,000
17	Honduras	1993, 1993, 1999	$67,998,442	$21,414,221
18	Jamaica	1991 (2), 1993	$405,837,956	$21,937,956
19	Jordan	1995 (2), 2000, 2001	$91,000,000	$45,500,000
20	Madagascar	1989, 1990, 1991, 1993 (3), 1994, 1996, 2003	$37,574,707	$26,517,359
21	México	1991 (2), 1992, 1993, 1994 (3), 1995, 1996 (3), 1997 (2), 1998	$5,175,277	$4,690,867
22	Nicaragua	1993	$13,600,000	$2,700,000
23	Nigeria	1991	$149,000	$93,000
24	Panamá	2003	$10,000,000	$10,000,000
25	Paraguay	1991	$9,000,000	$5,000,000

26	Peru	1993, 1994, 1995, 1996, 1997, 1999 (2), 2002	$580,575,096	$86,554,048
27	Philippines	1988, 1990, 1992, 1993, 1996, 2002	$77,116,606	$37,230,089
28	Poland	1990 (2), 1991, 1993 (2), 1997, 1998, 2000	$588,050,000	$588,050,000
29	Syria	2001	$31,700,000	$15,900,000
30	Tanzania	1993	$25,600,000	$190,000
31	Tunisia	1992, 1993	$1,819,300	$1,819,300
32	Uruguay	1992 (2)	$34,400,000	$6,193,400
33	Vietnam	1996, 1999, 2001[26]	$41,600,000	$10,400,000
34	Zambia	1989, 1994	$3,257,098	$2,206,688
TOTAL		**1987-2004**	**$3,728,861,601**	**$1,211,483,125**

Sources: TNC 2003, TNC 2004, WWF 2003a, WWF 2003b

[26] The amount of conservation financing generated by the 2001 Vietnam DNS in not available (WWF 2003a).

B. Protected Areas Types of Belize

Protected Area	Enabling Legislation (Year)	Definition[27]
Archaeological Reserve	Ancient Monuments & Antiquities Ordinance (1981)	"An area reserved for the protection of archaeological and historic resources."
Forest Reserve	Forest Ordinance (1926)	"An area reserved for the protection of forest for management and exploitation, plus the conservation of soil, water and wildlife resources."
Marine Reserve	Fisheries Ordinance (1977)	"An area reserved for the protection, research, recreation education, and controlled extraction in relation to marine and freshwater species and their habitats."
National Park	National Parks System Act (1981)	"An area reserved for the protection and the preservation of natural and scenic values of natural significance for the benefit and enjoyment of the general public."
Natural Monument	National Parks System Act (1981)	"An area reserved for the protection and preservation of nationally significant natural features of special interest or unique characteristics to provide opportunities for interpretation, education, research and public appreciation."
Nature Reserve	National Parks System Act (1981)	"An area reserved as a scientific reserve for the protection of nature to be it biological communities or species and to maintain natural processes in all undisturbed state in order to have ecologically representative examples of the natural environment available for scientific study, monitoring, education and the maintenance of genetic resources."
Private Reserve		"A private reserve is a protected area that is owned by a private individual or a non-governmental organization."
Wildlife Sanctuary	National Parks System Act (1981)	"An area reserved as a nature conservation reserve for the protection of nationally significant species groups of species, biotic communities or physical features of the environment requiring special human manipulation for their perpetuation."

Sources: PACT 2002, Zisman 1996

[27] Definitions are excerpted from the PACT's 2001-2002 Annual Report (PACT 2002: 24-25).

C. Interview Guide[28]

Program Questions: To learn about the overall framework of the Belize DNS

1. What would you say was the overall goal for the Belize DNS?

2. Could you elaborate on the possibility of securing those goals without the DNS?

3. How does the Belize DNS fit into your organization's overall goals?

4. What, if any, are the specific benchmarks for the Belize DNS?

5. Could you describe the activities the debt swap created funding for?

Implementation: To learn about conditions that affect implementation of Belize DNS

6. In terms of planning for the debt swap, were stakeholder concerns integrated into your approach, and how so?

7. What do you think contribute / will contribute to the securing of the objectives of the Belize DNS?

8. What [potential] obstacles do you see to the securing of the objectives of the Belize DNS?

9. Where the literature on debt swaps often cites lack of enforceability as a potential problem, could you comment on how this might possibly affect the viability of the Belize DNS?

Measuring Success: To learn about specific evaluative criteria for the Belize DNS

10. Could you describe what, if any, short- and long-term monitoring your organization undertakes in connection with the Belize DNS?

11. Could you describe what you think an effective debt swap would look like?

12. Could you describe what an ineffective debt swap would look like?

13. When the DNS expires in 2027, what do you think would indicate whether the swap has been effective?

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[28] On June 2, 2003 this project was approved by the University of Washington's Human Subjects Division, under the project title "Exploring Evaluative Criteria for the Belize Debt-for-Nature Swap" (Certificate of Exemption # 03-7954-X).