



Gra Gra Lagoon National Park Management Plan 2006

Report to:
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&
National Parks Management Program of the Forest Department, Ministry of
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Executive Summary

This document describes a management plan for Gra Gra Lagoon National Park, a small protected area of approximately 485 ha (1,197 acres), immediately south of Dangriga in the Stann Creek District, Belize. A very shallow brackish lagoon is the centerpiece of the park but the protected area also includes the greater part of the surrounding mangrove system, excepting that on the seaward (southern) shore. The mangrove grades into swamp forest and lowland forest on the inland (northern) side. There are patches of tall herbaceous swamp behind the beach-crest close and entering the park boundary and large areas of freshwater reed swamps within the forested swamplands.

Although small, the park encompasses several ecosystems that are under-represented in the current protected areas system of Belize. The park is co-managed between the Belize Forest Department and Friends of Gra Gra, a local community based NGO.

The site plays a very useful role in maintaining the quality of water outflow into the marine system. The lagoon may be expected to carry agro-industrial effluent and sediment from the agricultural hinterland. Nonetheless the quality of the lagoon system appears high, indicating that the system is able to absorb current levels of input. By the same token the quality of the outflow into the marine system appears good.

The lagoon plays a further important role as a safe haven for small craft during storms and hurricanes. This may indeed be its main contribution to the economy of the region in monetary terms, protecting investments and allowing swift recovery of economic activity.

The over-riding management aim is to maintain ecosystem functions as the general area becomes increasingly developed. Compromised water quality appears to be the more insidious and deep-reaching threat to overall integrity than fishing, which is anyway more amenable to control and already at reduced levels. The current construction of a marina with associated activities such as dredging are of management concern for the park but through good cooperation between park management and developer, negative effects are to be avoided.

Because of the ecosystems represented inside the park, the overall biodiversity is low. Nevertheless, some conservation targets were identified of which the most important are:

- Tropical freshwater reed-swamp
- Morelet's Crocodile
- Bird (Egret) roosting sites

In addition, neighboring areas containing critical habitats were identified that should preferably be included in the park in the nearby future. These critical habitats are clustered around the western end of the current park boundaries in an area locally known as "Old England".

Threats to the biodiversity come most directly from urban development.

The principal management constraints and limitations are due to the fact that Gra Gra Lagoon National Park is essentially locked in by private development. The only easy ways for getting into the park are either:

- Over sea from Dangriga through the Yemeri Creek entrance

- By road from Dangriga to the road crossing private Property
- Over road from Dangriga, past the Commerce Bight pier across private property to the Yemeri Creek.

Principal consequence is that it will not be possible to erect any management structures on land that is controlled by either Government or Friends of Gra Gra. This issue remains unresolved and prevents actual development of most of the management planning.

A zonation plan for the park is proposed based on the criterion that the protected area must be managed for the primary objectives which include: “To manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state” The zonation plan gives 18% of the park a “multiple use status, 42 % of the park a tourism use and the remaining 40 % a conservation management status.

The actual managements plan centers around the financial management. Since Gra Gra Lagoon National Park is co-managed and the co-managing agency is expected to raise necessary funds for the management of the protected area, the income generating activities have a large priority.

Other conservation and monitoring activities that need to be developed include: Water Quality sampling and monitoring of biological indicators such as Crocodiles, roosting birds and fish.

Income generating activities are centered on tourism. At this stage, Friends of Gra Gra already have a small infrastructure in place to allow for some tourism activities. In order to allow for a proper start of these activities, a donor driven cash injection of approximately BZ\$ 200,000 during the first year of operation is needed if the group is expected to become self sustaining within the 5 year life span of the management plan. A detailed financial plan outlining expenses and target incomes is presented. A list of potential donors is also presented.

Acknowledgements:

The consultants, Jan Meerman & Roger Wilson, wish to acknowledge the staff of the Forest Department and in particular Natalie Rosado and Earl Codd for constant feedback during the consultancy. Equally important were consultations with Marco Zambrano, consultant for the World Bank and Mr. Edgar Puga from the project execution office of the Ministry of Works. Funding was provided by the Worldbank through the Ministry of Works.

Most of all, the input of the membership of the Friends of Gra Gra should not be forgotten, in particular the tenaciousness and ceaseless energy of Timothy Flores and Julian Lewis are to be commended and forms an example for other NGO leaders.

Contents

1. Introduction	
1.1. Background and Context	2
1.2. Purpose and Scope of Plan	2
2. Current Status	
2.1 Location	4
2.2 Regional Context	5
2.3 National Context	6
2.3.1 Legal and Policy Framework	6
2.3.2 Land Tenure	12
2.3.3 Evaluation of Protected Area	13
2.3.4 Socio-Economic Context	20
2.4. Physical Environment of Management Area	22
2.4.1 Climate	22
2.4.2 Geology and Soils	24
2.4.3 Hydrology	25
2.5. Biodiversity of Management Area	26
2.5.1 Ecosystems	26
2.5.2 Flora	36
2.5.3 Fauna	37
2.5.4 Past and Present Research	38
2.6 Cultural and Socio-Economic Values of Management Area	39
2.6.1 Community and Stakeholder Use	39
2.6.2 Tourism and Recreation Use	40
2.6.3 Other Economic Use	41
3. Conservation Planning	
3.1 Conservation Targets	42
3.1.1 Identification of Conservation Targets	42
3.1.2 Assessment of Conservation Target Viability	45
3.2 Threats to Biodiversity and strategies to reduce these threats	47

4. Management Planning	
4.1 Management and Organisational Background	50
4.2 Management Goals	52
4.3 Management Strategies	53
4.3.1. Management Constraints and Limitations	53
4.3.2. Management Zones and potential park extension	54
4.4 Management Programmes and Objectives	56
4.4.1. Introduction.	56
4.4.2. Identification of priority management programs.	58
4.4.3. Expenditure programme.	59
4.4.3.1. Start-point.	59
4.4.3.2. Management cost estimates.	60
4.4.4. The Resource Protection Programme.	62
4.4.4.1. Site protection.	62
4.4.4.2. Maintenance of up-stream viability.	63
4.4.5. Recreational Use Programme.	65
4.4.6.1. Visitor facilities.	65
4.4.6. Environmental Awareness Programme.	68
4.4.7. Environmental research and monitoring programme.	70
4.4.8. Institutional Capacity Building programme.	72
4.4.9. Income generation.	74
4.4.9.1. Financial strategy.	74
4.4.9.2. Self-generated income.	75
4.4.10. Marketing strategy.	77
4.4.11. Fund-raising strategy.	79
5. References	82

Appendices

Appendix 1. Estimated Expenditures	83
Appendix 2 Expenditure: explanatory notes	85
Appendix 3. Income generation	89
Appendix 4: Gra Gra lagoon funding requirements	91
Appendix 5. Income generation scenario	92
Appendix 6 Property map of lands surrounding Gra Gra Lagoon National Park	93
Appendix 7 Terms of Reference	94
Appendix 8 Attendance Gra Gra Stakeholders Meeting March 5, 2005	99
Appendix 9 Species Lists	100
Appendix 10. Statutory Instrument 86 of 2002.	110
Appendix 11. Co-management agreement 22 April, 2002	111
Appendix 12. NPAPSP case study: Gra Gra Lagoon National Park	120

List of Figures and Graphs

Box 1. Detailed description of IUCN Category II	6
Figure 1. Protected Areas map of Belize with Gra Gra Lagoon National Park indicated.	1
Figure 2. Map of Gra Gra Lagoon National Park showing buffer communities.	4
Figure 3. Locked MARXAN Analysis	15
Figure 3. Seeded MARXAN analysis	15
Figure 5. Selected Hexagons with overlay of property boundaries	16
Figure 6. Ecosystems map of Gra Gra Lagoon National Park with selected NPAPSP hexagon overlay	17
Figure 7. Survey map of Gra Gra Lagoon and Surroundings.	21
Figure 8. Average monthly minimum and maximum temperatures at Melinda Forest Station, Stann Creek District.	22
Figure 9. Average monthly rainfall figures for Dangriga.	23
Figure 10. Agricultural Land Value of the Gra Gra Lagoon Area and Surroundings.	24
Figure 11. Watersheds of the Gra Gra Lagoon Area	25
Figure 12. Ecosystems of the Gra Gra Lagoon Area and Surroundings.	26
Figure 13. <i>Colubrina asiatica</i> , Dangriga May 12, 2005.	36
Figure 14. Landsat image (January 2004) showing land-use around Gra Gra Lagoon National Park. The marina site immediately below the lagoons, is clearly visible.	41
Figure 15. Morelets Crocodile.	42

Figure 16. Specific Conservation Targets in and around Gra Gra Lagoon National Park.	44
Figure 17. Land ownership around Gra Gra Lagoon National Park	53
Figure 18. Gra Gra Lagoon National Park management zonation	55

List of Tables

Table 1. Place of Gra Gra Lagoon National Park in NPAPSP ranking system	13
Table 2. Population Statistics for the Gra Gra Lagoon National Park Surroundings.	20
Table 3. Hurricanes affecting the area in the last 100 years.	23
Table 4. Ecosystems present within the Gra Gra Lagoon National Park	27
Tables 5 through 12. Ecosystem descriptions based on Meerman & Sabido, 2001.	28
Table 13. Critical species found in Gra Gra Lagoon National Park	37
Table 14. Ecosystems present in Gra Gra Lagoon National Park that are under-represented on a national scale.	42
Table 15. Critical species found in Gra Gra Lagoon National Park	43
Table 16. Conservation target (ecosystem) viability	45
Table 17. Conservation target (species) viability	46
Table 18. Threats and counter strategies.	48
Table 19. Budget summary per year	61
Table 20. Budget Resource Protection Programme with implementation time period	64
Table 21. Budget Recreational Use programme with timeline	67
Table 22. Budget Environmental Awareness Programme with timeline	69
Table 23. Budget Environmental Research and Monitoring Programme with timeline	71
Table 24. Budget Institutional Capacity Building Programme with Timeline	73

Glossary

AGM = Annual General Meeting

BZ\$ = Belize Dollar 1 BZ\$ = 0.50 US\$

C = Celsius

cf = compare with/in other words

CITES = Convention on International Trade in Endangered Species

F = Fahrenheit

FD = Forest Department

FGG = Friends of Gra Gra

Fig = Figure

ha = Hectare

IUCN = World Conservation Union

km² = Square Kilometer

LIC = Land Information Center

MARPOL = International Convention for the Prevention of Pollution from Ships

mm = millimeter

MoA = Memorandum of Association

MoU = Memorandum of Understanding

N = North

NAD = North American Datum

NARMAP = Natural Resource Management and Protection Project

NB = Nota Bene

NICH = National Institute of Culture and History

NPAPSP = National Protected Areas Policy and Systems Plan

PA = Protected Area

PACT = Protected Area Conservation Trust

PACT = Protected Areas Conservation Trust

pour-points = place where an inland water body enters the sea.

SI = Statutory Instrument

UNDP = United Nations Development Programme

UTM = Universal Transverse Mercator

Yr = Year

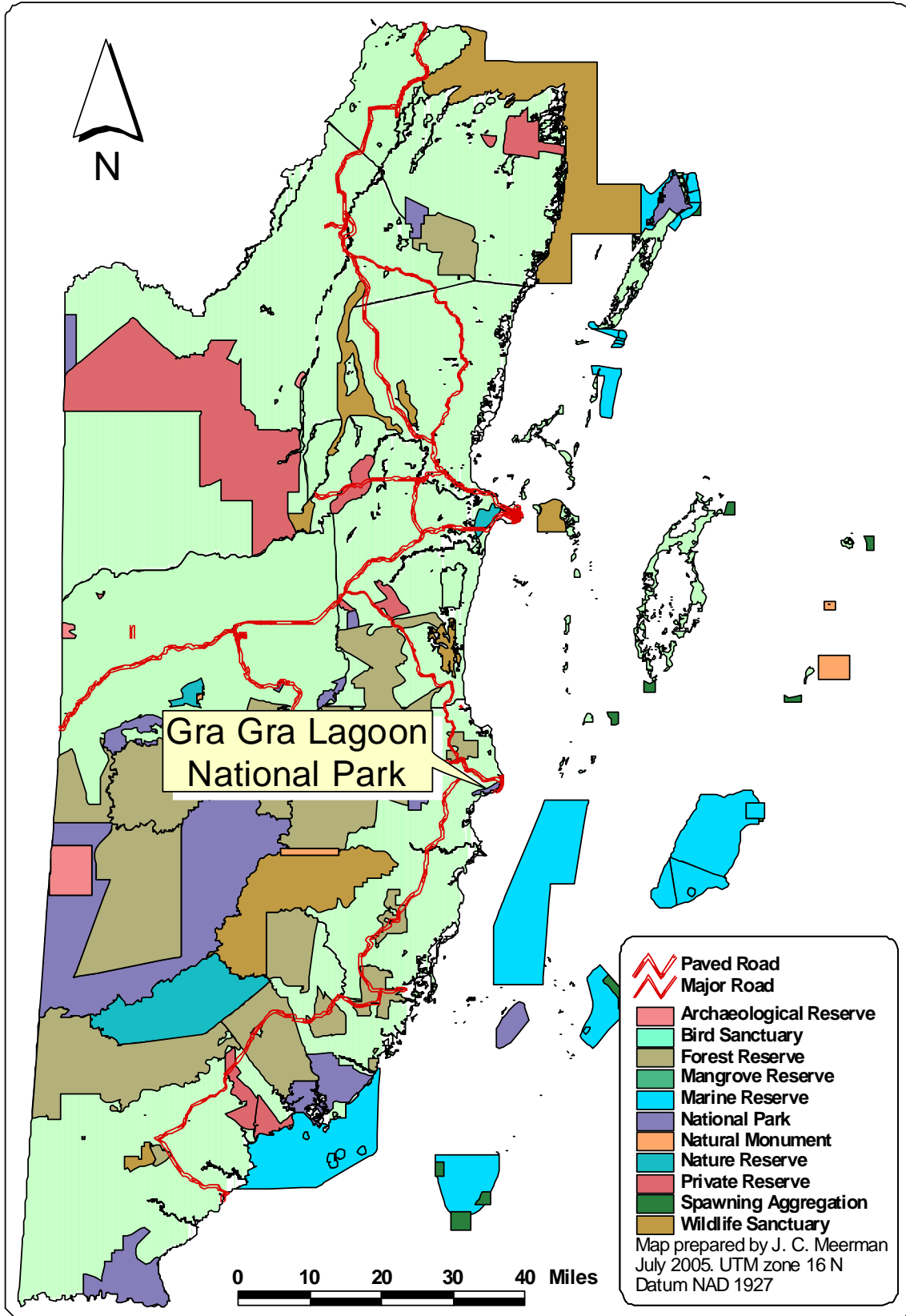


Figure 1. Protected Areas map of Belize with Gra Gra Lagoon National Park indicated.

1. Introduction

1.1 Background and Context

Gra Gra Lagoon National Park is located near the coast just below the town of Dangriga, the capital of the Stann Creek District (figure 1). The park was established in 2002 (S.I. No 86 of 2002)(see appendix 9) and covers approximately 1,197 acres (485 ha). The very shallow brackish lagoon of 300 acres (120 ha) is the centerpiece of the park but the protected area also includes the greater part of the surrounding mangrove system, excepting that on the seaward (southern) shore. The mangrove grades into swamp forest and lowland forest on the inland (northern) side. There are patches of tall herbaceous swamp behind the beach-crest close and entering the park boundary and large areas of freshwater reed swamps within the forested swamplands.

Gra Gra Lagoon was established as National Park under the National Parks System Act, 1981. The classification “National Park” indicates that the area is declared for the protection and preservation of natural and scenic values of national significance and for the benefit and enjoyment of the general public. As such Gra Gra Lagoon National Park conforms with IUCN Category ii.

Based on the National Park Systems Act, allowed activities in a national Park include; research, education and tourism. As a national park, statutory responsibility for site management lies with the Forest Department. Day-to-day administration has, however, been devolved through a formal co-management agreement to Friends of Gra Gra, a local community group.

1.2 Purpose and Scope of Plan

Based on the “National Park” classification it follows that the area is to be managed; “for the protection and preservation of natural and scenic values of national significance and for the benefit and enjoyment of the general public”. The IUCN Category II description adds more detail to this management objective (See under regional context: Box 1).

The current managements plan has been written with the existing co-management organization “Friends of Gra Gra” in mind. The Management Plan is intended for a 5 year period starting upon acceptance of the plan.

The original Terms of Reference (appendix 7) called for a financial management plan as part of an environmental management plan. This environmental management plan was to follow the outline as provided by the Forest Department. In August 2005, this outline was replaced by a new Protected Areas Management Plan Outline developed as part of the National Protected Areas Policy and Systems Plan. While this outline has been followed extensively, it was not possible to follow it to the letter given the history of development of the management plan. In particular, in the current management plan, emphasis is given to the financial sustainability of the management.

The forest Department will be the agency responsible for the approval of the plan and Friends of Gra Gra as the co-management agency will be responsible for the implementation of the plan.

As part of the Protected Areas Management Plan development the following steps were taken:

- **Coordination with National Parks Management Program of the Forest Department and Friends of Gra Gra.** The First consultation meeting with Forest Department, a representative of the World Bank and Friends of Gra Gra Lagoon took place on February 23, 2005. A second such consultation took place on August 25, 2005. Throughout the whole process, close communications with Friends of Gra Gra was maintained.
- **Literature studies (including “gray” literature):** A number of unpublished reports and documents was reviewed. See the literature section for a full list.
- **Stakeholders Consultation** The consultation took the shape of a stakeholders meeting with the consultants, National Parks Management Program, Friends of Gra Gra, and any other stakeholder willing to attend. The Stakeholders meeting was announced by personal invitation and by advertisement on the local cable television station. The stakeholders meeting took place at the Town Hall on March 5, 2005. A total of 17 stakeholders attended.
- **Diagnosis of the wildland area:** A study focusing on importance of the Gra Gra Lagoon within the national context was carried out as a component of the National Protected Areas Policy and Systems Plan (NPAPSP) of Belize. This study ended on July 15, 2005 upon which the draft results were made available for inclusion in this managements plan.
- **Field studies:** Between March 1 – 5, 2005 and May 9 – 12, 2005, the principal field visits took place. This field visit focused on verification surveys for flora, fauna (including birds, mammals and herpetofauna), the marine environment as well as social and economic indicators. These site visits did not intend to be a “Rapid Ecological Assessment” but were principally carried out to test the accuracy of the data obtained through the literature study and various meetings and to ensure that this information was is still valid. Areas visited include not only the Lagoon complex itself but also the surrounding farmlands and other sites of importance. Essentially, the field visit was a verification tour for activities within the entire Gra Gra Lagoon watershed. Also during the field visit, informal interviews were held with tour guides, tour operators and hotel owners. An over-flight of the area was made on May 17, 2005.

- **2. Current Status**

2.1 Location



Figure 2. Map of Gra Gra Lagoon National Park showing buffer communities.

Gra Gra Lagoon National Park is situated in the Stann Creek district (fig 1) near the town of Dangriga (fig. 2). The protected area lies roughly between UTM coordinates 363,210 and 369,600 east, 1871900 and 1874930 north (NAD, 1927 UTM zone 16 N) and covers approximately 1,197 acres (485 ha). The boundaries are established in Statutory Instrument 86 of 2002 (Appendix 9). Presently the boundaries are not physically demarcated by cut lines or signs.

Based on the “National Park” classification it follows that the area is to be managed; “for the protection and preservation of natural and scenic values of national significance and for the benefit and enjoyment of the general public”. The IUCN Category II description adds more detail to this management objective (See national context: Box 1).

The park is essentially land locked and access is over a paved road from Dangriga along the quickly developing coastline just south of Dangriga. Access is also possible through some farm roads north from of the park (fig. 2). There is no actual infrastructure inside the protected area.

The principal community affecting the park is Dangriga, the Stann Creek District capital with an estimated 10,400 inhabitants (2004 estimate). Other nearby communities include Sarawee (also called “4 miles”), Silk Grass and Hopkins (fig. 2).

2.2 Regional Context

Regionally, the Gra Gra Lagoon National Park is of limited importance. The Selva Maya, Zoque and Olmec Ecoregional Plan (www.selvamaya.org) did not select the Gra Gra Lagoon area as a regional priority. Neither does it form part of any national or cross-boundary biological corridor. Nevertheless, through providing protection for certain ecosystems as Mangrove and certain animals as the Morelet’s Crocodile, Gra Gra Lagoon National Park may assist in meeting Belize’s commitments under regional agreements such as the Convention on Biological Diversity (1992) and the Alliance for the Sustainable Development of Central America (1994).

2.3 National Context

2.3.1 Legal and Policy Framework

Gra Gra Lagoon was established in 2002 as National Park under the National Parks System Act, 1981. The classification “National Park” indicates that the area is declared for the protection and preservation of natural and scenic values of national significance and for the benefit and enjoyment of the general public. As such Gra Gra Lagoon National Park conforms to IUCN Category ii (Box 1).

Box 1. Detailed description of IUCN Category II

CATEGORY II: Protected area managed mainly for ecosystem protection and recreation.

Definition: Natural areas of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation detrimental to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible. At least 75% of the designated protected area must be managed for the primary objective.

Objectives of Management

1. To protect natural and scenic areas of national and international significance for spiritual, scientific, educational, recreational or tourist purposes;
2. To perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity;
3. To manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state;
4. To eliminate and thereafter prevent exploitation or occupation detrimental to the purposes of designation;
5. To maintain respect for the ecological, geomorphologic, sacred or aesthetic attributes which warranted designation; and
6. To take into account the needs of indigenous people, including subsistence resource use, in so far as these will not adversely affect the other objectives of management.

Guidance for Selection

- The area should contain a representative sample of major natural regions, features or scenery, where plant and animal species, habitats and geo-morphological sites are of special spiritual, scientific, educational, recreational, and tourist significance.
- The area should be large enough to contain one or more entire ecosystems not materially altered by current human occupation or exploitation.

Based on the National Park Systems Act, allowed activities in a national Park include; research, education and tourism. As a national park, statutory responsibility for site management lies with the Forest Department. Day-to-day administration has, however, been devolved through a formal co-management agreement to Friends of Gra Gra, a local community group.

The Friends of Gra Gra (FGG) has been active since the late 1990s. It was established as a membership organization with the objectives of conserving and managing local natural resources, preserving the biodiversity of Gra Gra and its environment, and involvement in environmental action in general. The declaration of Gra Gra lagoon as a national park

was a key aim, successfully achieved largely due to FGG advocacy. The importance of the Gra Gra Lagoon system was recognized in an 1999 EIA (Meerman, 1999) carried out by the Halcrow group with funding from the Worldbank. This study recognized the protection of the lagoons as a way to mitigate environmental impacts caused by the construction of a improved drainage infrastructure for Dangriga. This EIA ultimately resulted in Worldbank funding for the current management plan.

The FGG was formally constituted as a non-profit company in February 2003. The Memorandum of Association (MoA) retains the original objectives but broaden their scope to include establishment and support for a community-based management plan that would support the development process of Dangriga and its surrounding communities. It also defines non-profit status, stipulating that all income must be spent on furthering the aims of the society rather than any member while allowing for payment for services that may be provided (salaries, fees, rents ...). The permanence of investments made in support of FGG is assured by the requirement that, in the event of organizational failure, all assets must be passed to another organization with similar objectives. Revised Articles of Association are attached to the MoA. These require Annual General Meetings (AGM) – which must not be more than 15 months apart - to consider special business, officer's reports and accounts, requiring a quorum of one-third total membership. FGG affairs are managed by a Board of Directors which at present levels of membership essentially consists of the FGG members though provision is made for delegation to a management committee. Maintaining proper accounts and undertaking an independent annual audit are requirements, while the Board of Directors may also establish other financial procedures as necessary. The Chairman, Secretary and Treasurer are elected from the board at each AGM.

Formal constitution of FGG as a non-profit company opened the way to the co-management agreement with the Forest Department for the newly-declared national park. The agreement was signed in April 2003 (Appendix 11), is valid for 5 years and is renewable. Essentially the Forest Department (FD) has statutory responsibility for the national park but management is shared with FGG, using a management plan produced jointly by both bodies. Other key points under the agreement are that FGG:

- is responsible for all day-to-day management activities while the FD is responsible for security and law enforcement and will assist with infrastructure;
- is responsible for all visitor activities within the site, for routine maintenance and for education programs;
- has the right of first refusal for all recreation-related concessions and activities, provided standards are acceptable;
- may collect fees for entrance, camping, programs and concessions;
- may retain 70% of the fees collected, with 20% for PACT and 10% for government;
- must keep detailed records of fees collected, provide quarterly financial statements, and present an annual report;

- will have exclusive use of any funding secured for the management and development of the area.

In December 1998, FGG received a grant of BZ\$ 64,500 for protection of Gra Gra Lagoon, education and outreach, organizational capacity building and alternative occupational training. Although this was intended as a 16-month project it actually extended over two phases into August 2002. Both PACT and local business provided co-financing with an in-kind contribution of BZ\$ 18,810 from the group.

Essentially this grant allowed FGG to establish itself and to develop its organizational skills. The key indicator of success is that the primary objective of FGG, formal designation of the lagoon as a national park, was achieved. The group obviously went through growing pains but received training, gained experience and received expert advice in weak areas – there are, for instance, detailed recommendations for financial procedures in the UNDP mid-term report. FGG has proved institutionally tenacious, won local respect and increased membership to 220.

Since then, FGG backing has been limited to the Wildlife Conservation Society, which paid for posters and brochures. It remains active but self-generated income is effectively zero and recent efforts to obtain grant support (PACT, Oak Foundation) have been unsuccessful, pending the production of a management plan. The World Bank has pledged support, but this is again conditional on a management plan. Nonetheless, FGG does hold assets inherited from the UNDP grant, consisting essentially of a wood-built office (well-located but on the parcel of a member), a small amount of office furniture, some signs and four canoes with equipment (life jackets, paddles). Two of the canoes are not very suitable (too large, too heavy) and all this equipment is over five years old – i.e. still serviceable and, though dispersed, still available but written off for accounting purposes except for the office building.

The main pieces of legislation that govern protected areas in Belize are the: National Parks System Act, Fisheries Act, Forest Act and National Institute of Culture and History Act.

Existing Environmental, Legal and Policy Framework.

There is no explicit policy or legal / regulatory framework specifically addressing the conservation or sustainable use of Biodiversity. However there are policies or laws/regulations which impact on Biodiversity on existence since 1928 (first Forest Policy) Such policies that exist are linked to a broad range of activities conducted by the Public Sector Institutions responsible for the management of a particular natural resource.

Legal or Regulatory Framework:

The existing legislation divides the environmental issues into three broad categories:

- Environmental Protection
- Natural Resource Management
- Land Use Planning and Management

These three categories involve activities which directly and indirectly impact on Biodiversity. The legal framework also empowers distinctive agencies, Ministries and quasi Government Institutions to design policies and carry out a broad range of activities

related to the three management categories. Key pieces of Legislation are the following¹ (Legislation of particular interest to Gra Gra Lagoon National Park marked with *):

1*. Environmental Protection Act - This Act requires that Environmental Impact Assessments be conducted before certain development projects are carried out. It is administered by the Department of the Environment. Subsidiary legislation passed under this Act are:

- Environmental Impact Assessment Regulations, 1995
- Effluent Limitation Regulations, 1996,
- Pollution Regulations, 1996

2*. Public Health Act - This Act provides general regulatory power for pollution control. It establishes certain regulations for the disposal of liquid and solid waste and other issues related to public health including the prevention of contamination of water for human consumption specifically, it gives the Public Health Department wide powers in the control of pollution in the air, water and on land as it affects the quality of human habitation. This wide powers are not, however, supported by Subsidiary legislation which would set standards for monitoring and procedures for maintaining control.

3. Pesticides Control Act - This Act deals with the regulation and control of the sale and use of Pesticides. It establishes a Pesticides Control Board which sets standards for the monitoring of such substances. The Pesticides Control Board falls under the responsibility of the Ministry of Agriculture.

4*. Water and Sewerage Act - This Act governs the control and regulation of all matters pertaining to the monitoring and use of drinking water and sewerage disposal in Belize. It establishes a Water and Sewerage Authority (WASA) which falls under the control of the Ministry of Natural Resources, Environment and Industry.

5. Solid Waste Management Authority Act -This Act establishes an Authority which to date has not become functional. It is intended to govern the collection and disposal of solid waste in Belize.

6*. Forest Act -The protection of the forest and the mangroves is regulated by this Act which is in the process of being revised. This Law also regulates the creation and management of Forest Reserves and is administered by the Ministry of Natural Resources Environment and Industry.

7*. National Parks Systems Act - This Act is administered by the Ministry of Natural Resources Environment and Industry. It establishes four categories of protected areas, which are – Natural Monuments, National Parks, Nature Reserves and Wildlife Sanctuaries.

¹ Ministries and their portfolio's are being "re-adjusted" on an ever increasing pace. It was not always possible to trace the most current title of each ministry responsible for the management of the various acts listed.

8*. Wildlife Protection Act - This Act controls the activities in relation to Wildlife in Belize. It is administered by the National Parks Management Program of the Ministry of Natural Resources Environment and Industry and it seeks to regulate hunting, research, and trade of wildlife species including marine wildlife. The CITES Convention is also administered by this Department.

9*. Fisheries Act - This Act is administered by the Ministry of Agriculture and Fisheries. It seeks to control all aspects of the fisheries resources in Belize by establishing regulations controlling minimum size, types of fishing equipment to be used open and closed seasons and registration of fishing boats and fishermen. Marine Protected Areas are also established under this Act. Some of the Marine Reserves are managed collaboratively with the Ministry of Natural Resources Environment and Industry.

10*. Mines and Minerals Act - This governs the extraction of all non-renewable resources in Belize. Of particular importance are its control of dredging and quarrying activities. It is administered by the Ministry of Natural Resources Environment and Industry.

11. Petroleum Act - This Act governs the exploration and extraction of petroleum and related products in Belize. This would also affect those areas of the Coastal Zone and exclusive Economic Zone, under which petroleum may be discovered. The Act is also regulated by the Ministry of Natural Resources Environment and Industry.

12*. National Lands Act - This Act regulates the distribution of national land and the overall delineation of national reserves. It seeks to provide some management and control of land by requiring environmental impact assessments to be conducted for land over 500 acres. It also establishes a 66ft width river frontage as public lands. This Act is administered by the Ministry of Natural Resources Environment and Industry.

13*. Land Utilization Act - This Act, administered by the Ministry of Natural Resources, seeks to control the subdivision of any land in Belize, whether private or public. It establishes a Lands Utilization Authority which makes recommendations on subdivision applications. It also establishes Special Development Areas which limit the types of development permissible within these zones.

14. Ancient Monuments and Antiquities Act -This Act regulates the establishment and management of archaeological reserves as well as other cultural artifacts falling under the control of the legislation. It is administered by the National Institute of Culture and History (NICH).

International Conventions and Agreements relating to the Environment to which Belize has become a Party (Source: Ministry of Foreign Affairs)(Agreements of particular interest to Gra Gra Lagoon National Park marked with *):

1*. Convention on Wetlands of International Importance especially as Waterfowl Habitat
1971

2. International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL) 1973
3. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) Toxins and their destruction 1980
- 4*. Convention on International Trade in Endangered Species of Wild Fauna and Fauna (CITES) 1981
5. United Nations Law of the Sea Convention 1982
6. International Convention for the Regulation of Whaling, 1982
7. Convention concerning the Protection of Workers against Ionizing Radiation 1984
8. Vienna Convention for the Protection of the Ozone Layer - Final Act of the Plenipotentiaries on the Protection of the Ozone Layer 1985
- 9*. International Plant Protection Convention 1987
10. Montreal Protocol on Substances that Deplete the Ozone Layer - Final Act and Amendments 1987
- 11*. The UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage. 1990
12. Bilateral Agreement between Belize and Mexico on Cooperation for the protection and improvement of the Environment and conservation of Natural Resources in the Border Zone 1991
13. Convention concerning Indigenous and Tribal Peoples in Independent Countries 1991
- 14*. Convention on Biological Diversity 1992
- 15*. Climate Change Convention 1992
- 16*. Agreement establishing the Inter-American Institute for Global Change Research 1992
17. Agreement establishing the Fund for the Development of Indigenous Peoples of Latin America and the Caribbean 1992
- 18*. Alliance for the Sustainable Development of Central America 1994
19. Statement of Intent for Sustainable Development Cooperation and Joint Implementation of Measures to Reduce Emissions of Greenhouse Gases by the Government of the USA, Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama 1995
20. Marrakesh Declaration of 1994 - Final Act embodying the Results of the Uruguay Round of Multilateral Trade Negotiations re GATT. 1994
21. Agreement for the implementation of the Provision of the United Nations Convention on the Law of the Sea of 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks 1995

Of importance for Gra Gra Lagoon National park are the policies regulation co-management.

Policy Framework for Co-management

Co-management is really a type of governance involving a range of different interest groups with varying capacities, sharing responsibility for and benefits of managing a protected area. Currently, there is no national policy on co-management of natural resources.

A framework for co-management of protected areas already exist under Decision VI/28 of the Convention on Biological Diversity, which should guide the development of local policy.

Application of IUCN Protected Areas Categories

The IUCN guidelines propose six categories of protected areas, based on the primary management objective. At least 75% of the designated protected area must be managed for the primary objective. The definitions, objectives for management and guidance on selection of sites are provided for Categories I-VI. In terms of sustainable use of natural resources, Categories IV-VI allow for exploitation as important objectives. Natural resource use in Category III is not often considered as an objective. Categories II and Ib permit some resource use often in the context of needs of indigenous people, or people living in or adjacent to the site. Category I does not allow resource extraction and limits public access to the area. See also Box 1 for further details.

The use of natural resources within each protected area category should be governed by the management objectives for which each site was designated. These objectives are further developed and implemented through the management plan created for each site. The creation of management zones can be used to meet the varied objectives within a category. The identification of potential zones will be based on an understanding of the natural resource abundance, distribution, health, use and threats. This information will be gathered through surveys and engagement of resource users and communities adjacent to the site. The active and transparent participation of the stakeholders will lead to a zoning plan that is agreeable to all parties, and likely to require little effort by state agencies for enforcement.

2.3.2 Land Tenure

Gra Gra Lagoon National Park is National Land but bounded nearly completely by private lands (figure 7). The effect of this is that access to the lagoons within the park is problematic and possible only using one road and from the sea (Figure 17). These restrictions create severe issues for the practical management of the park (See chapter 4.4.1. Management Constraints and Limitations).

2.3.3 Evaluation of Protected Area

Recently, a National Protected Areas Assessment and Analysis was completed (Meerman, 2005). Within this assessment a ranking analysis was carried out for all existing protected areas. This system allow for ranking according to Biophysical characteristics, land use/management characteristics and a combination of both.

Table 1. Place of Gra Gra Lagoon National Park in NPAPSP ranking system

	Ranking (out of 94)
Biophysical	48
Land use - management	66
Combination	47

This analysis shows Gra Gra Lagoon to come up in the middle ranks when compared to all other protected areas with respect to biophysical characteristics (biodiversity, uniqueness of ecosystems, location near other protected areas). This middle rank can be explained by the small size of the protected area and it not being adjacent to another protected area and not within a biological corridor. The documented presence of bird roosts and an endangered species as the Morelet’s Crocodile counted as features in it’s favor. Its low rank within the Land use/management characteristics, is due to the lack of research data for Gra Gra Lagoon (at the moment of the analysis), the absence of a structured management and most of all the close proximity of development projects negatively impacting the protected area. The implementation of this management plan should change at least the first 2 reasons and mitigate the last.

In addition a MARXAN analysis was carried out. This type of analysis is called a decision support tool and is a technical way to rank a large number of conservation targets and select which areas are most in need of conservation. Effectively, the more conservation targets (special ecosystem, endangered species etc) occur in an area the greater its need for conservation, The MARXAN analysis for the whole country of Belize used 10 km² hexagons that incorporated all identified conservation features (see original document for explanation). A separate “case study” was prepared (Appendix 12) focusing on the Gra Gra Lagoon Area (Meerman, 2005), this case study allows a quick overview of the national priorities as they apply to the Gra Gra Lagoon National Park and surroundings.

Interestingly, the MARXAN analysis does not only select the Gra Gra Lagoon, but also recognizes a whole string of hexagons along the coast south of it as priority areas for conservation.

When comparing two different MARXAN outputs: “Locked” (figure 3 below left) and “Seeded” (figure 4 below right), it shows that both outputs are very similar. The main difference being that the “seeded” version has the north-eastern lobe of the Gra Gra Lagoon National Park less frequently selected. Gra Gra Lagoon National Park is actually covered by two 10 km² hexagons: #1947 and #4894 (see figure 5).

The two principal ecosystems of the Gra Gra Lagoon NP within hexagon #4894 are: Caribbean mangrove forest; basin mangrove and Brackish/saline lake (see figure 6). A quick look at the NPAPSPS gap analysis (Meerman, 2005) shows that neither of these ecosystems is sufficiently represented within the current PA system, and therefore there are other reasons for the de-selection of the NE lobe of the National Park.

MARXAN selects conservation areas based on lowest “cost”. In other words, to meet set conservation feature targets, where are these met most easily and cost effective? The overlay of private properties in figures 5 and 6 clearly show the Gra Gra Lagoon NP being hemmed in by private properties. This fact alone will result in high “costs” for the maintenance of this PA and thus, MARXAN tries to place the conservation outside this “high cost” area.

Based on the cost factor alone, it may appear that the eastern lobe of the Gra Gra Lagoon National Park is not a high priority on a national scale. This notion is somewhat supported by the place of Gra Gra Lagoon National Park in the site scoring system as discussed before. While it thus appears that there is a lower priority on a national scale for the conservation of the north eastern lobe, this actually creates opportunities for the management of the protected area as a whole. It’s proximity to developed areas creates a opportunity or even a need for heavier use (tourism activities, education) and thus warrant different management for this zone of the park. Meanwhile, more critical sections of the park are to be managed more for its strict biodiversity qualities.

While hexagon 4894 was less frequently selected, hexagon #1947 was strongly selected as were a number of adjacent hexagons all the way south to False Sittee Point near Sittee River. The fact that these hexagons were selected in both MARXAN analysis types indicates gaps in the conservation feature coverage on a national scale.

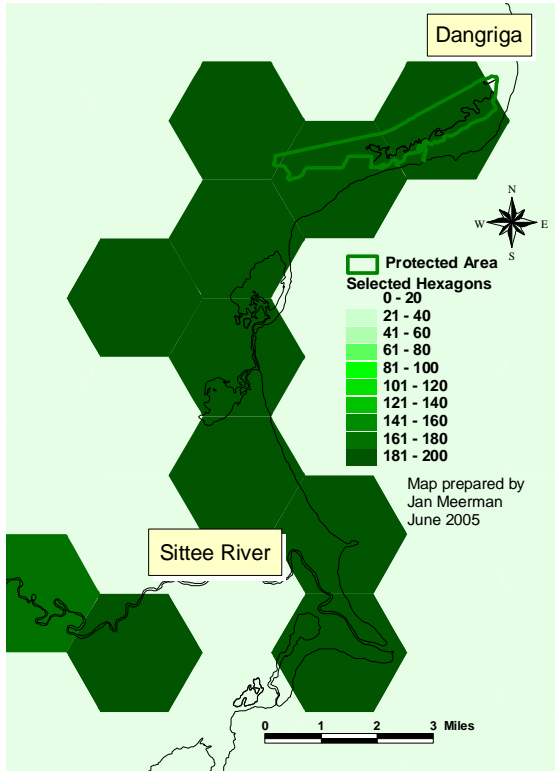


Figure 3. Locked MARXAN Analysis

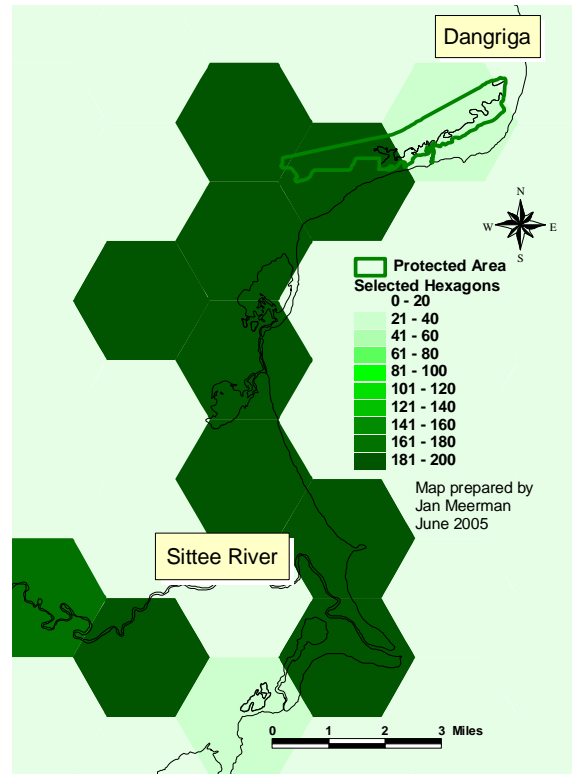


Figure 4. Seeded MARXAN analysis

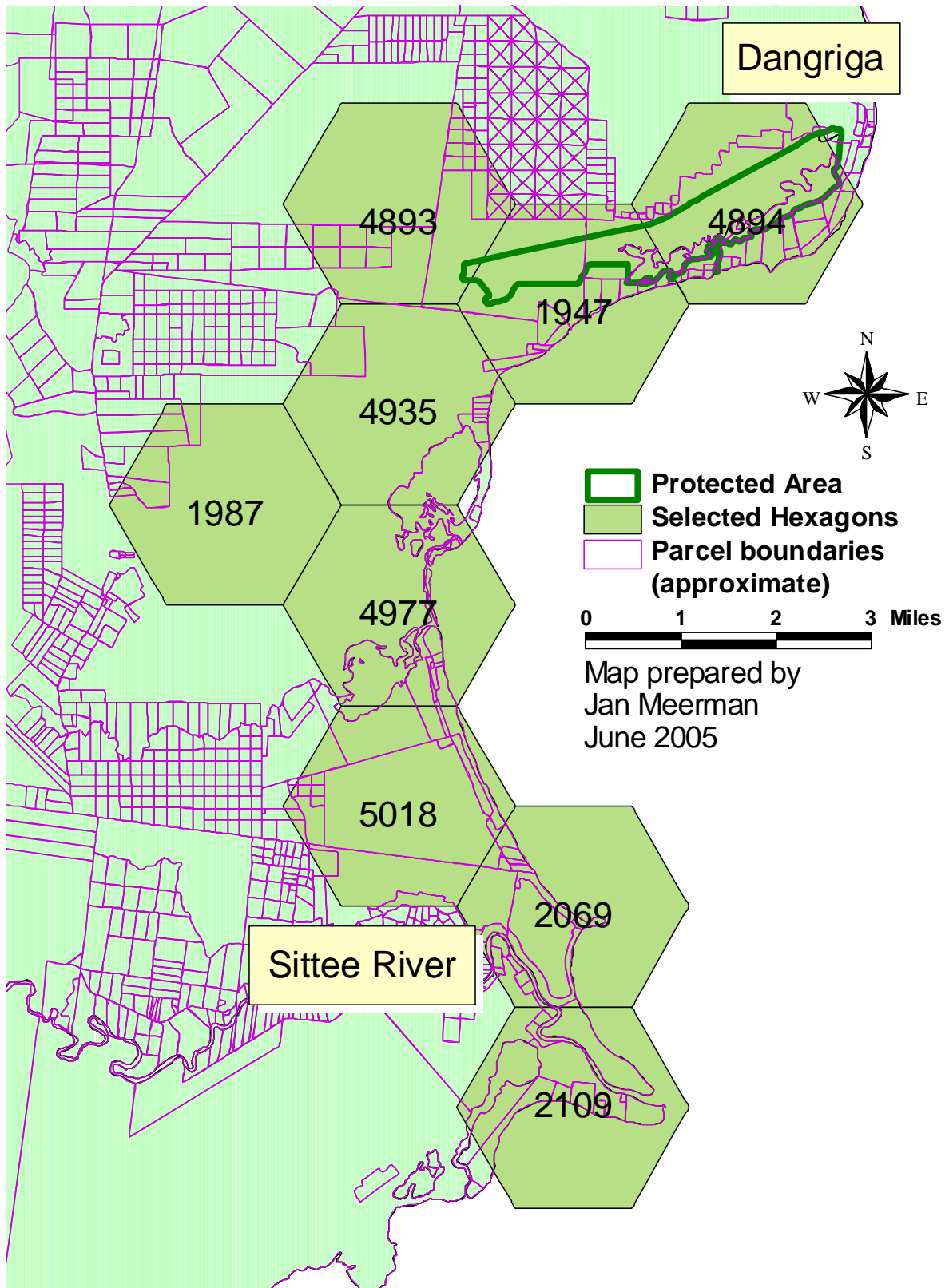


Figure 5. Selected Hexagons with overlay of property boundaries

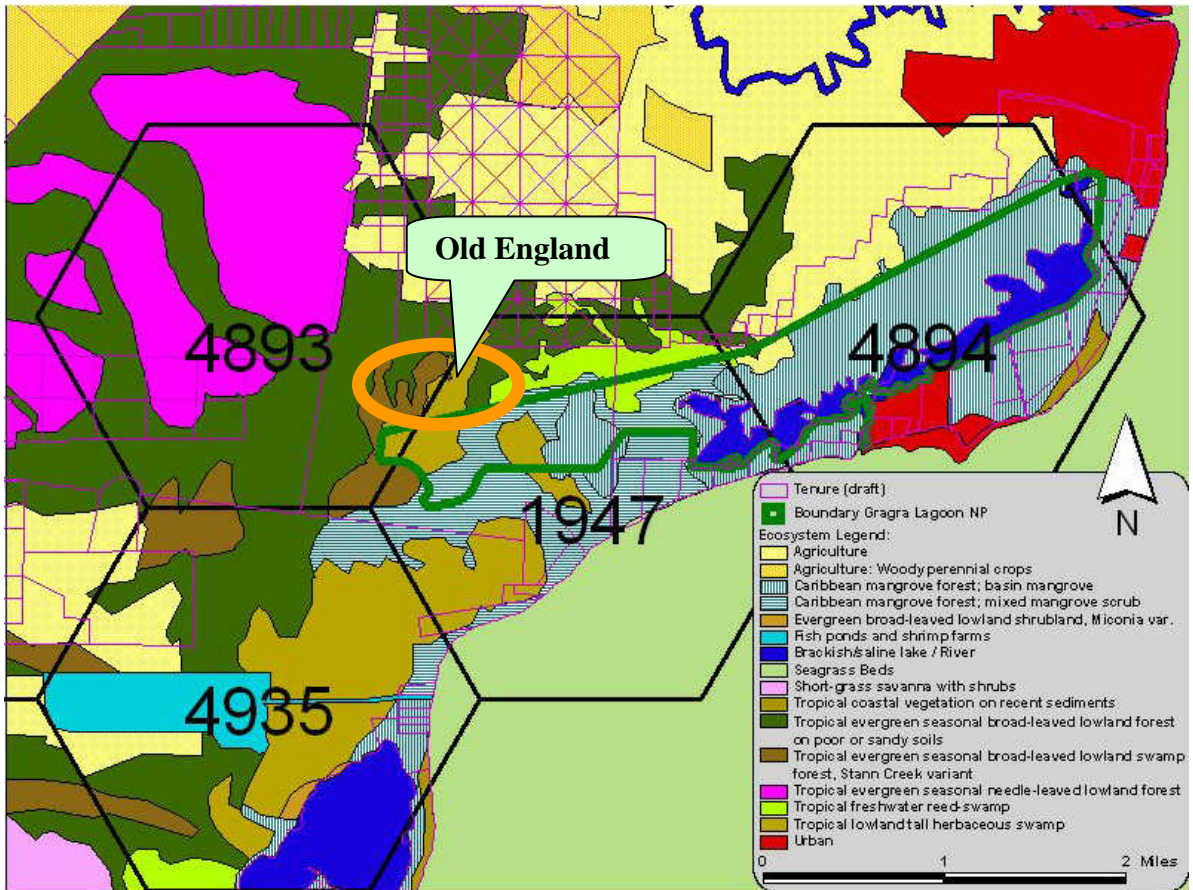


Figure 6. Ecosystems map of Gra Gra Lagoon National Park with selected NPAPSP hexagon overlay

The NPAPSP analyses reveal that in the ten adjoining 10 km² hexagons, the following ecosystems can be found (ecosystems found inside the Gra Gra Lagoon National Park indicated with *):

1. Tropical evergreen seasonal broad-leaved lowland forest on poor or sandy soils
2. Tropical evergreen seasonal needle-leaved lowland forest
3. Tropical evergreen seasonal broad-leaved lowland swamp forest, Stann Creek variant
4. Caribbean mangrove forest; mixed mangrove scrub*
5. Caribbean mangrove forest; coastal fringe mangrove*
6. Caribbean mangrove forest; basin mangrove*
7. Evergreen broad-leaved lowland shrubland, Miconia variant
8. River
9. Brackish/saline lake*
10. Short-grass savanna with scattered needle-leaved trees
11. Short-grass savanna with shrubs
12. Eleocharis marsh.
13. Tropical coastal vegetation on recent sediments
14. Tropical freshwater reed-swamp*
15. Tropical lowland tall herbaceous swamp*

The details for each of the above ecosystems including their set targets can be found in tables 1 & 2. When studying these tables it becomes clear that several of the above ecosystems features are rare with three of them particularly rare:

1. Tropical evergreen seasonal broad-leaved lowland swamp forest, Stann Creek variant
2. Tropical coastal vegetation on recent sediments (This is the “littoral forest”. 83 ha of which are located within these few polygons which is 5% of the national total surface of 1591 ha)
3. Tropical freshwater reed-swamp*

Only the freshwater tropical reed-swamp is present within the Gra Gra Lagoon National Park boundaries.

Based on the MARXAN analysis, there are ample reasons to extend management activities from Gra Gra Lagoon south all the way to False Sittee Point near Sittee River. The parcel boundaries information as presented in figure 6 are incomplete but it is clear that the actual coast itself is already in private hands virtually ruling out formal conservation management activities. This is particularly the case for the very rare and threatened littoral forest (tropical coastal vegetation on recent sediments). This emphasizes the point that not all conservation targets can be addressed through orthodox protected areas. However, private development activities in this area, could take the obvious presence of conservation features on their properties into account in their development plans. Through the Environmental Protection Act it is possible to dictate conservation zones and biological corridors. For this reason it is preferable that all activities here should be made subject to an environmental impact assessment (and enforcement of their outcomes).

Only for parts of hexagons #4893, #4935, there are opportunities for traditional conservation activities and additional fieldwork combined with title research should establish whether it is possible to expand the extend of the Gra Gra Lagoon National Park and add critical wetlands and swamp forest types (Tropical evergreen seasonal broad-leaved lowland swamp forest, Stann Creek variant) to the portfolio of this protected area.

These swamps and wetlands form actually part of the headwaters of the Gra Gra Lagoons and inclusion of those would give greater integrity to the coastal wetland system as a management unit. Fieldwork carried out in the “Old England” area, as part of this management plan, has actually confirmed the special character of these swamp forests.

Environmental services and resource use.

The site plays a very useful role in maintaining the quality of water outflow into the marine system. Comso Creek carries effluent from Dangriga into the lagoon. This flow was recently channelled directly into the sea by a drainage channel, but beach sand blocks the mouth and the flow may potentially revert to its natural drainage. Yemeri Creek may be expected to carry agro-industrial effluent and sediment from the

agricultural hinterland. Nonetheless the quality of the lagoon system appears high, indicating that the system is able to absorb current levels of input. By the same token the quality of the outflow into the marine system appears good.

The lagoon has supported a certain level of fishing, by line but mainly by net, for shrimp and a range of fin-fish. Only one family is currently engaged in this on a regular basis. Present policy is to discourage all forms of off-take and checking for nets is the main protection activity. It is also used for tourism by boat and canoe. Currently there are c. 12-15 paying visitors per year from Dangriga. A rather greater number of visitors come on tours from Hopkins but park fees are not captured from this source at this time.

The lagoon plays a further important role as a safe haven for small craft during storms and hurricanes. This may indeed be its main contribution to the economy of the region in monetary terms, protecting investments and allowing swift recovery of economic activity.

The over-riding management aim is to maintain ecosystem functions as the general area becomes increasingly developed. Compromised water quality appears to be the more insidious and deep-reaching threat to overall integrity than fishing, which is anyway more amenable to control and already at reduced levels.

Conclusions

A thorough analysis of the MARXAN conservation feature analysis of the Gra Gra Lagoon area between Dangriga and Sittee River comes up with the following points:

- There are a number of conservation features in this area that are not currently “protected” Several of these conservation features in this area are located on private property and can not be declared “protected” in the traditional sense. Instead, creative ways (such as enforcing conservation zones and biological corridors through the Environmental Impact Assessment mechanism) are to be sought to incorporate these conservation features in the management of these private properties and to maintain a desirable context in the wider landscape. The Environmental Impact mechanism can be an important tool in this.
- There is room to expand the Gra Gra Lagoon National Park to the west and include critical swamps and wetlands (Figure 16) thus increasing integrity of the wetland system as a whole.
- The north eastern section of the Gra Gra Lagoon National Park is very suited for development of conservation related activities such as education, research and tourism, while strict conservation efforts have limited chance of success. A zoning of the Gra Gra Lagoon National Park is to include this section as a multiple use zone, while the south western sections of the park are to be zoned for more strict conservation.

2.3.4 Socio-Economic Context

The Gra Gra Lagoon National Park is surrounded by four communities. All of which are considered stakeholders to some degree. The largest of these is Dangriga with an estimated population of > 10,000 persons.

Table 2. Population Statistics for the Gra Gra Lagoon National Park Surroundings. Source: Central Statistics Office

	1980	1991	2000	Growth/yr	Economy
Dangriga	6661	6565	8814	2.8 %	Agriculture, Services
Sarawee (4 miles)	NA	262	203	-3.2 %	Agriculture
Silk Grass	246	508	728	3.4 %	Agriculture
Hopkins	749	808	994	2.1 %	Tourism

According to official Census data, the community of Sarawee is showing a decline in population. However, the boundaries of the community are ill defined and the decline may be the result of a census error.

All communities used to be agriculture based with additional fishing in the case of Dangriga and Hopkins. Large scale citrus farming shifted the focus from subsistence farming to a marked based agricultural economy. However, there is still a large amount of subsistence farming going on even near Dangriga and subsistence farming is still considered part of the cultural pattern.

Recent expansion of tourism has changed the face of Hopkins in particular. From a decreasing and sleepy village of fishermen and subsistence farmers in the 1980'ies it has transferred into a community dependant on tourism with many small tourism based facilities such as restaurants, bed and breakfasts and some hotels. The strong Garifuna culture acts as an added catalyst for this type of small scale tourist development.

There is some tourism in Dangriga but this is mostly based on transits to the cayes. There are some hotels, but as a destination, Dangriga itself has not developed. Some developers have seen opportunities in developing the coastline for tourism and residential purposes. In particular, this influences the strip of land immediately between the Gra Gra Lagoon National Park and the sea. Up to today, actual development is still in its embryonic stage.

The most obvious benefit that Dangriga as a community could derive from a well managed National Park such as Gra Gra Lagoon National Park is through increased visitation. Visitors attracted to the park would spend (extra) time in Dangriga and subsequently spend more money there.

In general, the area surrounding the National Park is largely under some form of human development and largely in private hands. Figure 7 shows how the Gra Gra Lagoon is essentially locked up between private properties and human development

Most significantly, all the southern shore of the Gra Gra Lagoon and the land between it and the sea is in private land (Figure 7 & Appendix 6). Government land is available only towards the west.

With these high pressures from all sides, it would seem obvious that there are many people that have an interest in the area that is now Gra Gra Lagoon National Park. However, these interests are more limited than could be expected. Traditional interests such as hunting and fishing are of limited

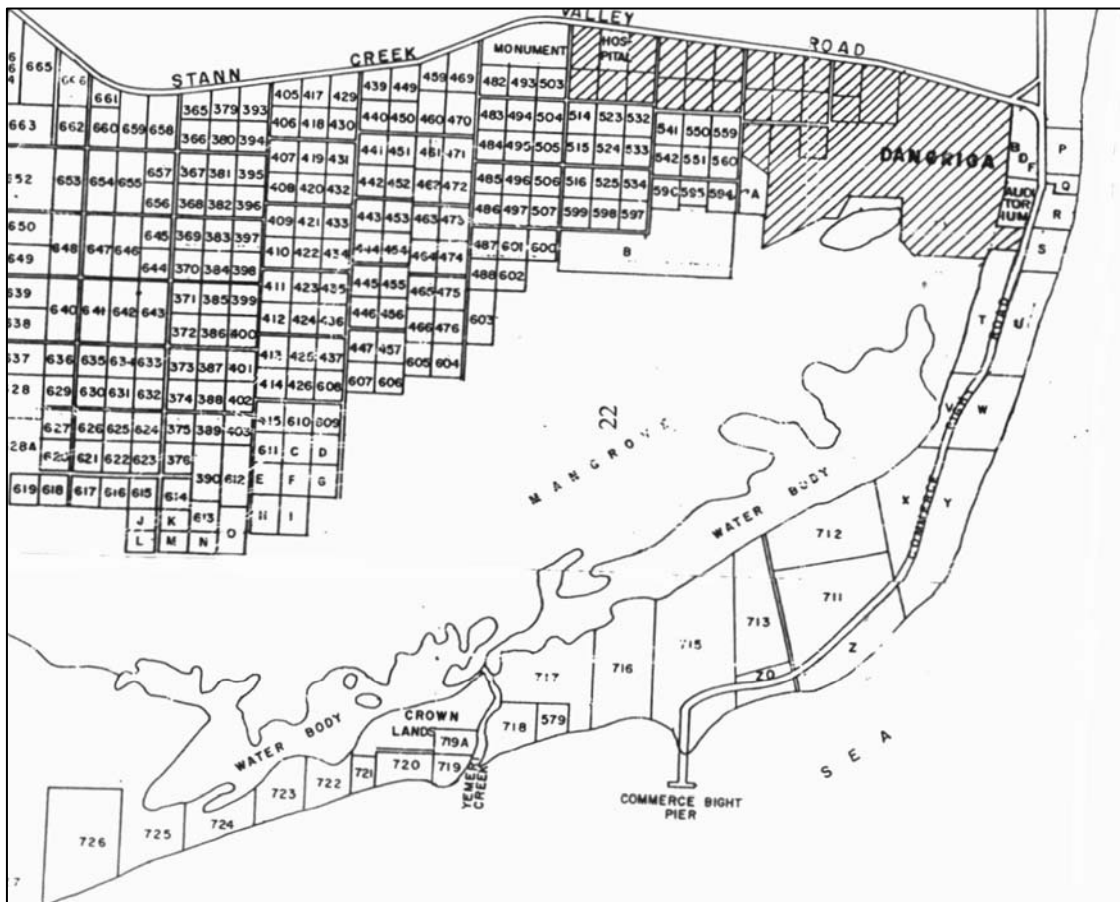


Figure 7. Survey map of Gra Gra Lagoon and Surroundings. Source: Lands Office, Dangriga

importance. The lagoon is very shallow, difficult to navigate and not a prime habitat for fish species that are favored by subsistence fisher folk. Hunting is of little importance since the mangrove habitat that comprises the terrestrial section of the National Park is poor in wildlife of the type that is favored by hunters and further more, the Mangrove is very difficult to travel. Past uses of the lagoon included access to the agricultural land north of the Mangrove but with the advent of roads and vehicular traffic, this access route has become obsolete and the creeks used for this type of travel have now overgrown to such an extent that they are nearly impossible to locate.

There is some interest from the north of the area. Villagers of Sarawee have expressed interest in the “Old England” area, which is actually a wetland area that drains into the Bocatora Creek, just before that joins the park boundary. This interest is traditionally for fishing and hunting but recently some people expect the area has ecotourism potential.

More recent developments put much more pressure on the area. Several urban, tourism and real estate developments have sprung up on the south shores of the lagoon. It can safely be assumed that these developments are to benefit from a healthy lagoon environment which will actually increase the attractiveness and thereby value of their properties. Because of this, these developers are some of the most significant stakeholders. There is a need for a continued and even increased participation in the management of these particular stakeholders.

2.4. Physical Environment of Management Area

2.4.1 Climate

Gra Gra Lagoon National Park is Located within the outer tropics, the general area has an average annual maximum temperature of approximately 86°F (30°C), while the average minimum temperature is just above 72°F (22°C). December though February are the cooler months while May through September are the hottest months (figure 8).

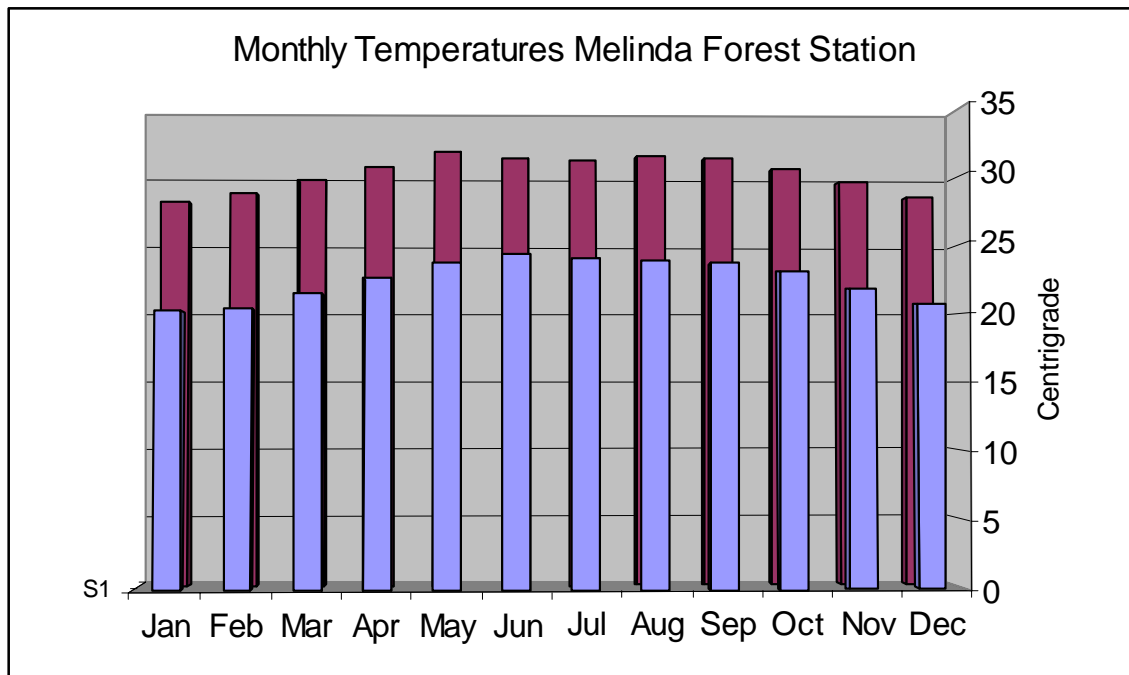


Figure 8. Average monthly minimum and maximum temperatures at Melinda Forest Station, Stann Creek District. Source: Meteorology Department.

Temperature and Rainfall are influenced by cold fronts or “northers” during the colder months and by tropical waves during the warmer months. Hurricanes affect the area frequently and can be expected in the period June through November. During the past century the area has been affected to some degree by 7 hurricanes (one every 14 years) and seriously impacted by 4 (one every 25 years). Hurricane Iris in 2001 made landfall in Monkey River village (38 miles to the south) and did not impact the Gra Gra Lagoon area (Table 3).

Name	Year	Landfall Distance	Location.
NOT NAMED I	1918	25 Miles	Placencia
NOT NAMED II	1921	12 Miles	Dangriga area
NOT NAMED III	1934	0 miles	Dangriga area
NOT NAMED IV	1934	< 50 Miles	Followed coast of Belize
ANNA	1961	25 Miles	Placencia
HATTIE	1961	0 Miles	Dangriga area
GRETA	1978	0 Miles	Dangriga area

Table 3. Hurricanes affecting the area in the last 100 years. Source: Meteorology Department.

Rainfall figures of the area are approximately 2,000 mm (80”) annually. With February through May being the driest months and June/July + September-November being the wettest months (Figure 9). Much variation exists and monthly rainfall figures are largely being decided by the number of cold-fronts, tropical waves and tropical storms passing.

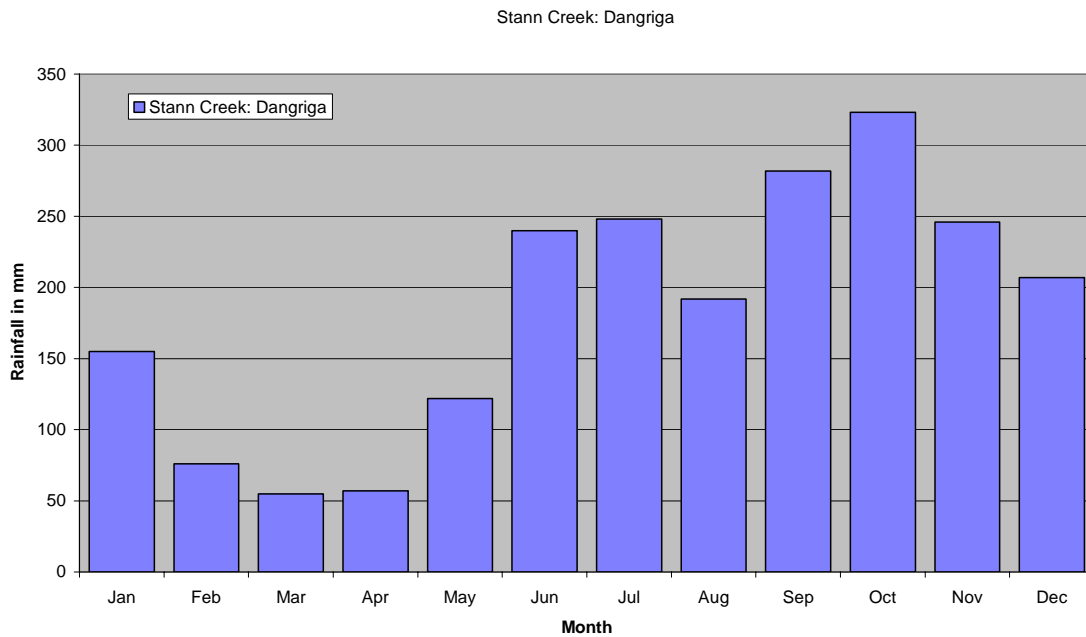


Figure 9. Average monthly rainfall figures for Dangriga. Source: Meteorology Department

2.4.2 Geology and Soils

The soils in the general area are very mixed, and partly composing of deposits of weathered material from the Maya Mountains immediately to the west, and partly resulting from alluvial processes producing more fertile soils, particularly along the Stann Creek River. The geology of the entire area is defined as “Recent Pleistocene”.

As a result the agricultural land value of the general area is very mixed as well, with Gra Gra Lagoon National Park essentially covering soils that are unsuitable for agriculture. Directly to the north, higher valued land is located (figure 10). Currently, these are nearly all in use for some form of agriculture.



Figure 10. Agricultural Land Value of the Gra Gra Lagoon Area and Surroundings. Source: King et al. 1992

2.4.3 Hydrology

According to the watershed data prepared under the NARMAP project the Gra Gra Lagoon National Park is part of the Freshwater Creek Watershed. Closer inspection of maps and fieldwork data reveals that there are several discrete pour-points and it would be more appropriate to split up this watershed in several watersheds in their own right. With this in mind the Gra Gra lagoon National Park is part of two watersheds (figure 11):

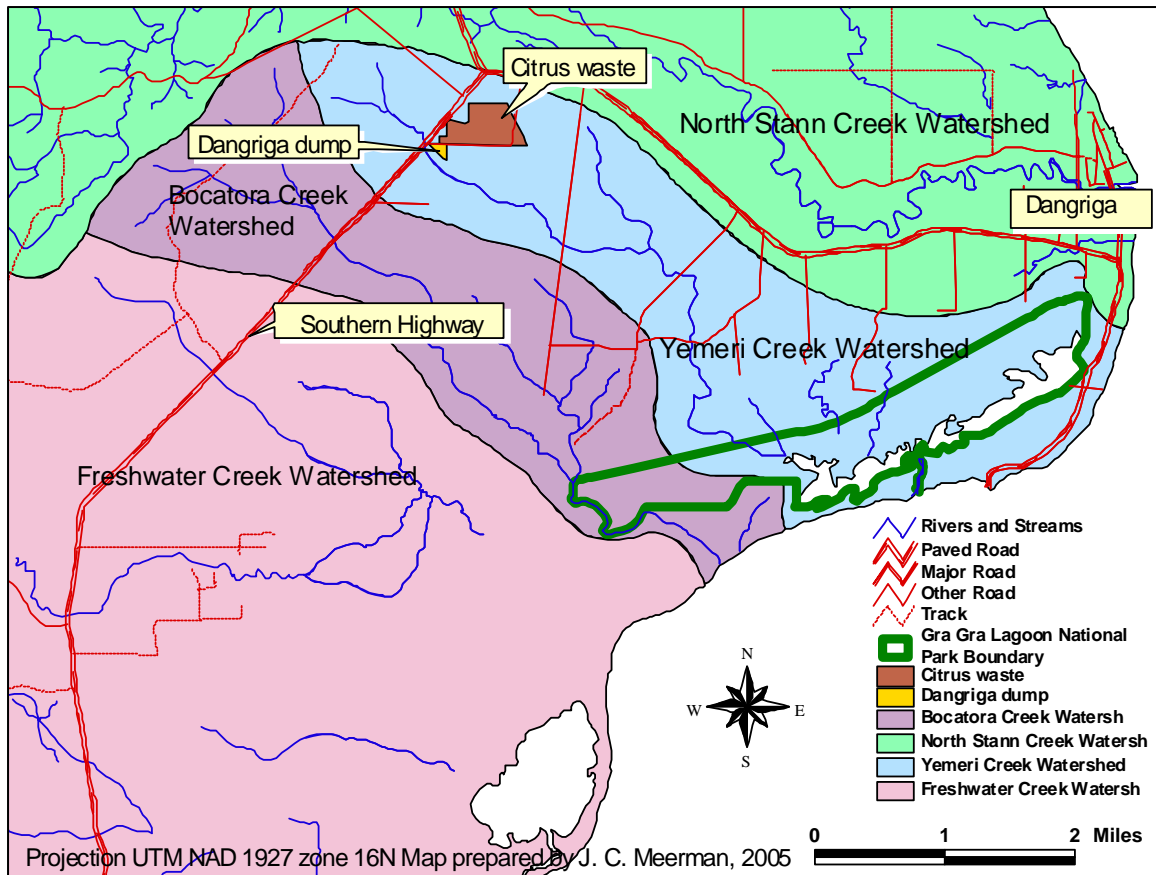


Figure 11. Watersheds of the Gra Gra Lagoon Area

- Bocatora Creek Watershed of approximately 4,210 acres (1,700 ha)
- Yemeri Creek Watershed of approximately 5,320 acres (2,150 ha)

These drain the mixed agricultural lands of the coastal plain, comprising a mosaic of citrus, farm-plots, patches of secondary growth and, especially towards the lagoon, low forests typical of sandy/poor soils. The Dangriga municipal dumpsite plus a large area devoted to composting of citrus waste is located in the upper reaches of the Yemeri watershed. At its northern end the lagoon is close to Dangriga, receiving inflow from its outskirts via the Comso Creek. The other creeks draining into the lagoons are now choked by mangrove though they were at one time open for dory traffic to gain access to the hinterland. The Bocatora Creek forms the southern boundary but does not feed into the lagoon. Due to the level nature of the terrain, the various drainages are almost certainly not fully separable from their neighboring drainages in their lower reaches, especially during flood periods.

2.5. Biodiversity of Management Area

2.5.1 Ecosystems

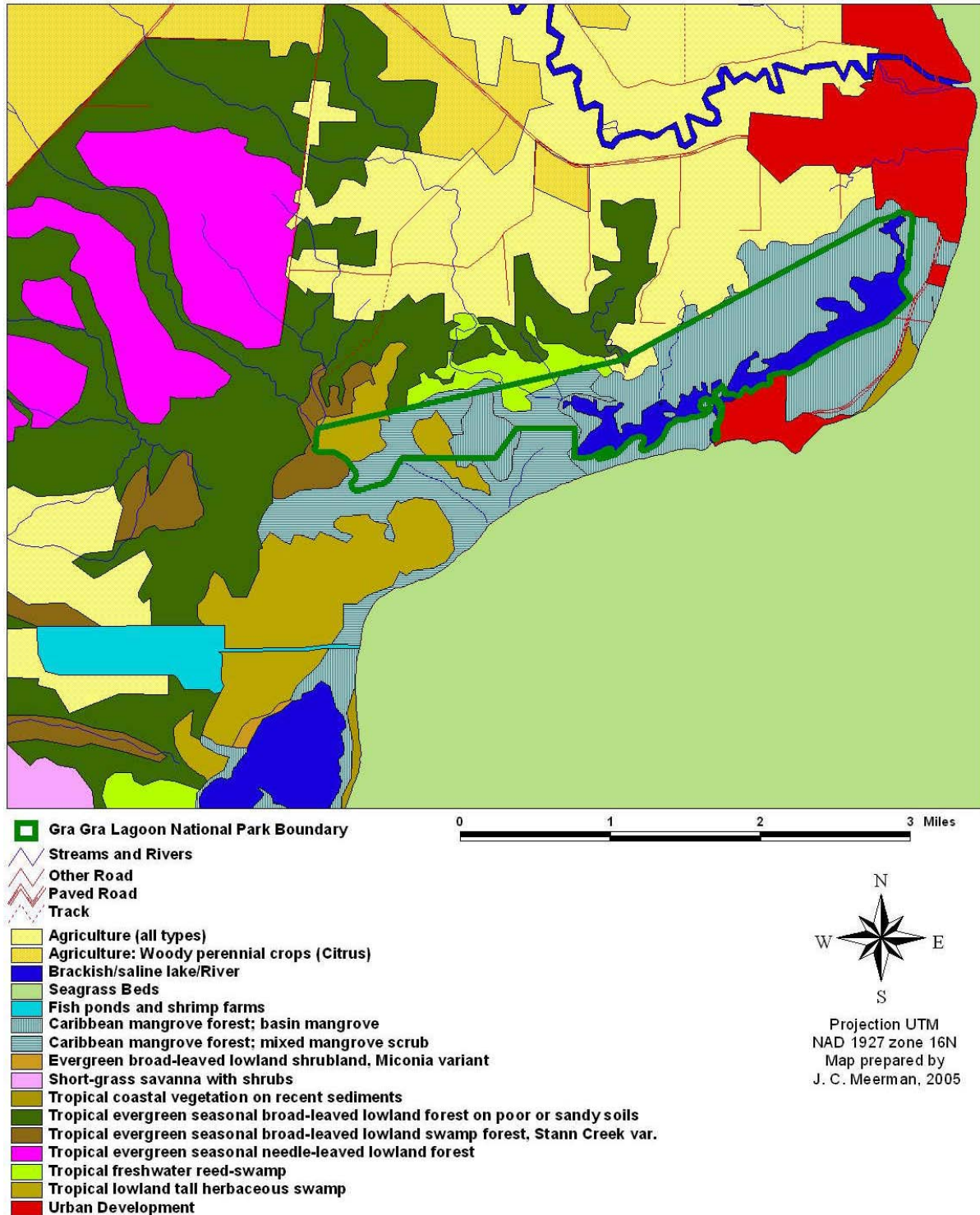


Figure 12. Ecosystems of the Gra Gra Lagoon Area and Surroundings. Source: Meerman, 2005


The various ecosystems found in and around Gra Gra Lagoon National Park are mapped in figure 12. While in the general area approximately 15 ecosystems can be found, only the following six ecosystems can be found inside the park (table 4):


Table 4. Ecosystems present within the Gra Gra Lagoon National Park


UNESCO code	Ecosystem	ACRES	HECTARES
IA5a(1)(c)	Caribbean mangrove forest; mixed mangrove scrub	200	81
IA5a(1)(f)	Caribbean mangrove forest; basin mangrove	655	265
SA1b(5)	Brackish/saline lake	295	119
SPA	Agriculture	26	10
VII B1a	Tropical freshwater reed-swamp	36	14
VII B4	Tropical lowland tall herbaceous swamp	104	42


These ecosystems and their relative importance are further discussed in tables 5 through 12. These tables also discuss the bordering ecosystems even if they are not represented within the park itself.


Tables 5 through 12. Ecosystem descriptions based on Meerman & Sabido, 2001.


UNESCO Classification code	<u>I.A.2.g.(1).(a).SCf</u>
Name	<u>Tropical evergreen seasonal broadleaf lowland swamp forest: Stann Creek variant.</u>
Presence within Gra Gra Lagoon National Park	Not present but abuts the protected area in the “Old England” region in the far west of the protected area. Included in this management plan as a feature that should be included in the management of the protected area.
National significance	Very rare ecosystem nationally. Not represented in any protected area.
Geology and soil	Mostly over calcium-poor soils. Some hog-wallow micro-relief exists.
Water regime	Ill drained, often waterlogged for part of the year.
Rainfall	Average rainfall less than 2500 mm per year with a pronounced dry season from February through May.
Fire exposure	Limited to areas with slash and burn cultivation.
Description	Swampy stands of thin stemmed, partly deciduous trees and shrubs without emergents in the Stann Creek district.
Frequent plant species	Encountered plant species in the Old England area (May 10, 2005) were:  <i>Annona glabra, Aristolochia trilobata, Bactrix mexicana, Chrysobalanus icaco, Combretum laxum, Macradenia brassavolae, Montrichardia arborescens, Mouriri exilis, Myrmecophylla tibicinis, Nymphoides indica, Pachyra aquatica, Passiflora biflora, Pontederia cordata, Pterocarpus officinalis, Scleria bracteata, Symphonia globulifera, Tabebuia chrysantha and Vochysia hondurensis.</i>
Faunistic comments	The May 10, 2005 field visit indicated a variety of wildlife including many fishes, birds and signs of mammals.
References	Meerman 1999a, Wright et al. 1959: 14,14a, 14b, 14c; Iremonger and Brokaw 1995: I.1.1.1.2.1. Picture: <i>Bucida buceras</i> . Stann Creek District. J. Meerman

UNESCO Classification code	<u>I.A.5.b.(1).(c).</u>
Name	<u>Mixed mangrove scrub</u>
Presence within Gra Gra Lagoon National Park	Prevalent (200 acres) in the western section of the Protected Area. There is a transition from Basin Mangrove along the lagoon fringes and this ecosystem in the land locked locations. The ecosystem here varies from low to medium height, open to very dense. Some of it shows past hurricane damage.
National Significance	Fairly widespread in coastal regions. 16,133 acres in protected areas. Slightly under-represented nationally.
Geology and soil	Young alluvial soils.
Water regime	Not permanently inundated.
Rainfall	NA
Fire exposure	None
Description	Mixed mangrove communities.
Frequent plant species	<p>Typically, all three mangrove species occur: <i>Avicennia germinans</i>, <i>Laguncularia racemosa</i>, and <i>Rhizophora mangle</i>. Other frequent species include <i>Acoelorrhaphe wrightii</i>, <i>Acrostichum aureum</i>, <i>Conocarpus erectus</i>, <i>Eragrostis prolifera</i>, <i>Myrica cerifera</i> and <i>Rhabdadenia biflora</i>.</p> <p>During fieldwork (May 5, 2005) the following species were found: <i>Acoelloraphe wrightii</i>, <i>Annona glabra</i>, <i>Aristolochia trilobata</i>, <i>Blechnum serrulatum</i>, <i>Byrsonyma crassifolia</i>, <i>Dalbergia brownei</i>, <i>Ipomoea imperati</i>, <i>Myrica cerifera</i>, <i>Pachyra aquatica</i>, <i>Passiflora biflora</i>, <i>Passiflora ciliate</i>, <i>Rhabdadennia biflora</i> and <i>Rhizophora mangle</i>.</p>
	
Faunistic comments	Generally poor faunal diversity
References	Furley & Ratter 1992, Gray <i>et al.</i> 1990, Wright <i>et al.</i> 1959: 29, 31, Iremonger and Brokaw 1995: II.1.2.2 Picture: <i>Avicennia germinans</i> . Dangriga. J. Meerman


UNESCO Classification code	<u>I.A.5.b.(1).(d).</u>
Name	<u>Coastal fringe <i>Rhizophora mangle</i>-dominated forest</u>
Presence within Gra Gra Lagoon National Park	Not mapped within the reserve due to scale but technically present along the entrance of the Yemeri Creek (private land).
National significance	Widespread in coastal areas. 6,267 acres within protected areas. But taking the national importance of the ecosystem into account, the ecosystem is insufficiently protected.
Geology and soil	Young alluvial soils
Water regime	Develops in conditions of permanent inundation.
Rainfall	NA
Fire exposure	None
Description	Narrow fringe of scrub to high mangrove with a height of 2-14 m located along beaches and river mouths.
	
Frequent plant species	<i>Rhizophora mangle</i> is characteristically dominant in these communities.
Faunistic comments	Terrestrial biodiversity low but immensely high where prop roots hang down into the water.
References	Furley & Ratter 1992, Gray <i>et al.</i> 1990, Iremonger and Brokaw 1995: I.1.2.1. Picture: <i>Rhizophora mangle</i> . Belize City. J. Meerman

UNESCO Classification code	<u>I.A.5.b.(1).(f).</u>
Name	<u>Basin mangrove forest</u>
Presence within Gra Gra Lagoon National Park	The dominating ecosystem in the Gra Gra Lagoon National Park and found all along the lagoons (655 acres). There are distinct clines from the red mangrove fringe along the lagoons itself to the Black and White Mangrove stands further away from the lagoons.
National Significance	Widespread in coastal areas. 5,444 acres within protected areas. Insufficiently protected on a national scale.
Geology / soil	Young alluvial soils
Water regime	Mostly waterlogged.
Rainfall	NA
Fire exposure	None
Description	Found along coastal lagoons and in land-locked coastal depressions. Species composition and structure in these communities are highly variable depending on frequency and depth of inundation, nutrient exchange and water salinity levels.
	
Frequent plant species	<p><i>Rhizophora mangle</i> dominates in areas which receive frequent tidal flooding or where flood waters are predominantly deeper than 15 cm. Where water depth is less and tidal flushing, amplitude and kinetic energy of floodwaters decrease, other mangrove species and associates invade. Where salinity reaches levels above 50 % <i>Avicennia germinans</i> dominates. In addition to being highly saline the soils may be very reduced (anaerobic), giving the <i>Avicennia</i> an ecological advantage through its pneumatophores. Where salinity is about 30-40 %, dominant species include <i>Avicennia germinans</i>, <i>Laguncularia racemosa</i>, and <i>Rhizophora mangle</i>. When disturbed the fern <i>Acrostichum aureum</i> becomes the dominant species.</p> <p>Fieldwork on May 3, 2005 revealed the following species: <i>Acrostichum aureum</i>, <i>Avicennia germinans</i>, <i>Cassipourea guianensis</i>, <i>Laguncularia racemosa</i>, <i>Rhabdadenia biflora</i> and <i>Rhizophora mangle</i></p>
Faunistic comments	Low biodiversity.
References	<p>Furley & Ratter 1992, Gray <i>et al.</i> 1990, Iremonger and Brokaw 1995: I.21.2.3.</p> <p>Picture: Gra Gra Lagoon, Dangriga. J. Meerman</p>

UNESCO Classification code	<u>VII.B.1.a.</u>
Name	<u>Tropical lowland reed-swamp</u>
Presence within Gra Gra Lagoon National Park	An ecosystem of which parts (36 acres) are found in the western section of the protected area.
National significance	Uncommon but widespread ecosystem in low lying areas. Only 36 acres within protected areas (Gra Gra Lagoon National Park only!). Insufficiently protected nationally.
Geology and soil	Variable. Soils usually peat
Water regime	Inundated through much of the year, increasing salinity will favor the development of <i>Cladium jamaicense</i> , while increasing nutrient availability will favor the development of <i>Typha dominguensis</i> .
Rainfall	NA
Fire exposure	Fire is of at least occasional occurrence in this ecosystem
Description	Good examples are found near Hopkins village. 
Frequent plant species	Graminoid species such as <i>Typha domingensis</i> , <i>Phragmites australis</i> and/or <i>Cladium jamaicense</i> dominate. In the Stann Creek district, the sedge <i>Cyperus giganteus</i> is common. Occasionally the Maranthaceae <i>Thalia geniculata</i> is the dominant species. The latter probably indicates a transition to Predominantly tall herbaceous swamp. This habitat was not visited but identified during an over flight.
Faunistic comments	Little studied ecosystem, probably important for certain bird families (rails, bitterns etc).
References	Picture: Commerce Bight Lagoon, Stann Creek District. J. Meerman

UNESCO Classification code	<u>VII.B.4</u>
Name	<u>Tropical lowland tall herbaceous swamp</u>
Presence within Gra Gra Lagoon National Park	Common (104 acres) in the western section of the Gra Gra Lagoon National Park.
National significance	Widespread in the lowlands. 27,069 acres in protected areas meeting the target criteria.
Geology and soil	Variable
Water regime	Inundated during the rainy season but water level is shallow.
Rainfall	NA
Fire exposure	Fire is of at least occasional occurrence in this ecosystem
Description	This assemblage usually merges with the higher “savannas”. Where they occur in forested areas and have no drainage channel, they are locally known as “sibals”
	
Frequent plant species	A graminoid ecosystem often with <i>Phragmites australis</i> and/or <i>Cladium jamaicense</i> , <i>Ludwigia</i> spp. and a variety of herbaceous species occurs. There is a noticeable shrub component with <i>Bucida buceras</i> , <i>Crescentia cujete</i> , and <i>Acoelorrhaphe wrightii</i> . During fieldwork on May 5, 2005 the following species were encountered. <i>Acoelorrhaphe wrightii</i> , <i>Annona glabra</i> , <i>Aristolochia trilobata</i> , <i>Blechnum serrulatum</i> , <i>Byrsonima crassifolia</i> , <i>Cladium jamaicense</i> , <i>Phragmites australis</i> , <i>Dalbergia brownei</i> and <i>Myrica cerifera</i> .
Faunistic comments	Little studied ecosystem, probably important for certain bird families (rails, bitterns etc).
References	Rejmánková et al. 1996, Iremonger and Brokaw 1995: III.1.1.1. Picture: Commerce Bight Lagoon, Stann Creek District. J. Meerman

UNESCO Classification code	<u>VI.B.3.a.</u>
Name	<u>Tropical Littoral forest and beach communities</u>
Presence within Gra Gra Lagoon National Park	Not within the park but present along the coast line (most if not all on private land).
National significance	Rare ecosystem occurring along a narrow coastal belt. 336 in protected areas. The ecosystem is grossly under-protected on a national scale.
Geology and soil	Littoral forests are found in a narrow coastal strip on recent dune sands.
Water regime	Well drained
Rainfall	NA
Fire exposure	Unknown
Description	Typically they are bordered on the seaward side by low herbaceous beach vegetation with species such as <i>Argusia gnaphalodes</i> , <i>Canavalia rosea</i> , <i>Euphorbia trichotoma</i> and <i>Surania maritima</i> . On the inland side this ecosystem is typically bordered by Mixed mangrove scrub IA5b(1)(c), with mostly <i>Rhizophora mangle</i> and <i>Myrica cerifera</i> . These forests are not widespread in Belize and under considerable pressure from coastal development. In the past much of it has been transformed to coconut plantations and more recently, tourist and residential developments have claimed much of what remained.
Frequent plant species	The littoral forest itself varies in composition but usually contains the following species: <i>Brassavola nodosa</i> , <i>Bursera simaruba</i> , <i>Cassytha filiformis</i> , <i>Chrysobalanus icaco</i> , <i>Coccoloba uvifera</i> , <i>Cordia sebestena</i> , <i>Hymenocalis latifolia</i> , <i>Metopium brownei</i> , <i>Myrmecophylla tibicinis</i> , <i>Passiflora suberosa</i> , <i>Pouteria campechiana</i> , <i>Sophora tomentosa</i> and <i>Thrinax radiata</i> . The introduced <i>Cocos nucifera</i> now forms an integral part of this community.
Faunistic comments	Important habitat for migratory birds and breeding habitat for marine turtles and American Crocodiles <i>Crocodylus acutus</i> .
References	Meerman and Boomsma 1995a, Wright et al. 1959: 32, Iremonger and Brokaw 1995: II.2.2. Pictures top: Ambergris Caye. J. Meerman Bottom: Laughing Bird Caye. J. Meerman

UNESCO Classification code	<u>SA.1.b(5).</u>
Name	<u>Brackish/saline lake</u>
Presence within Gra Gra Lagoon National Park	Centerpiece of the Gra Gra Lagoon National Park covering approximately 295 acres.
National significance	Ecosystem occurring in the coastal plains. 18,262 acres in protected areas. The ecosystem is under-protected on a national scale.
Geology and soil	On recent Pleistocene soils, usually very poor quality soils.
Water regime	Permanent water but varying in salinity according to season
Rainfall	NA
Fire exposure	NA
Description	Brackish coastal lagoons are usually shallow causing the water to be hot. Many are fed by small freshwater streams but have openings towards the sea which causes strong fluctuations in salinity. During the rainy season, fresh water inflow dominates, during the dry season the marine influence is dominant.
	
Frequent plant species	The flora of these lagoons is usually poor or non-existent. The deeper lagoons can have sea grass species but generally algae are dominating.
Faunistic comments	Coastal lagoons are important for wading birds including herons and egrets. Several coastal lagoons harbor important breeding colonies and/or roosting sites. Often the lagoons are frequented by Crocodiles (<i>Crocodylus acutus</i> and <i>C. moreletii</i>). Deeper lagoons are important to Manatees (<i>Trichechus manatus</i>)
References	Meerman, J. C., T. Grimshaw, T. Boomsma, G. Martinez and B. Holland. 2000. Picture: Gra Gra Lagoon, Dangriga. J. Meerman

2.5.2 Flora

The dominant flora of the Gra Gra Lagoon National Park is mangrove consisting of all three species:

- Red mangrove (*Rhizophora mangle*)
- Black mangrove (*Avicennia germinans*)
- White mangrove (*Laguncularia racemosa*)

These species apart from their dominance represent the principal conservation feature of the park. A very dominant associate of the mangrove is the white flowering

- mangrove vine; *Rhabdadenia biflora*.

It is important to note that Mangrove as an ecosystem was identified as a conservation target within the NPAPSP analysis.

Towards the west of the park where other vegetation types than mangrove become dominant, notable species include:

- Sawgrass; *Cladium jamaicense*,
- Cat tail; *Typha dominguensis*.
- Reed; *Phragmites australis*,
- Palmetto; *Acoelorrhaphe wrightii*,
- the fern *Blechnum serrulatum*, and
- Teabox *Myrica cerifera*.
- Contriobo; *Aristolochia trilobata* This species of cultural and commercial value: was found here as well, but in low numbers.

The over all floristic biodiversity of the park is low.

Vegetation is further discussed in chapter 2.5.1. under the description of the ecosystems. A full species list of species identified during fieldwork is listed in appendix 10.



Even though found only outside the park it is noteworthy to mention the presence of the invasive species *Colubrina asiatica* (Rhamnaceae) (First record from Belize) along the road from Dangriga to the marina. Based on experience with this species in the USA, *Colubrina asiatica* has the potential of becoming a serious pest.

Figure 13. *Colubrina asiatica*, Dangriga May 12, 2005. Picture Jan Meerman

2.5.3 Fauna

The list of species known from inside the park is very small (appendix 9). This low diversity is a reflection of the low floristic diversity of the park. In general the fauna is still insufficiently investigated, particularly in the case of the fish fauna for which only anecdotal records exist. The lagoon is very shallow and thus is unlikely to present important fish habitat. Nevertheless, during nightly canoe rides large numbers of fish were seen (mullet?). Although the resident fish are reported as being a resource that is utilized by the local population, the area does not appear to be a prime fishing spot, and no commercial quantities seem to be caught.

The highest diversity was found in the littoral forest along the shoreline south of the park and in “Old England”, north-west of the park.

A species of importance is the Morelet’s crocodile (*Crocodylus moreletii*). This is a species that used to be endangered but has recovered to such an extent that it is now listed as “conservation dependant” in the national list of critical species (Meerman, 2005). This species is certainly the flag-ship vertebrate of the park.

Other critical species found in the Gra Gra Lagoon National Park include:

Table 13. Critical species found in Gra Gra Lagoon National Park

Birds	<i>Ardea herodias</i>	Great Blue Heron	Vulnerable
Birds	<i>Columba leucocephala</i>	White-Crowned Pigeon	Vulnerable
Birds	<i>Egretta thula</i>	Snowy Egret	Vulnerable
Birds	<i>Egretta tricolor</i>	Tricolored Heron	Vulnerable
Birds	<i>Eudocimus albus</i>	White Ibis	Vulnerable
Birds	<i>Nyctanassa violacea</i>	Yellow-Crowned Night-Heron	Vulnerable
Birds	<i>Nycticorax nycticorax</i>	Black-Crowned Night-Heron	Vulnerable
Birds	<i>Pelecanus occidentalis</i>	Brown Pelican	Vulnerable
Birds	<i>Phalacrocorax auritus</i>	Double-Crested Cormorant	Vulnerable
Birds	<i>Phalacrocorax brasilianus</i>	Neotropic Cormorant	Vulnerable
Birds	<i>Sterna antillarum</i>	Least Tern	Vulnerable
Reptiles	<i>Crocodylus moreletii</i>	Morelet’s Crocodile	Conservation Dependant

Although not listed as vulnerable, the Gra Gra Lagoon harbors another important faunal feature; bird roosts. In the eastern section of the park are several islands that are used as nocturnal roosting site, particularly during the migratory season. Brown Pelicans seem to be present year round, but in the winter months, large flocks of egrets, particularly Great Egrets *Egretta alba* use these islands as a safe haven for the night. These roosts should be considered conservation targets within the management of the park.

A total of 18 migratory bird species was established within the Protected Area boundaries. These are marked with an “X” in table of Appendix 9. Undoubtedly this number will increase once more observations take place.

2.5.4 Past and Present Research

Apart from the surveys carried out as part of the management plan presentation, very few research data exist for the Gra Gra Lagoon National Park. An Ecological Assessment was carried out in 1998 (Green, 1998) but this research focused on the potential biodiversity of the park based on known and published mangrove biodiversity.

While all ecosystems within the National Park are essentially poorly researched, there exists particular research potential for the Gra Gra Lagoon with the fish fauna. An important field for which the Gra Gra Lagoon National Park would offer great opportunities is the arena of water quality research. With the hinterland and immediate surroundings being developed, the hydrological cleaning and buffering function of the Lagoons are to be investigated in detail.

Data collected during the fieldwork for the preparation of this management plan have been deposited at the Biodiversity and Environmental Resource Data System of Belize (BERDS) <http://www.biodiversity.bz>

2.6 Cultural and Socio-Economic Values of Management Area

2.6.1 Community and Stakeholder Use

The most recent country-wide analyses confirm that Gra Gra lagoon is valuable on a national as well as local scale.

- As a coastal wetland, the area
 - ensures connectivity between the terrestrial/ freshwater and marine systems;
 - provides important environmental services, including moderation of flood-levels and maintenance of good-quality outflow into the marine ecosystem.
- It also contains habitats that are poorly represented in the national protected area system. Gra Gra Lagoon National Park makes a useful contribution to achieving protected area targets for “basin mangrove”, “mixed mangrove scrub” and “tropical freshwater reed land”.
- It harbors at least one species of conservation concern (Morelet’s Crocodile *Crocodylus moreletii*).
- It harbors important roosting sites for migrating herons during the winter season.

Culturally, there is “sentimental” value attached to the Gra Gra Lagoon System from the days that the system formed the main access to arable lands north of it.

Economically, the Gra Gra Lagoon is important as a sheltered location for small boats during hurricanes. Much of the southern fringe is currently being developed for tourism, residence and real estate purposes, all of which will benefit from an adjacent healthy and attractive ecosystem.

Friends of Gra Gra are hoping to increase the economic value of the lagoon by developing tourism activities. These opportunities and potential strategies will be discussed in chapter 16 on long term financing.

2.6.2 Tourism and Recreation Use

There is a general sense that Dangriga has yet to benefit to the same extent as its neighbours from growth in the tourism sector but that it is on the verge of doing so. There are indeed indications that this is more than simple optimism:

- Even at present visitation levels, there is a perceived need for a wider range of local tourism offerings. The lagoon fits in as one element in this array. Conversations with local guides suggest that, with the appropriate organisation, current demand of the order of 30-50 visitors per season could be met.
- Small (100-150 berth) cruise-ships have begun to visit Dangriga and could do so more regularly (say 4 visits per year) if the offerings for one-day trips were in place. According to one operator, this is a comfortable size for the available resources. There are also aspirations for visitation by the larger vessels. Feelings regarding cruise tourism are mixed but the consensus is that they are inevitable. Strategies must therefore accept this reality and work around it if the general community is to capture due benefits.
- Breaking the ground is imminent for a large (500 bed) resort at Sapodilla Lagoon, immediately to the south of Hopkins and some 15 km from Gra Gra as the crow flies. This gives a significant increase in the number of tourists based in the vicinity and seeking local tourism offerings.
- Local business interests are presumably fully aware of the potentialities and have already acquired most of the land on the seaward lagoon shore. They are already investing in their holdings (cf the marina) and it can be assumed that they will do so more intensively as and when development prospects mature. Further impacts on the lagoon may be reduced by strict application of the relevant regulations, but it is highly unlikely that they can be avoided. There is a certain element of inevitability about this process and it must be accepted and accommodated in management planning. On the other hand, it should be noted that mutual interests are involved as location by a high quality protected area will also boost property value.

Gra Gra Lagoon is also a small site and there is potential for future conflict between use and overuse when the foreseeable development trends are taken into account.

2.6.3 Other Economic Use

Although not a direct economic use of the protected area itself, the development of the Marina immediately south of the lagoon along the Yemerri Creek entrance is of significance for the Gra Gra Lagoon National Park.

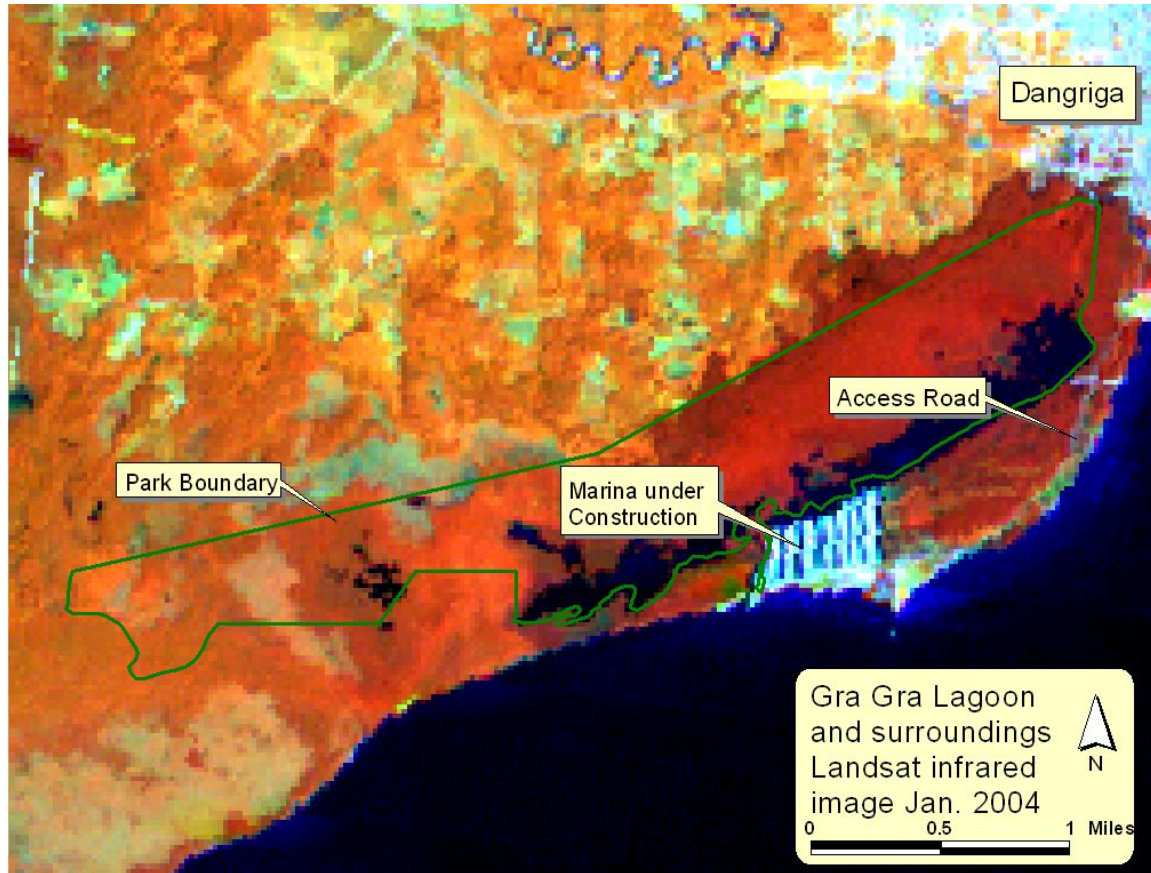


Figure 14. Landsat image (January 2004) showing land-use around Gra Gra Lagoon National Park. The marina site immediately below the lagoons, is clearly visible.

As can be seen from the satellite image, the marina development takes place immediately adjacent to the lagoon. Access to the marina is actually through the lagoon.

Due to the fact that the lagoon is extremely shallow (1ft or less), access to the much of the marina is currently not possible for outboard powered vessels. Therefore, to make the marina development viable, dredging within the National Park is inevitable.

The construction of the marina with associated activities such as dredging are of management concern for the park but through good cooperation between park management and developer, negative effects are to be avoided.

3. Conservation Planning

3.1 Conservation Targets

3.1.1 Identification of Conservation Targets

Virtually all of the ecosystems that have been reported from Gra Gra Lagoon National Park are under-represented on a national scale (table 14)

Table 14. Ecosystems present in Gra Gra Lagoon National Park that are under-represented on a national scale. The conservation target ranking indicates the management importance for the Park, 1 being the highest priority.

UNESCO code	Ecosystem	ACRES	Sufficiently represented in PA's	Conservation Target Ranking
IA5a(1)(c)	Caribbean mangrove forest; mixed mangrove scrub	200	No	2
IA5a(1)(f)	Caribbean mangrove forest; basin mangrove	655	No	2
SA1b(5)	Brackish/saline lake	295	No	2
VIIB1a	Tropical freshwater reed-swamp	36	No	1
VIIB4	Tropical lowland tall herbaceous swamp	104	±	3

Based on this, all these ecosystems should be considered conservation targets. This is particularly the case for VIIB1a: Tropical Freshwater Reed-Swamp for which the Gra Gra Lagoon National Park is currently only protected area in which it is represented.

At the species level, Morelet's crocodile (*Crocodylus moreletii*) is to be considered a conservation target. This is a species that used to be endangered but has recovered to such an extent that it is now listed as "conservation dependant" in the national list of critical species (Meerman, 2005).



Figure 15. Morelets Crocodile. Picture Jan Meerman

While this species is certainly the flag-ship vertebrate of the park, the park itself is not critical for the species. Analysis of data (Platt & Thorbjarnarson, 2000) indicates the presence of Morelet's Crocodile in the saline Gra Gra Lagoon is probably marginal.

Similarly important are the bird roosts that are found in the eastern half of the

lagoon system. Though no actual breeding colonies are known at this stage (which would greatly raise the stakes), these roosting sites are important for the well-being of the species involved and also add to the attraction of the park. Other critical species found in the Gra Gra Lagoon National Park include:

Table 15. Critical species found in Gra Gra Lagoon National Park. The conservation target ranking indicates the management importance for Gra Gra Lagoon National Park, 1 being the highest priority.

Scientific name	English Name	Status	Conservation Target Ranking
<i>Ardea herodias</i>	Great Blue Heron	Vulnerable	2
<i>Columba leucocephala</i>	White-Crowned Pigeon	Vulnerable	2
<i>Egretta thula</i>	Snowy Egret	Vulnerable	2
<i>Egretta tricolor</i>	Tricolored Heron	Vulnerable	2
<i>Eudocimus albus</i>	White Ibis	Vulnerable	2
<i>Nyctanassa violacea</i>	Yellow-Crowned Night-Heron	Vulnerable	2
<i>Nycticorax nycticorax</i>	Black-Crowned Night-Heron	Vulnerable	2
<i>Pelecanus occidentalis</i>	Brown Pelican	Vulnerable	2
<i>Phalacrocorax auritus</i>	Double-Crested Cormorant	Vulnerable	2
<i>Phalacrocorax brasilianus</i>	Neotropic Cormorant	Vulnerable	2
<i>Sterna antillarum</i>	Least Tern	Vulnerable	2
	Bird Roosting Sites		1
<i>Crocodylus moreletii</i>	Morelet's Crocodile	Conservation Dependant	1

But again, although these species are critical within the Belizean Context, the Gra Gra Lagoon is not directly critical to any of these species (Meerman, 2005).

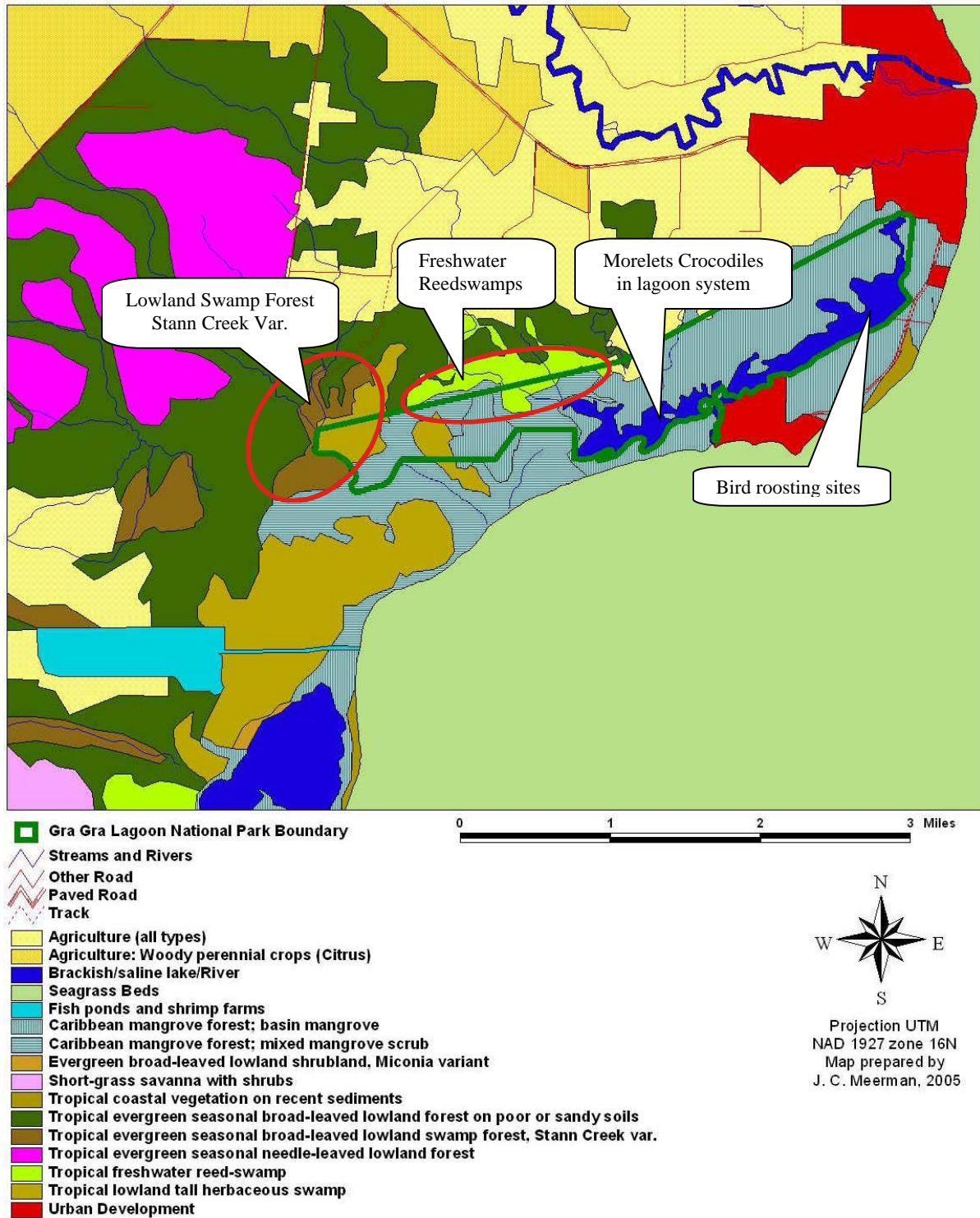


Figure 16. Specific Conservation Targets in and around Gra Gra Lagoon National Park.

3.1.2 Assessment of Conservation Target Viability

Based on field visits during the preparation of the management plan the viability of the set conservation targets was assessed where possible (tables 16, 17):

Table 16. Conservation target (ecosystem) viability. The conservation target ranking indicates the management importance for Gra Gra Lagoon National Park, 1 being the highest priority.

Ecosystem	ACRES	Conservation Target Ranking	Current Viability	Conservation Goal
Caribbean mangrove forest; mixed mangrove scrub	200	2	Healthy but potentially vulnerable	Maintain the target at its current state
Caribbean mangrove forest; basin mangrove	655	2	Healthy but potentially vulnerable	Maintain the target at its current state
Brackish/saline lake	295	2	Appears healthy but essentially unknown. Oil seepage from old storage facility?	Assess current state and Maintain/improve
Tropical freshwater reed-swamp	36	1	Healthy, appears unthreatened	Maintain the target at its current state
Tropical lowland tall herbaceous swamp	104	3	Healthy, appears unthreatened	Maintain the target at its current state

Table 17. Conservation target (species) viability. The conservation target ranking indicates the management importance for Gra Gra Lagoon National Park, 1 being the highest priority.

Scientific name	English Name	Conservation Target Ranking	Viability	Conservation Goal
<i>Ardea herodias</i>	Great Blue Heron	2	Population unknown	Maintain the target at its current state
<i>Columba leucocephala</i>	White-Crowned Pigeon	2	Population unknown	Maintain the target at its current state
<i>Egretta thula</i>	Snowy Egret	2	Population unknown	Maintain the target at its current state
<i>Egretta tricolor</i>	Tricolored Heron	2	Population unknown	Maintain the target at its current state
<i>Eudocimus albus</i>	White Ibis	2	Population unknown	Maintain the target at its current state
<i>Nyctanassa violacea</i>	Yellow-Crowned Night-Heron	2	Population unknown	Maintain the target at its current state
<i>Nycticorax nycticorax</i>	Black-Crowned Night-Heron	2	Population unknown	Maintain the target at its current state
<i>Pelecanus occidentalis</i>	Brown Pelican	2	Population unknown	Maintain the target at its current state
<i>Phalacrocorax auritus</i>	Double-Crested Cormorant	2	Population unknown	Maintain the target at its current state
<i>Phalacrocorax brasilianus</i>	Neotropic Cormorant	2	Population unknown	Maintain the target at its current state
<i>Sterna antillarum</i>	Least Tern	2	Population unknown	Maintain the target at its current state
	Bird Roosting Sites	1	Population unknown	Improve conditions for roosting
<i>Crocodylus moreletii</i>	Morelet's Crocodile	1	Population unknown	Increase abundance

3.2 Threats to Biodiversity and strategies to reduce these threats

Currently, the quality of the lagoon system, the mangrove habitats and the forested habitats to their rear appear good. It is, however, subject to present and growing pressure.

- *Urban expansion.* The park boundary follows the edge of the open lagoon along its southern (seaward) boundary, leaving the strip between the lagoon and the sea in private hands. It also carries the road to Commerce Bight pier, at the mouth of Yemeri Creek. Parts of the spit (which carries mangrove, beach-ridge and back-ridge habitats) are virtually intact but blocks are subject to disturbance. This ranges from thinning of the mangrove to the lay-out of a housing development/marina at the end of the spit, backing onto the lagoon. Current impacts are mainly aesthetic but reduction in natural cover on the seaward side of the lagoon also increases vulnerability and reduces ecosystem functionality. These trends will become more marked as development proceeds, along with a new source of effluent to add to that of Dangriga. Given the shallowness of the lagoon, there may also be pressure to dredge to improve access to the bays of the marina. Meanwhile, the town itself is expanding into the mangrove in the north-east.
- *Chemical waste.* There exists a fuel storage facility on the spit of land immediately south of the lagoon. According to unconfirmed reports, this abandoned facility is still leeching oil.
- *Agricultural expansion.* There is still a remarkable amount of forest cover north of the park but the entire area has been subdivided. The area immediately behind the park (Four Miles) is officially “Carib Reserve”. In practice this means it is a mosaic of small-holdings, secondary growth and blocks of high bush, quite favourable for watershed protection on flat land. Access roads are, however, being pushed in and the foreseeable trend is towards agricultural intensification on the northern boundary and partly even crossing the boundary (based on 2004 satellite images). Higher up the creeks drain land given over to agro-industrial citrus production. They therefore receive sediment and agricultural inputs, including run-off from the municipal and citrus pulp dumps, which eventually find their way to the lagoon. Again, this land use is intensifying. The creeks do not, however, run back far enough to be affected by intensified run-off from steep slopes.
- Hunting pressure is said to be insignificant although casual shooting of crocodiles and/or iguanas was reported. Hunting is probably more an issue in the area known as “Old England” just outside the park.

Table 18. Threats and counter strategies.

Threat source	Type	Severity	Urgency	Strategy to reduce threat	Success indicator
Hunting	Killing of wildlife	Minor, but may need revision in case Old England is added to the park.	Medium, but may need revision in case Old England is added to the park.	Needs monitoring. Particular attention should be focused on the conservation target species.	No hunting reported
Fishing	Line fishing and cast netting	Minor	Medium	Work with known fishermen. Needs monitoring. Note that aquatic fauna is essentially unknown and therefore impact is unknown	Fish fauna and abundance remains healthy
Urban expansion to the east of the Park	Waste filtering into the park	Unknown but probably limited as the result of new drainage canals constructed for Dangriga town	Low	Monitoring and devise actions based on the findings	No waste detected
Urban expansion to the south of the Park	Disturbance due to increased human presence	Moderate in the case the activities are restricted to the land south of the park to severe in case of penetration of the park.	Urgent.	Coordinate with developer(s). Involve developer in the management of the park	No negative changes in abundance/frequency of Conservation target species
Development of Marina at the mouth of the lagoon	Will require dredging of the lagoon part within the park	Severe but not necessarily damaging. The dredging will create deeper water which could be beneficial for the aquatic fauna	Urgent. Dredging is imminent.	This dredging should be strictly monitored (area, pollution).	No negative changes in abundance/frequency of Conservation target species
	Pollution (liquid waste, solid waste, chemicals)	Severe	Not an immediate issue. But will become urgent once actual development takes place.	Monitoring and devise actions based on the findings	No negative changes in abundance/frequency/health of Conservation target species

	Disturbance due to increased human presence	Severe. Of particular concern will be disturbance of bird roosting sites	Not an immediate issue. But will become urgent once actual development takes place.	Monitoring and devise actions based on the findings	No negative changes in abundance/frequency/health of Conservation target species
Agricultural expansion	Agricultural incursions	Minor. Most of the park is totally unsuitable for agriculture	Urgent. A small area of infiltration <u>appears</u> to exist along the northern border.	Proper park demarcation is required.	No agricultural activities detected.
Agricultural chemicals	Agricultural runoff containing agro-chemicals	Unknown	Urgent	Monitoring and devise actions based on the findings	No chemical pollution detected
Abandoned oil storage facility	Seepage of oil into the environment	Unknown	Urgent	Monitoring and devise actions based on the findings	Storage facility removed or cleaned up
Rural and agricultural waste management	Toxic runoff draining into the park	Unknown	Urgent	Monitoring and devise actions based on the findings	No chemical pollution detected

4. Management Planning

4.1 Management and Organisational Background

As a national park, statutory responsibility for site management lies with the Forest Department. Day-to-day administration has, however, been devolved through a formal co-management agreement to Friends of Gra Gra, a local community group.

The Friends of Gra Gra (FGG) has been active since the late 1990s. It was established as a membership organization with the objectives of conserving and managing local natural resources, preserving the biodiversity of Gra Gra and its environment, and involvement in environmental action in general. The declaration of Gra Gra lagoon as a national park was a key aim, successfully achieved largely due to FGG advocacy.

The FGG was formally constituted as a non-profit company in February 2003. The Memorandum of Association (MoA) retains the original objectives but broaden their scope to include establishment and support for a community-based management plan that would support the development process of Dangriga and its surrounding communities. It also defines non-profit status, stipulating that all income must be spent on furthering the aims of the society rather than any member while allowing for payment for services that may be provided (salaries, fees, rents ...). The permanence of investments made in support of FGG is assured by the requirement that, in the event of organizational failure, all assets must be passed to another organization with similar objectives. Revised Articles of Association are attached to the MoA. These require Annual General Meetings (AGM) – which must not be more than 15 months apart - to consider special business, officer's reports and accounts, requiring a quorum of one-third total membership. FGG affairs are managed by a Board of Directors which at present levels of membership essentially consists of the FGG members though provision is made for delegation to a management committee. Maintaining proper accounts and undertaking an independent annual audit are requirements, while the Board of Directors may also establish other financial procedures as necessary. The Chairman, Secretary and Treasurer are elected from the board at each AGM.

Formal constitution of FGG as a non-profit company opened the way to the co-management agreement with the Forest Department for the newly-declared national park. The agreement was signed in April 2003, is valid for 5 years and is renewable. Essentially the Forest Department (FD) has statutory responsibility for the national park but management is shared with FGG, using a management plan produced jointly by both bodies. Other key points under the agreement are that FGG:

- is responsible for all day-to-day management activities while the FD is responsible for security and law enforcement and will assist with infrastructure;
- is responsible for all visitor activities within the site, for routine maintenance and for education programs;

- has the right of first refusal for all recreation-related concessions and activities, provided standards are acceptable;
- may collect fees for entrance, camping, programs and concessions;
- may retain 70% of the fees collected, with 20% for PACT and 10% for government;
- must keep detailed records of fees collected, provide quarterly financial statements, and present an annual report;
- will have exclusive use of any funding secured for the management and development of the area.

Activities to date.

In December 1998, FGG received a grant of BZ\$ 64,500 for protection of Gra Gra Lagoon, education and outreach, organizational capacity building and alternative occupational training. Although this was intended as a 16-month project it actually extended over two phases into August 2002. Both PACT and local business provided co-financing with an in-kind contribution of BZ\$ 18,810 from the group.

Essentially this grant allowed FGG to establish itself and to develop its organizational skills. The key indicator of success is that the primary objective of FGG, formal designation of the lagoon as a national park, was achieved. The group obviously went through growing pains but received training, gained experience and received expert advice in weak areas – there are, for instance, detailed recommendations for financial procedures in the UNDP mid-term report. FGG has proved institutionally tenacious, won local respect and increased membership to 220.

Since then, FGG backing has been limited to the Wildlife Conservation Society, which paid for posters and brochures. It remains active but self-generated income is effectively zero and recent efforts to obtain grant support (PACT, Oak Foundation) have been unsuccessful, pending the production of a management plan. The World Bank has pledged support, but this is again conditional on a management plan. Nonetheless, FGG does hold assets inherited from the UNDP grant, consisting essentially of a wood-built office (well-located but on the parcel of a member), a small amount of office furniture, some signs and four canoes with equipment (life jackets, paddles). Two of the canoes are not very suitable (too large, too heavy) and all this equipment is over five years old – i.e. still serviceable and, though dispersed, still available but written off for accounting purposes except for the office building.

4.2 Management Goals

Key management issues.

Management programs and their rationale are developed fully in the management plan. However, given that the financial strategy comes in support of management, the main characteristics and priority management programs are summarized here.

Identification of priority management programmes.

Finance comes in support of environmental management and planning must therefore be based on priority management programs that are built around the characteristics of the area, address recognized threats, and fulfill key objectives. Under the terms of the National Parks Systems Act Revised Edition (2002), national park designation is aimed at protecting and preserving natural and scenic values for the benefit and enjoyment of the general public. National parks are also meant to provide opportunities for scientific research. These considerations help define a strategic long-term (i.e. 5+ years) goal for park management:

‘The Gra Gra Lagoon National Park maintains its value in terms of conserving biodiversity, providing critical ecological services, and contributing to the local economy and social well-being through recreational use’.

The goal is reached by meeting medium-term (5-year) objectives, each with a management program containing a set of actions and indicators to measure effectiveness. Five basic management programs have been identified that, following the recommendations of the public consultation, should cover the national park and its surrounding area:

- *Resource protection program;*
- *Recreational use program;*
- *Environmental awareness program;*
- *Environmental research and monitoring program;*

... and, to support the foregoing and provide for future expansion ...;

- *An institutional capacity building program.*

These management programs are described in the management plan, which is updated at 5-year intervals. The plan is a framework rather than a rigid structure. It helps keep activities focused but new opportunities, circumstances and insights will arise over its life-time. These can be addressed in annual work plans but the overall aims should still be maintained when making running modifications.

4.3 Management Strategies

4.3.1. Management Constraints and Limitations

The principal management constraints and limitations are due to the fact that Gra Gra Lagoon National Park is essentially locked in by private development. The only easy ways for getting into the park are either:

- Over sea from Dangriga through the Yemeri Creek entrance
- By road from Dangriga to the road crossing Eugene Zabaneh Property. It is claimed that this is a public road (which it is by default) but this information could not be confirmed.
- Over road from Dangriga, past the Commerce Bight pier across Johnny Zabaneh property to the Yemeri Creek.

Principal consequence is that it will not be possible to erect any management structures on land that is controlled by either Government or Friends of Gra Gra. The only available location for such management structures would be at the end of the northern most access road.

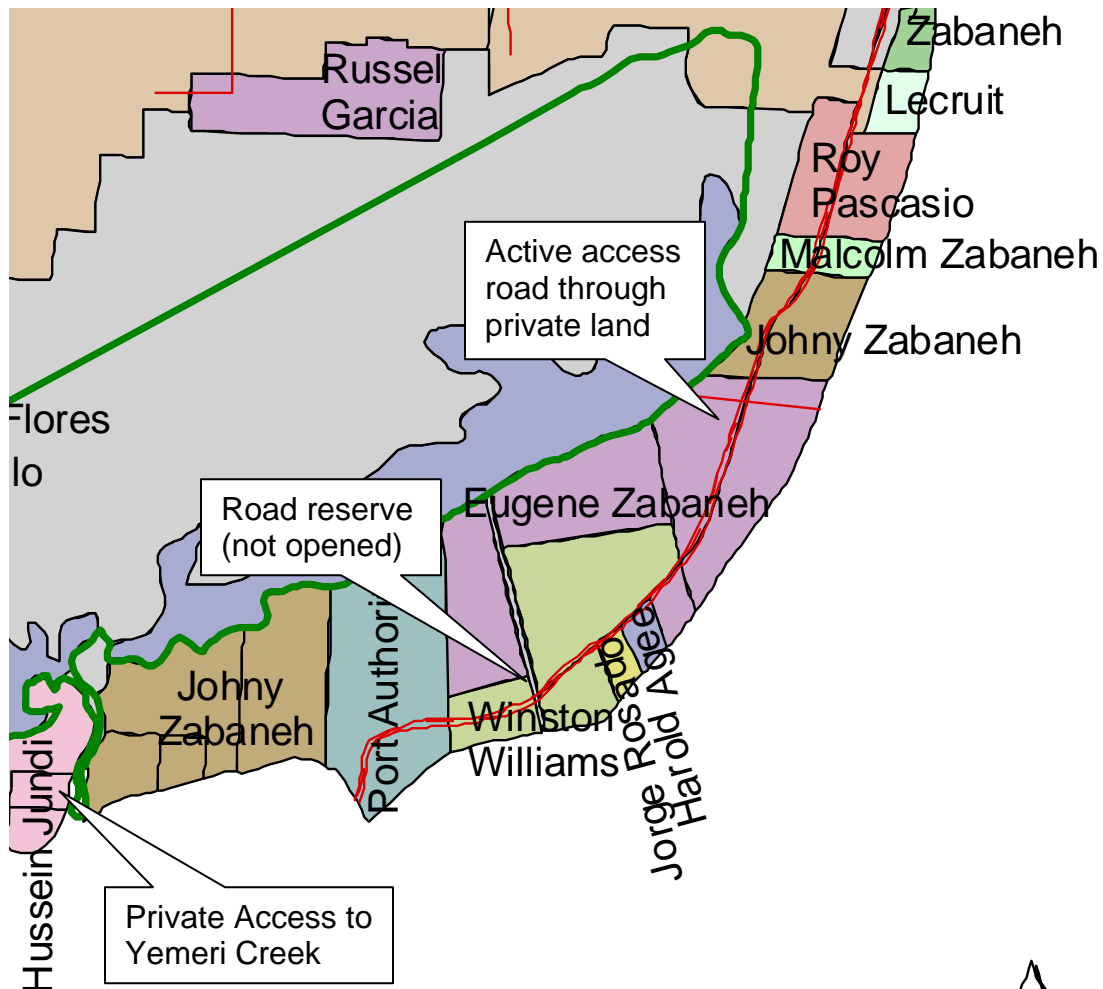


Figure 17. Land ownership around Gra Gra Lagoon National Park (source: Elliot Martinez, Lands Department, Dangriga).

4.3.2. Management Zones and potential park extension

Bases on it's designation as a National Park which is equivalent with IUCN category II: **Protected area managed mainly for ecosystem protection and recreation**, the objectives of management are:

- To protect natural and scenic areas of national and international significance for spiritual, scientific, educational, recreational or tourist purposes;
- To perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity;
- To manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state;
- To eliminate and thereafter prevent exploitation or occupation detrimental to the purposes of designation;
- To maintain respect for the ecological, geomorphologic, sacred or aesthetic attributes which warranted designation; and
- To take into account the needs of indigenous people, including subsistence resource use, in so far as these will not adversely affect the other objectives of management.

At least 75% of the designated protected area must be managed for the primary objectives. Critical here is the line "To manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state"

As such the Gra Gra Lagoon is well suited but due to the type of terrain it will be difficult to manage a full 75 % for this primary objective. While the lagoon (it's main feature of visitors interest) is the centerpiece of the park, it covers only 22% of the parks territory. The remainder of the park is made up of inaccessible (swamp) and to some degree fragile ecosystems. While some of these can be developed or used for very low impact visitation, the practical and logistical challenges are impressive.

Incorporating the NPAPSP assessment and analysis results, the following zonation is proposed:

Conservation Zone:

Location: Western section of the existing PA + section of the northern tall mangrove stands in the eastern half of the park. These two conservation zones are selected by default due to its impenetrable nature + the rarity of the freshwater reed-swamp.

Size: 528 acres or 40% of the park.

Conservation features: Basin Mangrove; Freshwater reed-swamp; Tall herbaceous swamp, Morelet's Crocodile.

Permitted uses: Research, education.

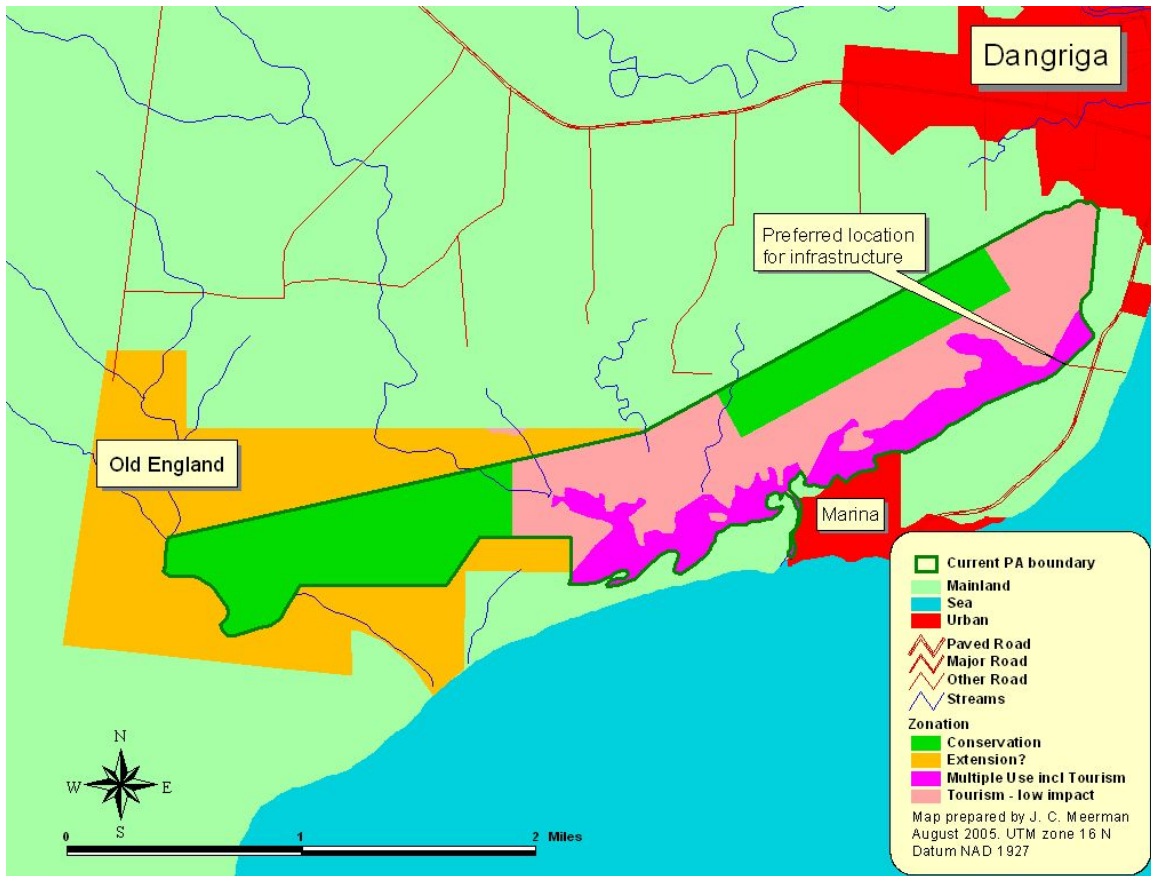


Figure 18. Gra Gra Lagoon National Park management zonation

Multiple Use Zone:

Location: Lagoon and fringing mangroves. This is effectively all that section of the park that will be affected by the development of the marina.

Size: 240 acres or 18% of the park

Conservation features: Brackish/saline Lake, Basin Mangrove, Morelet’s Crocodile.

Permitted uses: Research, education, public access for Marina, tourism, tourism infrastructure, sports fishing.

Tourism Zone:

Location: Mangrove stands immediately adjacent to the agricultural lands in the Carib Reserve + Eastern most section of the lagoon and fringing mangroves including islands and Comso Creek.

Size: 553 acres or 42% of the park.

Conservation features: Brackish/saline Lake, Basin Mangrove, Morelet’s Crocodile, Bird roosting sites. The bird roosting sites are the principal features here that warrant a more careful approach than in the multiple use zone.

Permitted uses: Research; education; low impact tourism; sports fishing.

Potential Park Extension:

Based on the results of the NPAPSP assessment and analysis (Meerman, 2005) and confirmed by additional fieldwork, an extension of the Gra Gra Lagoon National Park with the area known as “Old England” is proposed. This extension will strengthen the biological and ecological rationale for the Gra Gra Lagoon National Park, and put some rare and currently un-protected ecosystems under protection. This extension has some community support and was discussed during the stakeholders meetings.

All that is required for this extension to become reality is a title search, new boundary description (following example in figure 18) and gazetting.

Note that incorporation of Old England in the Gra Gra Lagoon National Park will require some revisions of the Management Plan.

Location: National Lands in the Bocatora Creek watershed along the western lobe of the current National Park. This zone includes the area locally known as “Old England”. This area lies in the interest sphere of the Sarawee – 4 Mile Community.

Size: Approximately 900 acres.

Conservation Features:

- Tropical evergreen seasonal broad-leaved lowland forest on poor or sandy soils,
- Tropical evergreen seasonal broad-leaved lowland swamp forest, Stann Creek variant,
- Caribbean mangrove forest; mixed mangrove scrub, Caribbean mangrove forest; basin mangrove,
- Tropical freshwater reed-swamp,
- Tropical lowland tall herbaceous swamp,
- Wildlife.

Permitted uses: Research, education, very limited tourism. Permitted uses need to be reviewed once established and in consultation with Sarawee stakeholders.

4.4 Management Programmes and Objectives

4.4.1. Introduction

The Management Plan has been completely integrated with the financing strategy and as such it describes how management actions are to be financed, and is one of the basic tools used to facilitate effective and efficient protected area management. Its purpose is to set out the current financial status underpinning operations and devise a practical way of securing the resources required to maintain them as they develop over the short-, medium- and long-term. In doing so, a sound business plan serves other key purposes by:

- promoting focused and strategic thinking;
- helping justify support from all sources (public, private, governmental) for specific management programs;
- ensuring transparency in use of funds;
- demonstrating to donors the cost effectiveness of their support, measured against clear indicators;
- instilling confidence in all parties that management and financial issues are effectively covered and deliver recognized benefits.

There are several ways of approaching protected area business planning but the The Centre for Park Management has recently helped develop business plans for two protected areas in Belize. Their methodology has therefore been used extensively here, modified to the circumstances of Gra Gra Lagoon as a site and Friends of Gra Gra as a managing agency.

4.4.2. Identification of priority management programs

Finance comes in support of environmental management and planning must therefore be based on priority management programs that are built around the characteristics of the area, address recognised threats, and fulfil key objectives. Under the terms of the National Parks Systems Act Revised Edition (2002), national park designation is aimed at protecting and preserving natural and scenic values for the benefit and enjoyment of the general public. National parks are also meant to provide opportunities for scientific research. These considerations help define a strategic long-term (i.e. 5+ years) goal for park management:

‘The Gra Gra Lagoon National Park maintains its value in terms of conserving biodiversity, providing critical ecological services, and contributing to the local economy and social well-being through recreational use’.

The goal is reached by meeting medium-term (5-year) objectives, each with a management programme containing a set of actions and indicators to measure effectiveness. Five basic management programs have been identified that, following the recommendations of the public consultation, should cover the national park and its surrounding area:

- *Resource protection programme;*
- *Recreational use programme;*
- *Environmental awareness programme;*
- *Environmental research and monitoring programme;*

... and, to support the foregoing and provide for future expansion ...;

- *an institutional capacity building programme.*

These management programs are described in the management plan, which is updated at 5-year intervals. The plan is a framework rather than a rigid structure. It helps keep activities focused but new opportunities, circumstances and insights will arise over its life-time. These can be addressed in annual work plans but the overall aims should still be maintained when making running modifications.

4.4.3. Expenditure programme

4.4.3.1. Start-point.

The current situation, therefore, is that FGG:

- Exists as a fully constituted non-profit company, with a bank account and a procedures for financial management appropriate to a small NGO;
- Has formal responsibilities to GoB with regard to the management of the Gra Gra Lagoon National Park, and legally-backed opportunities to develop the use of the area in ways that benefit the organisation and the community but are compatible with national park aims;
- Possesses some assets but has no reliable sources of income.
- Has considerable social legitimacy – i.e. the group is a recognised part of the community, drawn from and representing a true community interest.

Furthermore FGG now has a wider remit that covers involvement in surrounding communities and has close links with other community groups with similar aims that have or are evolving – the North Stann Creek Watershed Association, Friends of Mayflower (based in Silk Grass), and in the Four Miles, Sarawee and Hopkins area.

Several important issues bearing on strategy development were identified through the consultation with stake-holders.

- First, it is recognised that Dangriga and its surrounding communities are expanding, that Gra Gra Lagoon lies within that expansion area, and that the site must be factored into town planning (a 50-year plan is being drawn up at this time). In effect the park will become suburban, with implications for ready access and recreational use by the local people and Belizean residents.
- The site must also be seen in the wider context. Even on a local scale, it is only one of a range of interesting areas with amenity, recreational and biodiversity values and potentials. Furthermore the quality of these sites are inter-dependent – degradation higher up the watershed will impact on Gra Gra Lagoon at some point. On a larger scale, and with special reference to tourism, it is one of the more swiftly accessible of a wide selection of sites that can be reached more easily from Dangriga than any other point in the country.
- There is a general sense that Dangriga has yet to benefit to the same extent as its neighbours from growth in the tourism sector but that it is on the verge of doing so. There are indeed indications that this is more than simple optimism:
 - Even at present visitation levels, there is a perceived need for a wider range of local tourism offerings. The lagoon fits in as one element in this array. Conversations with local guides suggest that, with the appropriate organisation, current demand of the order of 30-50 visitors per season could be met.
 - Small (100-150 berth) cruise-ships have begun to visit Dangriga and could do so more regularly (say 4 visits per year) if the offerings for one-day trips were in place. According to one operator, this is a comfortable size for the available resources. There are also aspirations for visitation by the larger vessels. Feelings regarding cruise tourism are mixed but the

consensus is that they are inevitable. Strategies must therefore accept this reality and work around it if the general community is to capture due benefits.

- Breaking the ground is imminent for a large (500 bed) resort at Sapodilla Lagoon, immediately to the south of Hopkins and some 15 km from Gra Gra as the crow flies. This gives a significant increase in the number of tourists based in the vicinity and seeking local tourism offerings.
- Local business interests are presumably fully aware of the potentialities and have already acquired most of the land on the seaward lagoon shore. They are already investing in their holdings (cf the marina) and it can be assumed that they will do so more intensively as and when development prospects mature. Further impacts on the lagoon may be reduced by strict application of the relevant regulations, but it is highly unlikely that they can be avoided. There is a certain element of inevitability about this process and it must be accepted and accommodated in management planning. On the other hand, it should be noted that mutual interests are involved as location by a high quality protected area will also boost property value.
- Gra Gra Lagoon is a pretty site but there is doubt that it can, on its own, offer enough to command the US\$ 40.00 fee plus BZ\$10.00 entrance fee for a 2-hour guided visit. If the perception of value for money is not maintained, reputation (and thus long-term sustainability) will be compromised.
- Gra Gra Lagoon is also a small site and there is potential for future conflict between use and overuse when the foreseeable development trends are taken into account. This should be taken into account from the very beginning, to avoid problems in the future.

4.4.3.2. Management cost estimates.

The first step in financial planning is to estimate the capital and recurrent costs needed to implement the management programs (table 19). It is crucial that the programs be kept simple, effective and realistically sized to the capacities and resources of FGG as the implementing agency if they are to be well-implemented and fully financed. The financial strategy (section 4.5.9) envisages a combination of self-generated and grant funding to underpin management but special care must be taken with recurrent costs, notably salaries, vehicle running and equipment maintenance/replacement costs. These tend to rise when grants are available to levels that are difficult, indeed often impossible, to maintain when the support ceases. Recurrent costs must therefore be kept to the strict minimum necessary to cover basic needs and are priority areas for reinvestment of self-generated income, liberating management from dependency on grants and thus ensuring continuity and sustainability. Budgets for all programmes can be found in appendix 1 – 5.

Table 19. Budget summary per year

<i>Planning Horizon</i>	<i>Short</i>	<i>Medium</i>		<i>Long</i>			
	<i>Year</i>						
	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>		<i>2010 & on</i>
<i>Estimated expenditure requirement</i>							
- Capital	127850	0	0	893	0		54593
- Recurrent	78460	81260	93102	91303	111238		134871
Total	206310	81260	93102	92196	111238		189464
<i>Self-generated income</i>							
- Visitor target	200	700	1000	1300	1500		1500
- Visitor income	3559	12457	17796	23134	26693		26693
- Concessions income	9600	19200	28800	28800	28800		28800
Total	13159	31657	46596	51934	55493	0	55493
<i>Donor requirement</i>							
- Capital expenditure	127850	0	0	893	0		54593
- Recurrent expenditure	65301	49603	46507	39369	55745		79378
Total	193151	49603	46507	40262	55745		133971
<i>Potential Funding sources</i>							
World Bank	127850						
PACT: foregone 20% entry fee	400	1400	2000				
PACT: 1:2 match	6580	15828	23298	25967	27747		27747
<i>Residual recurrent target as grant target</i>	58321	32374	21209	14295	27998		106224

4.4.4. The Resource Protection Programme

The objectives of the resource protection programme are to ensure that:

- the regulations covering the use of the national park are respected (site protection);
- ecological viability is not compromised by up-stream influences in the watershed.

4.4.4.1. Site protection.

Tables 14 through 17 (pages 44-46) identified specific conservation targets, both ecosystems and species, and assesses their viability. While these are important targets, most of the goals set out here can simply be achieved by maintaining current state. To achieve this, 2 major actions are required:

- **Action 1: boundary demarcation.** The most basic and cost-effective protective action is to show clearly where the boundary is on the ground. Two tasks are needed.
 - **Boundary establishment:** Formal boundary survey is a costly undertaking and can be extraordinarily difficult through mangrove. The progressive development close to (and at some points already reaching) the northern and eastern boundary nonetheless makes this a necessary pre-emptive action. To leave it unmarked invites incursion at some point. Surveying the boundary is a capital cost, usually estimated at BZ\$ 1000 per mile but, given the terrain, here raised to BZ\$ 1500. This should include a narrow cut-line (through ground vegetation only, without cutting tall trees) but markers (metal poles, painted and set in a concrete plug sunk in the ground at 500 ft intervals) are an extra cost. Recurrent expenditure consist of checking and cleaning the line annually, using a 3-man team.
 - **Signage:** The signage is multi-purpose, marking the boundaries, giving information on the site and rules of use, and helping users navigate around it. Different signs are used for different tasks. Current needs consist of:
 - two large signs (using the standard pattern used for national protected areas) at the main points of entry – i.e. the landing and the boat entry via Yemeri Creek – with provision for a third if visitor access opens up from the northern side.
 - 12 smaller signs within the lagoon and at access points from the north bank, including one where Comso Creek enters the park on the outskirts of Dangriga. The signs may be of two sizes – a larger one giving full information and smaller one for directional purposes only.

Maintenance involves refurbishing or replacing signs on a regular basis i.e. every two years, with an assumption that half the signs will need replacement every 5 years.

- **Action 2: Enforcement.** Infractions of park regulations will occur. On the other hand, regular patrols require personnel (staff or volunteers) on ready call if they are to be useful. Furthermore, direct involvement of FGG in enforcement will be socially divisive (and thus counterproductive) and the responsibility anyway lies with the FD under the terms of the co-management agreement. Persuasion and

peer pressure is a more cost-effective policy for routine operations, saving more muscular approaches involving the FD for extreme or persistent cases. The following strategy is recommended:

- Include public awareness of the park regulations, their rationale and the impacts of non-observance in the environmental awareness programme. This reduces incidence of infractions through self-regulation backed by force of public opinion.
- Prioritise participation of local fishermen in the recreational use programme (guides, boat-men) to generate self-interest in the good management of the park;
- Associate local guides and other stakeholders in good park management with the FGG and the management programme as volunteer wardens.

These are either non-cost approaches or subsume costs in other management programs. Above all they place the primary responsibility for promoting observance of regulations for a park intended to serve community interests firmly with the community itself.

4.4.4.2. Maintenance of up-stream viability.

Areas that are within the Yemeri Creek or neighbouring watersheds that are found to be particularly important to the integrity of Gra Gra and are on national land may be considered candidates for inclusion with the national park, either as **extensions** or **annexes** (cf the freshwater swamp forests at **Old England**). These will require new management planning processes to integrate them with the Gra Gra Lagoon N.P. Most of the area is, however, in private ownership and a different approach is needed:

- The park will benefit from the promotion of strong, active, interest groups in the watershed, with close links to FGG. This fulfils FGG objectives and may develop into a local environmental plan for the district (a stated FGG aim) but the more immediate gain is to ensure local advocacy for proper application of the national environmental protection regulations. Developing this capability is part of the institutional capacity-building programme and the environmental awareness programme contributes to the effort. However, given that some groups are already in operation and that the need to work on a wider scale was specifically pointed out at the public consultation, a small provision of BZ\$ 5,000 p.a. is included in the budget to support such activity. This permits a basic level of activity and can be built on through grant support.
- Private landowners are also interested in the environment but that interest (as with all community members) is greatly enhanced by the prospects of benefits through tourism. This would be reinforced by linking visits to Gra Gra with other local attractions.
- Extension of the park by annexing the Old England area (figure 18)

Table 20. Budget Resource Protection Programme with implementation time period

Year	Type	2005	2006	2007	2008	2009		2010 >
Annexing Old England and Boundary extension	Capital		Not budgeted separately					
1.1. Boundary demarcation (including Old England?)								
* Boundary demarcation.								
- Survey/initial cut-line	Capital	7500						
- Boundary markers	Capital	5300						
- Boundary maintenance	Recurrent		2544	2697	2858	3030		3212
* Signage								
- Erection	Capital	13100						
- Maintenance	Recurrent			2248		2526		
- Replacement	Recurrent							8766
1.2. Local advocacy	Recurrent	2000	2120	2247	2382	2525		2676
Total Capital		25900	0	0	0	0	0	0
Total Recurrent		2000	4664	7192	5240	8081	0	14654

4.4.5. Recreational Use Programme

This is the pivotal management programme, being:

- The most obvious and direct linkage between the park, the community and the local economy;
- The primary source of self-generated income for park management.

4.4.5.1. Visitor facilities.

- **Action 1: Visitor reception area.** It is crucial that FGG secure a land parcel of c. 2 acres facing onto the lagoon and with road access. The present access point (a road leading off that to Commerce Bight jetty) is ideal but it is a public right of way surrounded by private land. Investment in infrastructure for the main entry point/visitor reception point cannot be justified until clear rights are established. There are various options to explore – government land grant, use of the end of the present access road and its ‘road reserve’ and/or continuation as decking out onto the lagoon itself, negotiation for a subdivided parcel. All of these options involve costs and a provision of BZ\$ 10,000 has been set aside to secure a site plus a further BZ\$ 7,500 for site preparation and trails/walkways in the adjoining mangrove (NB – extreme care must be taken to observe all regulations in this respect, notably preservation of the fringing mangrove). Once secured, infrastructure and equipment for visitor reception can be established. Signage is already provided for.
 - **Visitor shelter:** FGG envisages a cement structure consisting of a raised apron, low surrounding wall and a sheet-roof raised on pillars, equipped with benches and a table, with the general idea that visitors pass through it to reach the rest of the reception area. This appears appropriate (durability being a key consideration, though due care must be taken regarding appearance), with an estimated cost of BZ\$ 12,000 .
 - **Jetty/landing area:** Visitation centres on boats and a jetty is indispensable. A wooden structure is suggested, using local materials (botan, palmetto) to the greatest degree possible with due regard to safety and stability. This task also includes clearing the immediate area of obstructions. A BZ\$ 5000 budget provision is included.
 - **Boat-shed:** A simple and efficient system of catering for visitors is essential, immediate and easy availability of canoes and equipment being a key consideration. Security is also crucial and a ‘hard’ lock-up structure is envisaged, large enough to store 10 canoes and associated equipment. A BZ\$ 10,000 provision has been made but a night-watchman remains essential. On the other hand, having the equipment to hand removes the need for a means of transportation from town to entry-point.
 - **Basic utilities:** As a visitor area the entry point should have basic utilities (water, electricity, toilets). Costs include a hook-up to the town electricity supply (primarily for the office) and to the mains water. If the town supply is not likely to be available in the immediate future, a small header tank is needed, including provision for regular re-supply by water-tanker. Toilets and waste-management are challenging in a mangrove area, but also offer an opportunity to demonstrate good practice. Expert advice is needed. In

the meantime, a budget provision of BZ\$12,000 has been included based on installation costs of two composting toilets.

These represent capital costs. A recurrent budget of BZ\$ 2,500 is also given for annual repairs and refurbishment.

- **Action 2: Visitor activities.** Two forms of visitor activity compatible with park management aims are envisaged, both based primarily on boat access:
 - Guided and self-guided tours of the lagoon;
 - Non-commercial line fishing.
- **Boat tours.** These can be organised in two ways, through agencies with their own boats (e.g. out of Hopkins) or through FGG itself, which provides additional self-generated revenues. To engage in this, FGG should be equipped with 8 canoes (making a total of 10, allowing the 2 unsuitable ones to be sold off) with associated equipment (paddles, life jackets). Estimated cost is BZ\$ 14,000, with a write-off period of 5 years.
- **Fishing.** Whether or not fishing is compatible with park management is a contentious issue. The consensus at the public consultation was that commercial fishing and use of nets was definitely inappropriate but that a ban on ‘subsistence’ line-fishing for personal consumption by local residents would be ineffective. A managed fishery would be preferable under such circumstances, is allowed for under the revised National Park Act, and would create an interest group (perhaps in the form of a local fishing association) in the good management of the area. The logical progression is to allow catch-and-release fishing for visitors under day-permits. Line-fishing opens up a new visitor activity and supplementary income streams – through the permits and through equipment hire – for park management. A small budget provision of BZ\$ 750 has therefore been given for equipment for hire, subject to formal inclusion of fishing as a permissible activity.
- **Guide-training.** The number of qualified tour-guides in the area is adequate for day-to-day activities but becomes a constraint at peak periods, notably when cruise ships arrive. Visit quality is related directly to the skills and knowledge of the guide, not only in general but specific to the area being visited. Three forms of guide-training are therefore indicated:
 - **On-site work-shops for qualified guides working on Gra Gra Lagoon and its immediate area.** These are supplementary courses to inform guides of the special qualities and points of interest of the area, of the regulations in force, of especially sensitive sites, and of the conservation activities that are taking place. An annual one-day workshop is therefore provided for, as a recurrent cost.
 - **Site-specific specialised courses for local part-time guides.** The aim here is to train a cadre of local people, with preference for members of the fishing community, in tour-guiding on and around Gra Gra as a part-time activity. This relieves the constraint in availability of guides at peak periods, provides

supplementary incomes for local people and increases the number of stakeholders in effective park management. These courses must be integrated with national guide certification scheme and should be open to any interested person, with a target of an extra 5 guides being on call at any given time. People do move in and out the district so courses should be organised as a recurrent cost at 2-year intervals.

- **Specialist training in catch-and-release fishing.** This requires certain skills in techniques and fish-handling over and above local knowledge on when and where the fish are to be found, and should be seen as an extra guide qualification. Courses are organised from time to time on a national basis and the budget provision is to ensure that people from the Dangriga area have the opportunity to participate.
- **Action 3: Sales materials.** Visitation creates opportunities for supplementing income through sales. It is not suggested that FGG become heavily involved in this activity – the greater benefit is obtained through a recognised contribution to the local economy, exploited by local entrepreneurs – but a small range, limited to easily produced and storable items such as T-shirts and caps, would be appropriate. These can be sold directly through the office or via other local sales outlets to gain extra revenues but also serve a marketing and awareness function. A BZ\$ 5000 budget has been allocated for an initial stock. This is seed-money, with re-supply covered by reinvestment of income.

Table 21. Budget Recreational Use programme with timeline

Year	Type	2005	2006	2007	2008	2009		2010 >
2.1. Visitor reception area								
- Site acquisition/preparation	Capital	7500						
- Visitor shelter	Capital	12000						
- Jetty construction	Capital	5000						
- Boatshed	Capital	10000						
- Utility connections	Capital	1500						
- Toilets/waste management	Capital	12000						
- Water tower	Capital	1200						
- Site maintenance/repairs	Recurrent	2500	2650	2809	2978	3156		3346
2.2. Visitor equipment								
- Canoes + equipment	Capital	14000						18735
- Line-fishing equipment	Capital	750			893			1064
2.3. Guide-training								
- Guide workshops	Recurrent	1500	1590	1685	1787	1894		2007
- Part-time guide training	Recurrent	6000		6742		7575		8029
- 'Catch-and-release' training	Recurrent	1500	1590	1685	1787	1894		2007
2.4. Sales materials								
- T-shirts etc ...	Recurrent	5000	5300	5618	5955	6312		6691
Total Capital		63950	0	0	893	0		19799
Total Recurrent		16500	11130	18540	12506	20831		22080

4.4.6. Environmental Awareness Programme

An educational element should always be built in to the park management regime, not only for its own sake but also as an adjunct to visit quality, marketing and management programs in general. Ultimately, management success is dependent on public support and the purpose of the awareness programme is to promote this support.

The sales materials contribute to the environmental awareness programme. Further actions include the following:

- **Action 1. Permanent information displays.** Two displays are suggested:
 - At the FGG office: This is an indoors display, intended both to inform and to improve the appearance of the office as the HQ of an active local NGO. It should be mounted on detachable wall-panels (i.e. usable as a travelling display) and display a map of the lagoon, its environmental values and its management issues and programs. It should also embed the site in the overall context of coastal zone management (freshwater, mangrove and coastal marine). Initial costs include design, materials and mounting, with recurrent costs for replacement of faded/damaged materials. The entire display should be revised at 5-year intervals.
 - At the park entrance. This should follow the same themes as that at the FGG office but, as an outdoor display, should rely on murals (which should be well-presented) and posters (which will need regular replacement). Both initial and recurrent costs are therefore higher.
- **Action 2: Information dissemination.** This action is broken down into three sub-headings:
 - **Information/publicity materials.**
 - * **Brochures:** A very good brochure has already been produced for Gra Gra Lagoon. The budget allows for regular print runs to maintain the stock.
 - * **Posters:** An excellent poster for the national park has also been produced and a budget provision has been made for fresh print runs. Posters are also a good means of disseminating general information on the ecological dynamics and importance of conserving the coastal ecosystem. These are relevant nationally but FGG has a vested interest and considerable reliance is placed on them for display purposes. They are also potential sales items and help spread generate awareness of the site and of FGG. A small budget (BZ\$ 3,000 every three years) is therefore allowed for to promote production of updated editions at regular intervals.
 - * **Stickers/calendars:** Stickers represent another form of cheap but effective publicity material that can also be sold. As with the sales items, subsequent restocking should be paid out of sales revenues. Calendars intended for free distribution to local businesses, partners etc. are cheap and effective means of spreading awareness and are included in this budget line.
 - * **Visitor's guide:** Gra Gra Lagoon is the only protected area in the country that concentrates on active protection of a mangrove

system. A guide to the natural history and ecological dynamics of mangrove systems, emphasising Gra Gra Lagoon, would therefore fill a useful niche in promoting environmental awareness while further diversifying sales. The budget allows for commissioning the text from a local expert as well as printing costs. Subsequent reprints should be covered from sales income.

- **Local media.** FGG should be able to make regular use of the local media (TV, radio, press) to inform the public of its activities. This is provided for in the recurrent budget.
 - **Web-site.** The concept here is to develop an FGG/Gra Gra Lagoon web site, linked to national networks. The content should include information on how to visit the area and how to contribute to its work, as well as on the characteristics of the site.
- **Action 3: Schools program.** The student population (estimated at c. 2,000, in eight establishments) is the evident start-point for environmental education at a local level. Posters and booklets should be distributed to all the local schools and Gra Gra should be promoted as a site for field trips. The budget allows for three visits per year by up to 25 students including transport to Gra Gra and boat hire. This is seen as a basic level of activity (i.e. to be maintained using self-generated income) but can be increased with grant funding. The field trip could be combined to good advantage with other simple but practical environmental actions – e.g. litter clean-up – using the sales items as prizes/rewards.

Table 22. Budget Environmental Awareness Programme with timeline

Year	Type	2005	2006	2007	2008	2009		2010 >
3.1. Permanent displays								
- Production	Capital	8000						10706
- Maintenance	Recurrent	800	848	899	953	1010		1071
3.2. Information materials								
- Brochure reprints	Recurrent	1800	1908	2022	2144	2272		2409
- Poster reprints	Recurrent	2000	2120	2247	2382	2525		3346
- New poster production	Recurrent		3180			3787		4015
- Stickers/calendars	Recurrent	2000	2120	2247	2382	2525		2676
- Visitor Guide production	Capital	7000						
- Visitor guide reprints	Recurrent				3573			3787
3.3. Media budget	Recurrent	1500	1590	1685	1787	1894		2007
3.4. Web-site maintenance	Recurrent	4000	4240	4494	4764	5050		5353
Total Capital		15000	0	0	0	0		10706
Total Recurrent		12100	16006	13596	17984	19063		24664

4.4.7. Environmental research and monitoring programme

As a national park, research at Gra Gra Lagoon should be encouraged. It is not, however, an indispensable need for management. The 'programme' therefore consists of being ready to give practical assistance to research programs as and when possible. Monitoring, on the other hand, is an important management activity that tracks the ecological health of the area and thus measures the effectiveness of the management investments themselves. Note that biological research typically requires a research permit issued by the Forest Department. For regular (non-invasive) monitoring activities no such permit is required and should fall under the regular management agreement by the park co-managers.

Two forms of monitoring are allowed for under the financial plan:

- **Action 1. Maintenance of the extent and quality of habitat types within the national park.** The current vegetation maps indicate four habitat types within the national park, excluding the aquatic system of the lagoon itself (considered under Action 2.). These consist of basin mangrove and the Stann Creek swamp forest variant (both conservation priorities), herbaceous swamp and upland forest on poor/sandy soils. All four types extend through the watershed, which also includes altered habitats subject to different land-uses. The management plan provides a more detailed assessment of vegetation and land-use cover in the 50 km² area including the park, the catchments of Yemeri Creek and the streams draining southern Dangriga, and of Bocatora Creek immediately adjacent to the west. Current mapping is based on 2001 Landsat imagery. This gives a historic baseline, while the new area map based on 2004 imagery establishes the current coverage and the trend. On-ground assessments add a quality assessment. This exercise should be repeated at 5 year intervals, as part of the management planning cycle and with particular emphasis on the two priority vegetation types. This should be done under contract, using a local consultant with access to the requisite equipment (satellite imagery, GIS capability), allowing for three days field time and two days desk/GIS work.
- **Action 2. Maintenance of the ecological health of the aquatic lagoon system.** The assumption here is that ecological health maintains ecosystem functions, including the capacity of the system to filter out and absorb effluents and residues prior to their discharge into the marine environment. The monitoring programme consists of:
 - **Water quality:** Water samples are easy to obtain and the Belize Agricultural Health Authority maintains a laboratory for water testing, at a cost of BZ\$ 200 per sample. The key indicators for run-off from urban and agricultural sites consist of sediment load, nutrients and pesticides. The establishment of three monitoring sites is proposed (the mouths of Comso and Yemeri Creek into the lagoon and at the lagoon-side mouth of the outflow of Yemeri Creek) and samples should be taken at low tide in April and September (i.e. height of the wet and dry seasons). The first measurements should be taken in Year 1, with subsequent measurements every two years. Provision is also made for spot-checks if there is reason to suspect a water-quality issue (e.g. appearance of oil, dead fish ...).

- **Biological indicators.** Biological indicators should be easy to recognise and measure, and three lend themselves to present purposes:
 - *Morelet's crocodile* – top predator, hunting target, species of conservation concern, relatively easily counted by eye-shine at night. The guides, as volunteer wardens, should keep note of numbers and size-classes of crocodiles encountered during night-spotting tours. These records should be backed up by regular (6-monthly) night-counts on a fixed route.
 - *Aquatic birds*, attending roosts – easily recognised and counted, of conservation concern, sensitive to disturbance but subject to seasonal abundance change. This is another task for the volunteer wardens, to be backed by monthly evening counts of the accessible roosts, including those on the two islands close to the landing.
 - *Catch/effort ratio for fin-fish* – sensitive indicator of water chemistry and related to resource use, assuming that line-fishing is deemed permissible. One of the conditions for holding a fishing permit for the national park should be to report the catch, by time fished, and number, species and size class caught.

These are all essentially no-cost activities or have costs subsumed in routine park administration.

Table 23. Budget Environmental Research and Monitoring Programme with timeline

Year	Type	2005	2006	2007	2008	2009		2010 >
4.1. Habitat extent/quality	Recurrent					2841		3011
4.2. Water Quality								
- regular programme	Recurrent	1200		1348		1515		1606
- spot-checks	Recurrent	600	636	674	715	757		803
Total Capital		0	0	0	0	0		0
Total Recurrent		1800	636	2022	715	5113		5420

4.4.8. Institutional Capacity Building programme.

Financial planning under this programme covers general administration costs as well as capacity building.

- **Action 1: Office site.** The present FGG office is serviceable and well placed but has been built on the parcel of a family member of an FGG officer. This is a reasonable expedient, but the situation will not be truly permanent unless it is relocated on a site to which FGG has clear rights as an entity. It is therefore suggested that it remain where it is until such time as the park entrance is secured and then relocated to form part of the visitor reception area. Concentrating the infrastructure increases efficiency and justifies the costs of a permanent watchman and, given the entrance is out of town, of transport for the FGG staff.
- **Action 2: Office equipment.** Currently, the office equipment is rudimentary. The following items are required:
 - A computer with printer;
 - Desk, benches and seats, both for the office and for meetings;
 - Storage cupboards.
- **Action 3: Communications.** Good communications are crucial for visitor management as well as for general administration. Security is also a consideration. It is therefore recommended that the office be provided with:
 - One fixed cell-phone (also ensuring fax/email communications);
 - One mobile for the other staff member;
 - ... backed up by:
 - Three two-radios plus spare batteries and chargers (essentially to ensure communications with the night-watchman while avoiding misuse of the mobile, and giving extra back-up from lagoon to shore).
- **Action 4: Staff.** Extreme care must be taken with staffing in order to ensure sustainability. Gra Gra Lagoon is a small area with simple management requirements. It is therefore suggested that voluntary support by stakeholders should be used to the maximum and that permanent staff be limited to the following:
 - Manager – a part-time post filled by a Board appointee from its membership, responsible for all day-to-day management and financial tasks;
 - Administrative assistant – a part-time post, assisting the manager and with particular responsibility for handling visitor enquiries and tours;
 - Accountant – limited accountancy skills and transparency in accounting is a recurrent concern with small NGOs and can create problems. It is therefore suggested that an accountant be hired to maintain the books on a monthly basis. This is separate to the annual audit, which should be undertaken by a different company and has a separate budget-line.
 - Watchman – a full-time post, responsible for security (including at night) and general maintenance around the park entry point.

Other tasks should be undertaken by under short-term contracts unless they are covered by specific grants, in which case the position is strictly limited to the grant-period.

- **Action 5: Transport.** Vehicle purchase and running costs also pose major problems in terms of sustainability. For the level of activity envisaged for Gra Gra, it appears more cost-effective to rely on public transport, hiring as necessary, and a budget provision has been allowed for that purpose.
- **Action 6: Staff development.** Training courses in specific park management techniques and in general administration are normally organised on a national basis and FGG staff and officers should take maximum advantage of the opportunities presented. Key areas already identified include enforcement of regulations, fire-fighting, environmental education techniques, plant and animal identification, protected area management, small business administration and financial management. Funding is normally provided by the organisers but an annual budget provision is also made to ensure ability to benefit fully and also, given that participation as an NGO in wider consultations on environmental affairs is also included in the broad ‘training’ concept, for travel and attendance at meetings.

Table 24. Budget Institutional Capacity Building Programme with Timeline

Year	Type	2005	2006	2007	2008	2009		2010 >
5.1. FGG Office								
- Relocation	Capital	5000						
- Office equipment	Capital	15500						20742
- Office maintenance/running	Recurrent	9000	9540	10112	10719	11362		12044
5.2. Communications								
- Cellular phones	Capital	1250						1673
- Handheld radios	Capital	1250						1673
- Communications costs	Recurrent	2400	2544	2697	2858	3030		3212
5.3. Staff								
- Manager	Recurrent	4800	5088	5393	5717	6060		12847
- Assistant	Recurrent	6000	6360	6742	7146	7575		8029
- Watchman	Recurrent	9120	9667	10247	10862	11514		12205
- Accountant	Recurrent	2400	2544	2697	2858	3030		3212
5.4. Transport	Recurrent	8040	8522	9034	9576	10150		10749
5.5. Training/staff development	Recurrent	3500	3710	3933	4169	4419		4684
5.6. Audit	Recurrent	800	848	899	953	1010		1071
Total Capital		23000	0	0	0	0		24088
Total Recurrent		46060	48824	51753	54858	58150		68053

4.4.9. Income generation

4.4.9.1. Financial strategy.

Estimated expenditure for the management programs (Appendix 1 & 2) indicates that recurrent costs are of the order of BZ\$ 80,000 p.a., rising to BZ\$ 111,000 p.a. at the end of the 5 year planning period. This is a minimal need – expenditure items such as staff and transport have, for example, been held to very, perhaps dangerously, low levels. It does, however, reflect the reality for a small park with a simple management structure and no current income.

Establishing the programs with this level of investment will have beneficial effects on the local economy. Although expenditure is modest, most will be local, includes a capital investment of c. BZ\$ 128,000 and creates one full-time job and two part-time posts for managerial staff. As envisaged here, a visitor program catering for 1000-1500 people per year will generate direct income approximating to annual recurrent expenditure and will provides supplementary income for c. 8 tour-guides. This is best seen as ‘every little bit helps’ but indirect benefits will be greater and are potentially substantial. The program sets up an effective national park as a local asset, contributes to the visibility of Dangriga as a place to visit, and establishes a visitor program. It is expected that this will take on its own dynamic as local entrepreneurs make use of the opportunities presented, both at Gra Gra and in the district as a whole.

The problem, however, is that although the park has the potential to generate at least as much revenue as it expends, not all of that revenue will accrue to the park itself. The estimates (see below) indicate self-generated tourism revenues for reinvestment in park management of the order of BZ\$ 17,800 rising to BZ\$ 26,000 – respectable enough but far short of the minimum need. The key implication is that ***the park should maximize its capacity to capture self-generated income but should not be expected to become self-sufficient from this source alone.*** There are other implications:

- Inability to become totally self-sufficient is not limited to Gra Gra Lagoon National Park. None of the smaller terrestrial protected areas in Belize, and perhaps none of the protected areas of any size, are likely to be capable of supporting an effective management program on their own locally-generated income. Collectively, however, they constitute an important national asset and must deliver substantial indirect benefits through tourism and delivery of environmental goods and services. This is a national issue, must be addressed at a national level, and is indeed the underlying purpose of the conservation levy and the Protected Area Conservation Trust (PACT). Regular support from PACT should therefore be expected to make up recurrent expenditure needs.
- Gra Gra National Park is a small management unit. Management programs (including accountancy, audit, project management) might be more efficiently handled by full-time staff working to support the volunteer/part-time personnel of a group of sites rather than attempting to run parallel programs at each one. This approach, amounting to a national support service, needs serious consideration as efficiency is an important factor in attracting international and national grant

funding but is often a real constraint, especially for community-managed protected areas.

- Great care must be taken to distinguish ‘core’ activities and programs from those that are desirable but not absolutely essential for the existence of a well-managed protected area. The difference is that ‘core’ activities should be covered by a combination of self-generated and reliable national sources (i.e. PACT). If these costs are met, the long-term sustainability threshold has been passed. Meanwhile, capital and ‘desirable’ activities must be covered by grant funding.

4.5.9.2. Self-generated income.

This centres on the recreational use programme. Current visitor levels are extremely low but local operators indicate this could be raised from present tourist numbers in the region if an effective system for organising visits were in place. Furthermore, cruise ship traffic is already established and it would be useful to offer Gra Gra as a local attraction. To that one can add a steady stream of independent travellers and the potential for visits by Belize residents. In the medium-term, increased accommodation in the area and the possibility of increased numbers of cruise vessels suggests that numbers could rise. Medium-term targets of 1000 visitors/year after three years and 1500 after 5 years have therefore been set. This represents an average of 3 visits per day rising to 4 visits per day after 5 years, which looks modest enough but:

- can only be achieved through an efficient visitor management and marketing effort (section 4.5.5 & 4.5.10);
- will involve periods of more intense use, as a significant proportion of the visitors are expected to come from cruise ships. This may be manageable if the vessels remain small (c. 30 people might be expected from a 100 berth boat) but larger numbers will probably place serious strains on infrastructural and organisational capacity. Periodic disturbance to sensitive sites (e.g. bird roosts) is extremely likely and the site may feel crowded. Handling such situations will require considerable skill and discipline on the part of the guides.

Means of generating income from visitors are outlined in section # and include collection of entry fees, a proportion of fees from guided tours (assumed to be 25%, the remainder going to the guide), sales and, if line fishing is permitted, rod-hire. Taking all categories of visitor into account, the average revenue per visitor is BZ\$ 17.80 (Appendix 5), giving the estimated income of BZ\$ 17,800 rising to BZ\$ 26,000. [NB: if park entry is included in canoe-hire, the equivalent figures are BZ\$ 16.90 per visitor, with estimated income of BZ\$ 17,000 rising to BZ\$ 25,500].

Income from park entries and guided tours therefore represents 25% of the total financial requirement for recurrent costs. In developing the recreational use program however, the park entrance becomes a point where visitors congregate and hence a attractive sales location for refreshments, local handicrafts and products. Direct involvement by FGG in this activity, beyond some direct sales from its office and marketing through other local outlets, would be a distraction from its core work. It would be far preferable, and spread benefits more widely, to give concessions for space in the entrance area (in front of the

visitor shelter to separate it from the entrance proper) to allow local entrepreneurs to take advantage of the opportunities presented. Visitor numbers are presently so low that it is unlikely that the park-entry would support permanent structures for sales. Temporary stalls are a more viable proposition, at least in the immediate future. The suggestion, then, is to rent rights to space for 12 stalls at an economic rate (BZ\$ 200/month) to create extra revenue (BZ\$ 28,800). Given that the intent is to increase visitation levels, the situation and opportunities should change over time. The initial rights should therefore be given out for a 3-year period, allowing for subsequent review and re-organization. The other revenue streams should also be reviewed at this time.

Assuming the 1000 visitor/year medium-term target is reached, the combined third year income (entries, tours and concession) should then reach BZ\$ 46,600 or approximately 65% of the estimated recurrent cost requirement. This leaves the remaining 35% for top-up support from PACT – ***a standard formula of 1\$ recurrent cost support for every 2\$ self-generated would in fact both complete the recurrent cost requirement and create an incentive to meet income targets.*** Park management does have to built up to achieve this and reliance is therefore placed on grant support for the first three years at least.

4.4.10. Marketing strategy

Gra Gra is a locally valuable site – people will not come to Belize, nor even Stann Creek, just to visit the lagoon. It will, however, contribute to the attractiveness of the country and the district, and enrich visit quality once people have made the decision to come. The materials for marketing the site are included in the various management programs and must be used to good effect to meet the visitor targets. There are two main considerations:

- **Increased visibility.** The aim here is to ensure that Gra Gra lagoon, its qualities and the option of visiting it, are widely known.
 - **The web-site:** The main purpose of the web-site is to inform potential visitors before they arrive, as they make their decisions on how to organise their itinerary. Apart from an attractive and well-maintained web-site, it is important to ensure good linkages with all other sites likely to be accessed by a prospective tourist.
 - **Posters and leaflets:** These should be used in combination. Leaflets carry more information but tend to be over-looked, scattered or misplaced. The main purpose of the poster is to draw attention to them. The main marketing strategy targets people who are already in the general area. Posters should therefore be visible everywhere that visitors tend to gather when in or around Dangriga – agencies, hotels, restaurants The stocks of leaflets must also be maintained and distributed at regular intervals. Both posters and leaflets (and the web site) must encourage visits and carry sufficient information for a visitor to be able to contact FGG.
 - **International guide-books:** The most important single act to promote visits by independent travellers is to ensure good reviews in the most commonly used travel guides. Opportunities must never be lost to ensure that the site receives a mention, and many encourage submissions for inclusion in future editions. The information will, however, certainly be vetted in some way and value for money will be the key issue. A poor review can effectively kill visitation.
 - **National visibility:** A special effort must be made to ensure that Gra Gra becomes one of the offerings given by the tour agencies, certainly those based locally and also those organising country-wide itineraries. This approach also includes entries in the national tourist information services (e.g. Destination Belize) and participation in national efforts to promote tourism.

- **Effective visitor management.**

At present, organising a visit on the lagoon is laborious – guides must be arranged beforehand and it can take over an hour to collect the canoes and other materials and transport them to the landing area. Concentrating all the equipment at the park entry circumvents the logistical issues but it is essential to develop a smooth and reliable routine. The key action is to use the part-time staff to ensure a regular presence at the FGG office, at known times and with good communications, in order to handle enquiries and organise visits. The second important action is to implement clear and transparent money-handling procedures. Efficiency in both of these areas is crucial in

assuring visit quality and engendering the sense of effective management both in visitors and among funding agency representatives.

- ***Visit quality and value.***

As noted in the public consultations, the quoted price of BZ\$ 80 plus BZ\$ 10 entry fee for a two-hour guided visit on the lagoon appears extremely high. The lagoon is pleasant but not exceptional and there is a distinct risk that it will gain a reputation for poor value however good the guides may be. On the other hand, FGG needs an income stream at this level if it is to meet its financial targets.

The suggestion, therefore, is to maintain the price but extend/repackage the tour to include other attractions in the area. The possibilities of developing additional offerings on the northern shore, accessed via the lagoon, should be explored. Extending the tours as far as Mayflower and taking in activities undertaken by the community groups should also be considered to promote their growth alongside that of FGG. Canoe trips on Stann Creek are said to be interesting and the concept of presenting the interplay between the natural environment and traditional Garifuna culture in the presentation must certainly be developed (c.f. the Community Baboon Sanctuary, successfully marrying rural Creole life with conservation). The local tour operators are best placed to design these itineraries and it is strongly recommended that FGG collaborate closely in their development. The general thrust is to enrich visit quality with offerings that, even if the overall price is higher, meet and preferably exceed expectations. Good reputation is the strongest marketing tool of all.

4.4.11. Fund-raising strategy

As set out here, the Gra Gra Lagoon National Park has the potential to become self-sustaining in its core activities through a combination of self-generated and national resources from the end of the third year of the management planning period – i.e. 2007. However, in order to do this FGG must secure grant-aid to establish its infrastructure and build up its operations over the first three years and continuing support over the first five years is highly desirable. Furthermore, any action that is not deemed absolutely essential to maintain the park will be only be undertaken with supplementary support. In effect, the programme breaks down into the following phases:

- **Establishment (2005-2006).** This is the *short-term financial planning period*, concentrating on infrastructure and the establishment of routine management programs and a visible on-ground presence. The budgets assume this is undertaken in the first year but, given funds must be found, it will in reality roll over into the first half of the second year.
- **Development (2006-2007).** This corresponds to the *medium-term planning period*. Grant-aid must be used to maintain routine programs while self-generated income is built up and starts to assume part of the cost.
- **Consolidation (2008-2009 and on).** The *long-term planning horizon*, in which core management programs are fully covered by self-generated and national support. Strictly speaking, grant-aid can therefore be limited to optional ‘add-on’ activities. In practice, however, provision must be made at this time for a new round of capital expenditure in 2010, including the preparation of the revised management plan. Continued grant-support relieves costs and allows a reserve to be built up, maintains donor contacts, and gives an added safety margin.

Annual budgets, broken down into capital and recurrent costs, are given in Appendix 1. These are re-organized in Annex 5, to take account of developing capacity for self-generated income and to estimate fund-raising needs.

At this time the World Bank is the only donor to pledge support, indicating willingness to provide approximately BZ\$ 30,000 of start-up funds in addition to the development of the management plan. This, however, falls far short of the capital expenditure seen here as a minimum initial investment. It is therefore strongly recommended that the level of initial support be reconsidered in order to give FGG a reasonable chance of achieving its objectives. The ideal would be to cover the entire capital expenditure program, allowing FGG to use that support to lever further funds for operating costs. If this is not possible, it should at least cover the capital costs for the recreational use and institutional capacity programs, estimated at BZ\$ 75,000 and instrumental in future revenue generation, leaving the remainder to be covered by grants from elsewhere.

Long-term core-financing should not be dependent on outside sources. It is also extremely important in attracting the necessary support to demonstrate from the outset that a plan is in place to sustain activity after the funding period. The involvement of PACT is therefore necessary from the beginning. Currently, PACT foregoes its 20% share of park entry fees, representing a donation of BZ\$ 2 per visitor or BZ\$ 3,800 assuming the policy is maintained over the next three years. As suggested above, it is

recommended that it also institute the permanent policy of providing a BZ\$1 match for every BZ\$2 self-generated. Initially, this gives modest support (c.BZ\$ 6,600) but rises to c. BZ\$ 28,000 at the end of the fifth year. More importantly it is reliable, secures the mechanism for long-term sustainability and underpins the overall fund-raising effort by demonstrating national support.

This leaves an annual recurrent budget requirement varying between BZ\$ 58,300 (in the first year) and BZ\$ 14,300, totaling BZ\$ 155,000 over the entire 5 year period. In grant-giving terms, this is not a large sum and it is therefore suggested that:

- the entire requirement for the full five years be sought from one donor, so gaining efficiency in reporting and managing donor relations;
- the sum sought be increased to cover *all* recurrent costs for the first five years, totaling BZ\$ 455,400. Meanwhile, the self-generated income and the PACT matching funds should be set aside as an interest-generating reserve fund. This covers the long-term strategic need, ensuring funds are in hand to cover the capital costs foreseen for 2010, creating a reliable supplementary income stream and providing a safety margin in case of need (e.g. recovery from storm damage).

In choosing which donor(s) to approach, it should be borne in mind that the importance of Gra Gra lies as much or more in the environmental services that it provides, notably clean water outflow into the marine environment, as in its intrinsic qualities as a national park. Basically this means that any agency involved in the conservation of the Meso-American Barrier Reef should also have an interest in the good management of Gra Gra Lagoon and similar coastal sites. It is suggested that four agencies be approached first, to ascertain interest:

- World Bank GEF: The management planning process has been supported by World Bank through its linkage with the infrastructural project for improved drainage in Dangriga, and the support extends to the capital costs involved in plan implementation. The logical step is to secure the remaining need for executing the plan from the World Bank financing instrument designed for that purpose.
- UNDP: The early evolution of FGG, and thus the establishment of the park, is largely due to the support given through the UNDP small grants program. It can be said that they have already fulfilled their role but it can also be argued that further support both consolidates what they helped begin and safeguards their original investment.
- Summit Foundation: The Summit Foundation is heavily committed to the conservation of the Belize Barrier Reef and also counts the maintenance of good quality outflow from agricultural lands among its priority action areas.
- Oak Foundation. A proposal has already been submitted but refused on grounds that include the absence of a management plan. Given that the plan has now been prepared, the proposal should therefore be re-packaged and re-presented.

The assumption is that the necessary core-finance can be obtained from one or a combination of these funding agencies. Meanwhile, FGG can also help reduce costs by fostering relationships with the wide range of organizations with access to funding and/or

capable of providing logistical support. Peace Corps, for instance, may be able to provide extra human resources to carry through organization through the initial stages of management plan implementation. Others, with due oversight from local experts, may help with construction. Nonetheless FGG must keep a narrow focus on establishing its operations and setting up smooth administrative procedures, to become a small but efficient management body. While this is taking place, involvement in any activities not directly related to the immediate work program is liable to be a distraction. Only when they are well set up and running should FGG consider widening its scope.

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Appendix 1: Gra Gra Lagoon - estimated expenditures

Year	Type	2005	2006	2007	2008	2009		2010 >
1. Resource Protection Programme								
1.1. Boundary demarcation								
* Boundary demarcation.								
- Survey/initial cut-line	Capital	7500						
- Boundary markers	Capital	5300						
- Boundary maintenance	Recurrent		2544	2697	2858	3030		3212
* Signage								
- Erection	Capital	13100						
- Maintenance	Recurrent			2248		2526		
- Replacement	Recurrent							8766
1.2. Local advocacy	Recurrent	2000	2120	2247	2382	2525		2676
Total Capital		25900	0	0	0	0	0	0
Total Recurrent		2000	4664	7192	5240	8081	0	14654
2. Recreational Use Programme								
2.1. Visitor reception area								
- Site acquisition/preparation	Capital	7500						
- Visitor shelter	Capital	12000						
- Jetty construction	Capital	5000						
- Boatshed	Capital	10000						
- Utility connections	Capital	1500						
- Toilets/waste management	Capital	12000						
- Water tower	Capital	1200						
- Site maintenance/repairs	Recurrent	2500	2650	2809	2978	3156		3346
2.2. Visitor equipment								
- Canoes + equipment	Capital	14000						18735
- Line-fishing equipment	Capital	750			893			1064
2.3. Guide-training								
- Guide workshops	Recurrent	1500	1590	1685	1787	1894		2007
- Part-time guide training	Recurrent	6000		6742		7575		8029
- 'Catch-and-release' training	Recurrent	1500	1590	1685	1787	1894		2007
2.4. Sales materials								
- T-shirts etc ...	Recurrent	5000	5300	5618	5955	6312		6691
Total Capital		63950	0	0	893	0		19799
Total Recurrent		16500	11130	18540	12506	20831		22080
3. Environmental Awareness Programme								
3.1. Permanent displays								
- Production	Capital	8000						10706
- Maintenance	Recurrent	800	848	899	953	1010		1071
3.2. Information materials								
- Brochure reprints	Recurrent	1800	1908	2022	2144	2272		2409
- Poster reprints	Recurrent	2000	2120	2247	2382	2525		3346
- New poster production	Recurrent		3180			3787		4015
- Stickers/calendars	Recurrent	2000	2120	2247	2382	2525		2676
- Visitor Guide production	Capital	7000						

- Visitor guide reprints	Recurrent				3573			3787
3.3. Media budget	Recurrent	1500	1590	1685	1787	1894		2007
3.4. Web-site maintenance	Recurrent	4000	4240	4494	4764	5050		5353
Total Capital		15000	0	0	0	0		10706
Total Recurrent		12100	16006	13596	17984	19063		24664
4. Environmental Monitoring Programme								
4.1. Habitat extent/quality	Recurrent					2841		3011
4.2. Water Quality								
- regular programme	Recurrent	1200		1348		1515		1606
- spot-checks	Recurrent	600	636	674	715	757		803
Total Capital		0	0	0	0	0		0
Total Recurrent		1800	636	2022	715	5113		5420
5. Institutional Capacity Building/Admin.								
5.1. FGG Office								
- Relocation	Capital	5000						
- Office equipment	Capital	15500						20742
- Office maintenance/running	Recurrent	9000	9540	10112	10719	11362		12044
5.2. Communications								
- Cellular phones	Capital	1250						1673
- Handheld radios	Capital	1250						1673
- Communications costs	Recurrent	2400	2544	2697	2858	3030		3212
5.3. Staff								
- Manager	Recurrent	4800	5088	5393	5717	6060		12847
- Assistant	Recurrent	6000	6360	6742	7146	7575		8029
- Watchman	Recurrent	9120	9667	10247	10862	11514		12205
- Accountant	Recurrent	2400	2544	2697	2858	3030		3212
5.4. Transport	Recurrent	8040	8522	9034	9576	10150		10749
5.5. Training/staff development	Recurrent	3500	3710	3933	4169	4419		4684
5.6. Audit	Recurrent	800	848	899	953	1010		1071
Total Capital		23000	0	0	0	0		24088
Total Recurrent		46060	48824	51753	54858	58150		68053
Combined Programmes								
Total Capital Costs		127850	0	0	893	0		54593
Total Recurrent Costs		78460	81260	93102	91303	111238		134871
Total Annual Budget		206310	81260	93102	92196	111238		189464

Appendix 2. Expenditure: explanatory notes

Inflation: annual increment of 6% per year over 2005 cost estimates.

Action: tasks required to implement work programme

Type: Capital or recurrent cost

Period : refers to write-off period for capital expenses, frequency for recurrent costs.

Action	Type	Period (years)	Expenditure type	Basis for estimate			Total 2005	Notes
				Unit	Unit No.	Unit cost		
Resource Protection Programme								
Boundary demarcation								
Boundary survey	Capital	10	Local service contract	Mile	5	1500	7500	Includes 50% mark-up for terrain
Boundary markers	Capital						5300	
<i>Boundary marker materials</i>		10	<i>Local purchase</i>				1460	
- 3 m poles				3 m pole	45	20	900	
- Cement				sack	25	15	375	
- Aggregate				sack	25	5	125	
- Paint				5-l tin	2	30	60	
<i>Boundary marking labour</i>		10	<i>Local service contract</i>				3840	
- Transport				Day	8	120	960	<i>Pick-up hire + fuel 3 man team for 8 days</i>
- Labour				Man-day	24	120	2880	
Boundary maintenance	Recurrent	1	Local works contract	Day			2400	
- Transport				Day	5	120	600	<i>Pick-up hire + fuel 3 man team for 5 days</i>
- Labour				Man-day	15	120	1800	
Signage								
Emplacement							13100	
<i>Purchase - large</i>	<i>Capital</i>	10	<i>National purchase</i>	<i>sign</i>	3	1000	3000	
- medium	<i>Capital</i>	10		<i>sign</i>	4	750	3000	
- small	<i>Capital</i>	10		<i>sign</i>	6	300	1800	

<i>Erection</i>	<i>Capital</i>	<i>Local works contract</i>						
- Materials						1460		Based on boundary marker costs (2 poles/sign)
- Labour						3840		Based on boundary marker costs (boat hire)
Maintenance	Recurrent	2	Local works contract			2000		50% replacement at 5 year intervals.
Replacements	Recurrent	5	National purchase			6550		
Local advocacy	Recurrent	1	Sub-grants			5000		Budget provision
Recreational Use Programme								
Visitor Reception								
Site acquisition	Capital		Local purchase	acre	2	5000	10000	
Site preparation	Capital		Local works contract	acre	1.5	5000	7500	
Jetty	Capital	10	Local works contract				5000	Budget provision
Boatshed	Capital	20	Local works contract				10000	Budget provision
Electricity/water connection	Capital		Local works contract				1500	Budget provision
Toilets	Capital	10	National works contract	Unit	2	6000	12000	Estimated (composting toilets).
Water-tower	Capital	5	Local works contract				1200	Budget provision
Site maintenance	Recurrent		Local works contract				2500	Budget provision
Visitor equipment								
Canoes and ancillary gear	Capital	5	National purchase	Canoe	8	1720	14000	Set - canoe, 2 paddles, 3 life-jackets + spares
Line fishing equipment	Capital	3	National purchase	Set	3	250	750	Provisional on compatibility
Guide-training								
- Annual work-shops	Recurrent	1	Local service contract				3000	Budget provision
- Part-time training	Recurrent	2	National service contract				6000	Budget provision

- 'catch-and-release'	Recurrent	1	National service contract				1500	Budget provision
Sales materials								
- T-shirts, caps	Recurrent	1	National purchase	set	250	20	5000	
Enviromental Awareness Programme								
Permanent displays								
- FGG office	Capital	5	National service contract				3500	Budget provision
- Park entry point	Capital	5	National service contract				4500	Budget provision
- Maintenance	Recurrent	1	Local service contract				1500	Budget provision
Information dissemination								
- Brochures	Recurrent	2	National service contract				1800	Budget provision (based on previous reprints)
- Poster reprints	Recurrent	2	National service contract				2500	Budget provision
- New poster production	Recurrent	3	National service contract				3000	Budget provision
- Stickers/calendars	Recurrent	1	National service contract				2000	Budget provision
- Visitor guide	Capital	3	National service contract				7000	Budget provision, includes drafting.
- Local media	Recurrent	1	Local service contract				1500	Budget provision
- Web-site	Recurrent	1	National service contract				4000	Budget provision
Schools programme								
- School visits	Recurrent	1	Local service contract				6000	
Environmental Monitoring Programme.								
Habitat extent/quality	Recurrent	5	National service contract	Day	5	450	2250	Includes field expenses
Water Quality monitoring	Recurrent	2	National service contract	Sample	6	200	1200	

Water Quality spot-checks	Recurrent	1	National service contract	Sample	3	200	600	Allows for one spot-check p.a.
Institutional Capacity Building								
Office relocation	Capital		Local service contract				5000	Budget provision
Office equipment								
- Computer	Capital	5	Local purchase			3500		
- Furniture	Capital	5	Local purchase			12000		To include photocopier
Office maintenance	Recurrent	1	Local service contract				9000	Budget provision. Includes utilities, stationery etc ...
Communications								
- Cellular telephones	Capital	5	Local purchase				1250	Budget provision
- Hand-held radios	Capital	5	National purchase		3	600	1250	Includes accessories
- Communications	Recurrent		Local service contract	Month	12	200	2400	
Staff								
- Manager	Recurrent	1	Local service contract	Month	12	400	4800	Part-time (25%), inclusive of social security
- Assistant	Recurrent	1	Local service contract	Month	12	500	6000	Part-time (50%), grant-aided
- Watchman	Recurrent	1	Local service contract	Month	12	760	9120	Full-time
- Accountant	Recurrent	1	Local service contract	Month	12	200	2400	Part-time
Transport								
- Public transport/car hire	Recurrent	1	Local service contract	Month	12	670	8040	Budget provision
Training								
- miscellaneous	Recurrent	1					3500	Budget provision, training-related only
Audit	Recurrent	1	Local service contract				800	Budget provision

Appendix 3. Income generation (BZ\$)

(NB - revenues rounded to nearest 5 BZ cents)

Visitor category	Unit Price	Income	Notes
Non-resident - using FGG tours:			
Park entry	10	7	20% to Pact, 10% to FD)
Guided canoe tour	80	20	75% to guide
Rod Hire	20	0.65	One visitor in 30
T-shirt + cap	30	3	One visitor in 10
Poster	5	0.15	One visitor in 30
Sticker	2	0.1	One visitor in 20
Guide booklet	30	0.5	One visitor in 50
Revenue/visitor		31.4	
Resident - using FGG tours:			
Park entry	2	1.4	20% to Pact, 10% to FD)
Guided canoe tour	40	10	75% to guide
Rod Hire	10	1	One visitor in 10
T-shirt + cap	30	0.6	One visitor in 50
Poster	5	0.05	One visitor in 100
Sticker	2	0.2	One visitor in 10
Guide booklet	30	0.3	One visitor in 100
Revenue/visitor		13.55	
Non-resident - using local operators:			
Park entry	10	7	20% to Pact, 10% to FD)
Guided canoe tour	0	0	
Rod Hire	20	0.65	One visitor in 30
T-shirt + cap	30	3	One visitor in 10
Poster	5	0.15	One visitor in 30
Sticker	2	0.1	One visitor in 20
Guide booklet	30	0.6	One visitor in 50
Revenue/visitor		11.5	
Resident - self-organised			
Park entry	2	1.4	20% to Pact, 10% to FD)
Canoe hire	20	4	One visitor in 5
Rod Hire	10	1	One visitor in 10
T-shirt + cap	30	0.6	One visitor in 50
Poster	5	0.05	One visitor in 100
Sticker	2	0.2	One visitor in 10
Guide booklet	30	0.3	One visitor in 100
Revenue/visitor		7.55	

Estimated Revenues					
<i>Visitor category</i>	<i>%</i>	<i>Total</i>	<i>Rev./vis</i>	<i>Tot. rev.</i>	<i>Av. Rev</i>
Non-resident - using FGG tours	33	330	31.4	10362	
Resident - using FGG tours	33	330	13.55	4472	
Non-resident - using local operators	10	100	11.5	1150	
Non-resident - self-organised	24	240	7.55	1812	
Total	100	1000		17796	17.80

Revenues: assumptions and explanatory notes.

Revenue figures based on 1000 visitors p.a. (i.e. mid-term target).

Assumes visitor breakdown of:

- 330 (33%) non-residents organising tours through FGG
- 330 (33%) non-residents organising tours through other local agencies
- 100 (10%) residents organising tours through FGG
- 240 (24%) residents self-organising visits to site

Further assumes (as a rough estimate) that among non-residents:

- 1 visitor in 10 buys a T-shirt and hat;
- 1 visitor in 20 buys a sticker
- 1 visitor in 30 i) hires fishing equipment;
ii) buys a poster
- 1 visitor in 50 buys a booklet

and that among residents:

- 1 visitor in 5 hires a canoe, the others using the trails only.
- 1 visitor in 10 i) hires fishing equipment;
ii) buys a sticker
- 1 visitor in 50 buys a T-shirt and hat;
- 1 visitor in 100 i) buys a poster
ii) buys a booklet

Appendix 4: Gra Gra Lagoon - funding requirements

Planning Horizon	Short	Medium		Long			
	Year						
	2005	2006	2007	2008	2009		2010 >
Estimated expenditure requirement							
- Capital	127850	0	0	893	0		54593
- Recurrent	78460	81260	93102	91303	111238		134871
Total	206310	81260	93102	92196	111238		189464
Self-generated income							
- Visitor target	200	700	1000	1300	1500		1500
- Visitor income	3559	12457	17796	23134	26693		26693
- Concessions income	9600	19200	28800	28800	28800		28800
Total	13159	31657	46596	51934	55493	0	55493
Donor requirement							
- Capital expenditure	127850	0	0	893	0		54593
- Recurrent expenditure	65301	49603	46507	39369	55745		79378
Total	193151	49603	46507	40262	55745		133971
Potential Funding sources							
World Bank	127850						
PACT: foregone 20% entry fee	400	1400	2000				
PACT: 1:2 match	6580	15828	23298	25967	27747		27747
Residual recurrent target as grant target	58321	32374	21209	14295	27998		106224

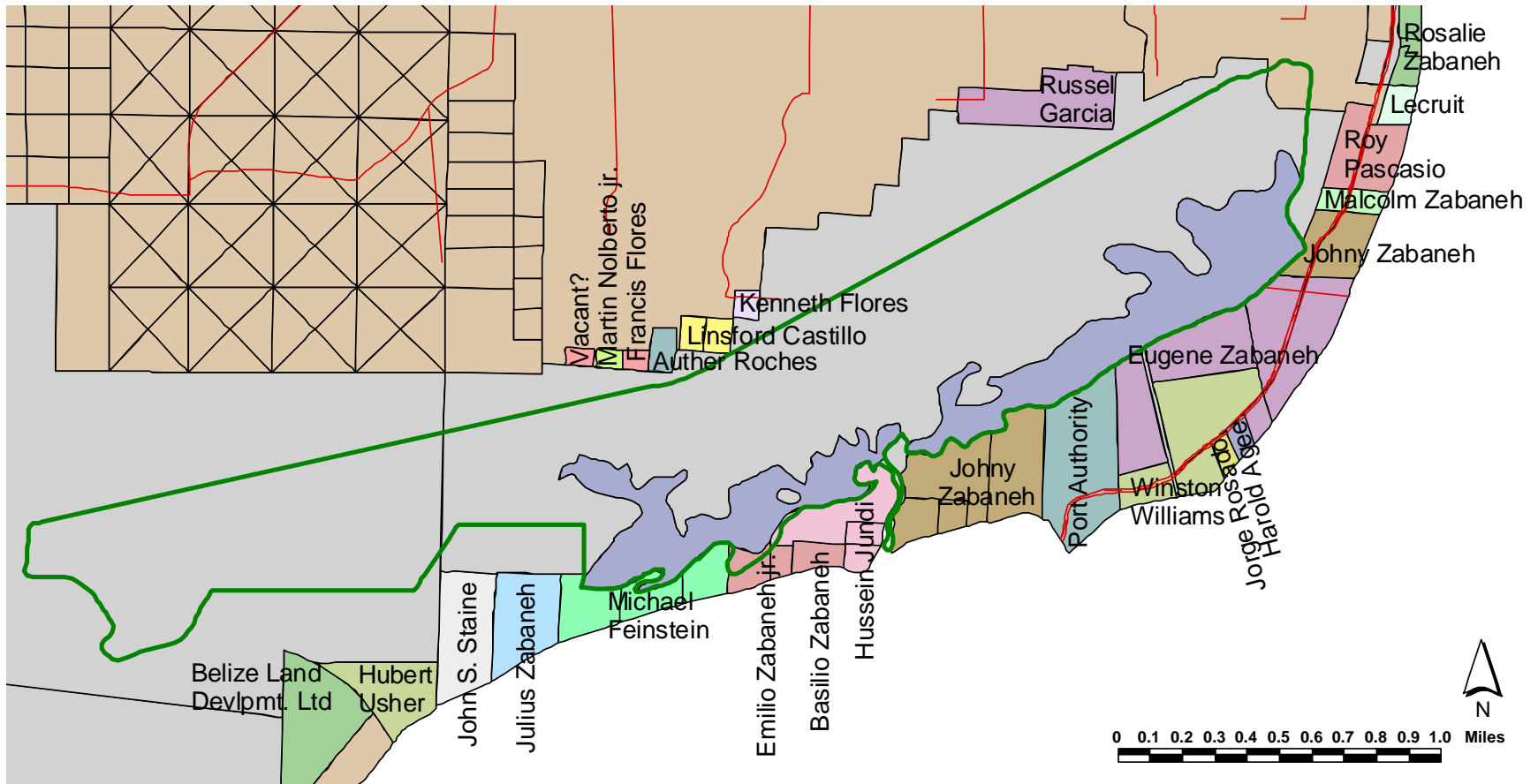
Appendix 5.

2. Income generation (BZ\$) - Scenario B (entry inclusive of price) (NB - revenues rounded to nearest 5 BZ cents)

Visitor category	Unit price	Income	Notes
Non-resident - using FGG tours:			
Park entry	10	7	20% to Pact, 10% to FD)
Guided canoe tour	70	17.5	75% to guide
Rod Hire	20	0.65	One visitor in 30
T-shirt + cap	30	3	One visitor in 10
Poster	5	0.15	One visitor in 30
Sticker	2	0.1	One visitor in 20
Guide booklet	30	0.5	One visitor in 50
Revenue/visitor		28.9	
Resident - using FGG tours:			
Park entry	2	1.4	20% to Pact, 10% to FD)
Guided canoe tour	38	9.5	75% to guide
Rod Hire	10	1	One visitor in 10
T-shirt + cap	30	0.6	One visitor in 50
Poster	5	0.05	One visitor in 100
Sticker	2	0.2	One visitor in 10
Guide booklet	30	0.3	One visitor in 100
Revenue/visitor		13.05	
Non-resident - using local operators:			
Park entry	10	7	20% to Pact, 10% to FD)
Guided canoe tour	0	0	
Rod Hire	20	0.65	One visitor in 30
T-shirt + cap	30	3	One visitor in 10
Poster	5	0.15	One visitor in 30
Sticker	2	0.1	One visitor in 20
Guide booklet	30	0.6	One visitor in 50
Revenue/visitor		11.5	
Resident - self-organised			
Park entry	2	1.4	20% to Pact, 10% to FD)
Canoe hire	18	4.5	One visitor in 5
Rod Hire	10	1	One visitor in 10
T-shirt + cap	30	0.6	One visitor in 50
Poster	5	0.05	One visitor in 100
Sticker	2	0.2	One visitor in 10
Guide booklet	30	0.3	One visitor in 100
Revenue/visitor		8.05	

Estimated Revenues					
Visitor category	%	Total	Rev./vis	Tot.rev.	Av. Rev
Non-resident - using FGG tours		33	330	28.9	9537
Resident - using FGG tours		33	330	13.05	4307
Non-resident - using local operators		10	100	11.5	1150
Non-resident - self-organised		24	240	8.05	1932
Total		100	1000		16926
					16.93

Appendix 6. Property map



Appendix 7. TERMS OF REFERENCE

1. GENERAL CONSIDERATIONS

1.1 BELIZE ROADS & MUNICIPAL DRAINAGE PROJECT

In June 2000, the World Bank approved a financing to the Belize Government (Ministry of Works, Transport and Communication) a loan of US\$ 13 millions to the "Belize Roads & Municipal Drainage Project" (BZ-40150).

The objectives of the project would be to: a) improve year-round traffic flows on the national road network by upgrading the road bypass connecting the Northern and Western Highway; b) improve natural drainage and reduce floods and/or the impact of floods in the selected municipalities through priority storm-water drainage improvements; c) assess the potential of private sector participation in road maintenance activities through the implementation of a pilot project; and d) improve the management of the transport sector, including transport policy coordination among the different government ministries and agencies involved in transport, through the preparation of national transport sector and road safety strategies.

1.2 ENVIRONMENTAL COMPONENT: MANAGEMENT PLAN OF GRA GRA LAGOON

The total cost of the project was included an environmental investment to protect sensitive areas, with resources of the Bank. In this sense it was considered important to support, with these resources, the elaboration of the Management Plan (MP). As a condition to finance this Plan, the MNREI presented to the Bank the Co-management Agreement of the Gra Gra Lagoon National Park for the "no-objection".

It is worth mentioning that the Friends of Gra Gra Lagoon Conservation Group, developed a Study financed with the support of GEF/UNDP with a Small Grant Project for the establishment of the area as a protected area, including environmental education, training and public awareness. They are expecting more support in the future by this institution to strengthen the environmental management of that area.

1.3 PURPOSE OF THE CONSULTANCY

The multiple uses of wildlands (recreation, tourism, scientific research, education, baseline environmental monitoring and controlled harvesting) increase the need for proper management planning so that the importance of the Wildland Management Areas (WMA) is not seriously impacted.

The Gra Gra Lagoon National Park, need a well-developed Management Plan to ensure efficient allocation of scarce financial and human resources. In this sense, the consultant will be the responsible to develop this instrument.

As part of the consultancy, the consultant has to propose a short Action Plan to be done in the short term. The amount of this Plan is to be included in the cost of the consultancy and it will apply to improve the institutional enforcement with the Friends of Gra Gra Lagoon National Park, and to the execution of main components that they need to begin the management of the Area. In the case of Institutional Enforcement, they have considered to buy a computer with printer and accessories to have Internet connection, and make a WEB Page for the Gra Gra Lagoon National Park. In the case of infrastructure components, they have to consider an investment of a main trail to access to the Park, prevention signs and a guardian house. The amount of this Plan is not to be major than US\$ 15.000.

The next section presents a general description of what it is expected in the MP. The consultant may include other aspects, in order to improve the Plan in the proposal.

I. MANAGEMENT PLAN

2.1 INTRODUCTION

2.1.1 Definition and Purpose of Management Plan (MP)

This section usually does not have more than one page. It should present a very concrete definition of the MP and the general and specific objectives of the plan. It should also give a general indication concerning the contents of the Plan.

2.1.2 Importance of the protected area

This section usually does not have more than three pages. It should present a summary of the importance of the environmental values within the protected area, as well as its biological and cultural values. It should also show the relation between the different environmental goods and services within a local and national context. Finally, it should show how many jobs the protected area generates or can generate.

2.1.3 Location of the protected area

This section should describe the geographical location of the protected area and its specific boundaries (no more than one page).

2.1.4 Legal basis of the protected area

The section should place the protected area within national environmental legislation. This section should contain information of activities that can

and cannot be done within and around the protected area. It should also include the institutional capacities of those managing the area, and information on the Co-management agreement, concessions, etc.

2.2 DIAGNOSIS OF THE WILDLAND AREA

2.2.1 National Context

This is a descriptive section on the national location of the protected area. It should have a general description of the protected areas system and its relationship with the economy in the country (no more than ten pages). This section should have a clear description of the interest groups or parties/stakeholders involved in the management of the area at the national level.

2.2.2 Local Context

This is a descriptive section on the regional location of the protected area, its biophysical resources, and the economic and social relations of the area. In general it can have another ten pages. In it the soil, vegetation, and climate of the area are described: additionally, communities, highways and infrastructure located within and outside of the protected area. Finally, it has a description of the productive system and the economic situation within which the protected area has been involved in.

2.3 ECO-REGIONS AND CONSERVATION ELEMENTS

This section shows a characterization of the cited elements of conservation. The section can have a few pages on terrestrial ecosystems and others on the marine ecosystems. This section presents the results of the most important inventories within the protected areas. In total it should contain no more than ten pages. This section should carry a map illustrating the most important conservation elements.

2.3.1 Zonation

The zonation is a section that illustrates the result of the exercise to analyze the resources and confront them with the objectives of the protected area. This is no more than the reflection of the land use planning of the protected area. This section should not have more than twelve pages and describe each zone (location, limits, activities allowed, activities not allowed, etc.). and the boundary of the protected area. This should be accompanied with a map.

2.3.2 Threats affecting conservation elements

The threat section should illustrate each conservation elements against the threats. It should describe the source of the threats and the major stakeholders to be dealt with to reduce threats. This section should not have more than eight pages and should also include a map that identifies the geographical context with which it interacts.

2.4 ENVIRONMENTAL MANAGEMENT

2.4.1 Management Objectives

This section describes the objectives of the said area based on the available information and the context of the protected area. These objectives define at the same time the management category that the area should have. This section should not be more than three pages.

2.4.2 Management Strategy

Based on the management objectives, on the location of the conservation elements, and on usage context; the principle and the general management strategy of the protected area need to be defined. This section should not have more than ten pages. This section should indicate possible connectivity with other ecosystems and adjacent protected areas among others. This section should also identify the risks and assumptions in developing the management plan.

2.4.3 Management Programs

The different management programs identified during the planning process are described. These depend on the objectives and the conservation elements. The size of the section varies depending on the resources, the demands and level of analysis (no more than fifteen pages). The programs should describe the work program/themes and the principal activities -of the referred zones, where and when activities will be carried out. Is important to include the budget of each programs, its schedule to will be implemented, and the necessity of personnel. For example: Environmental Management Program

- Protection
- Resource management
- Research
- Monitoring and cooperative scientific activities

Public use Program Recreation
Education Ecotourism Public
relations and extension

Operations Program
Administration
Maintenance

Integrated development Program

Development areas Personnel
development Institutional factors
Development schedule

2.5 SUCCESS INDICATORS

This section should describe the indicators chosen to measure progress in the management of the protected area. It should also describe the methodology used to measure the feasibility of conservation elements, and how to measure threat's mitigation/reduction incident upon the area and its resources (no more than 5 pages).

2.6 DEVELOPMENT SCHEDULE

This section serves to illustrate the development of the Plan. It can show a flow-chart, identifying the different stages and years in which the different activities will take place (no longer than two pages).

2.7 FINANCING STRATEGY

The plan should have a section that explains how the management of the area will be financed, the various potential financing institutions, in this sense, the consultant has to prepare a Strategic Fund Raising Plan. It should contain a budget table to will be financed in a short, mid and long term. This section should not have more than ten pages.

- 1) Make a description of the productive system and the economic situation within which the protected area has been involved in.
- 2) Prepare a financing strategy: This plan should have a section that explains how the management of the area will be financed, the various potential financing institutions, in this sense, the consultant has to prepare a Strategic Fund Raising Plan. It should contain a budget table to will be financed in a short, mid and long term. Special considerations need to be made to: Public Use (recreation), Education, Ecotourism and Public relations. This section should not have more than ten pages.
- 3) Show how many jobs the protected area generates or can generate.

2.8 ANNEX:

- **Supporting documents**
- **Glossary**
- **Bibliography**

Appendix 8. Stakeholders meeting attendance

GRA GRA Stakeholders
Meeting

ATTENDANCE 5 MAR 2005

NAME	Position
Raymond J. Mejia	FARMER - 502-2943 phone
Jody Morales	2nd Vice President - Gra-Gra National Park
Gregorio Castillo	Fisherman
Robert Garcia	1st Vice President GRA GRA
Dentfield Garcia	Forest Ranger - Forestry - 522-2094
Eugene Martinez	Business Man
Merlene Clarke	V. President NSCRW / V. Chairperson Sarawee Village SP District
Francis H Zuniga ³⁶⁰⁶⁻⁵⁰¹⁰	Rep. Jaguan Reef Lodge ⁵ / Fisherman / Hop Town Guide
ELVIS ARANA	Town Administrator (Dangiza) 522-2039
Rick Willoughby	
Jesse Nuñez	
Joseph Castillo	Afro-Caribbean Youth Empowerment dc 604-5230
Patricia Castillo	member - Gra - Gra National Park 606-6082
Timothy Flores	
Timothy Flores	Member - Gra - Gra Lagoon 502-0043
Francis Zuniga Jr	Concern personnel of Hopken Village
Nolan Jackson Jr	Reet's End Lodge
WALTER FAUX	

**Appendix 9. Specimen list of species recorded from Gra Gra Lagoon and Surroundings
a) Plants. Data in Bold indicate specimens found INSIDE the Protected Area.**

<i>Genus</i>	<i>species</i>	Colloquial name	locality	easting	northing	year	month	day
<i>Acoelorrhaphe</i>	<i>wrightii</i>	Palmetto	Gragra lagoon low swamp	364230	1871070	2005	5	10
<i>Acoelorrhaphe</i>	<i>wrightii</i>	Palmetto	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Acrostichum</i>	<i>aureum</i>	Mangrove Fern	Gragra lagoon north of in forest	367126	1873343	2005	3	5
<i>Acrostichum</i>	<i>aureum</i>	Mangrove Fern	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
<i>Aechmea</i>	<i>bracteata</i>		Old England	363246	1873015	2005	5	11
<i>Annona</i>	<i>glabra</i>	Pond Apple	Old England	363246	1873015	2005	5	11
<i>Annona</i>	<i>glabra</i>	Pond Apple	Gragra lagoon low swamp	364230	1871070	2005	5	10
<i>Aristolochia</i>	<i>trilobata</i>	Contribo	Old England	363246	1873015	2005	5	11
<i>Aristolochia</i>	<i>trilobata</i>	Contribo	Gragra lagoon low swamp	364230	1871070	2005	5	10
<i>Attalea</i>	<i>cohune</i>	Cohune	Carib Reserve, Dangriga	367000	1873600	2005	3	1
<i>Avicennia</i>	<i>germinans</i>	Black Mangrove	Gragra Lagoon on low scrub towards beach	366434	1872210	2005	5	10
<i>Avicennia</i>	<i>germinans</i>	Black Mangrove	Gragra lagoon north of in forest	367126	1873343	2005	3	5
<i>Avicennia</i>	<i>germinans</i>	Black Mangrove	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
<i>Bactris</i>	<i>mexicana</i>	Pokenoboy	Old England	363246	1873015	2005	5	11
<i>Bactris</i>	<i>mexicana</i>	Pokenoboy	Carib Reserve, Dangriga	367000	1873600	2005	3	1
<i>Blechnum</i>	<i>serrulatum</i>	Swamp Fern	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Byrsonima</i>	<i>crassifolia</i>	Craboo	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Cassipourea</i>	<i>guianensis</i>	Waterwood	Gragra lagoon north of in forest	367126	1873343	2005	3	5
<i>Chrysobalanus</i>	<i>icaco</i>	CocoPlum	Old England	363246	1873015	2005	5	11
<i>Colubrina</i>	<i>asiatica</i>		Gragra lagoon beach	369400	1873250	2005	5	10
<i>Colubrina</i>	<i>asiatica</i>		Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
<i>Combretum</i>	<i>laxum</i>		Old England	363246	1873015	2005	5	11
<i>Conocarpus</i>	<i>erecta</i>	Buttonwood	Gragra Lagoon on low scrub towards beach	366434	1872210	2005	5	10
<i>Cyperus</i>	<i>giganteus</i>		Old England	363410	1872980	2005	5	11
<i>Dalbergia</i>	<i>brownei</i>		Gragra lagoon low swamp	364230	1871070	2005	5	10
<i>Dalbergia</i>	<i>brownei</i>		Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Heliconia</i>	<i>latispatha</i>		Carib Reserve, Dangriga	366700	1874000	2005	3	1
<i>Ipomoea</i>	<i>imperati</i>		Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Laguncularia</i>	<i>racemosa</i>	White Mangrove	Gragra lagoon north of in forest	367126	1873343	2005	3	5
<i>Laguncularia</i>	<i>racemosa</i>	White Mangrove	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
<i>Macradenia</i>	<i>brassavolae</i>	Orchid	Old England	363246	1873015	2005	5	11
<i>Montrichardia</i>	<i>arborescens</i>		Old England	363246	1873015	2005	5	11
<i>Mouriri</i>	<i>exilis</i>		Old England	363246	1873015	2005	5	11
<i>Myrica</i>	<i>cerifera</i>	Teabox	Gragra lagoon low swamp	364230	1871070	2005	5	10

Myrica	cerifera	Teabox	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Myrica</i>	<i>cerifera</i>	Teabox	Gragra Lagoon on low scrub towards beach	366434	1872210	2005	5	10
<i>Myrmecophila</i>	<i>tibicinis</i>	Cowhorn Orchid	Old England	363246	1873015	2005	5	11
<i>Nymphoides</i>	<i>indica</i>	Water Lily	Old England	363410	1872980	2005	5	11
<i>Pachira</i>	<i>aquatica</i>	Provision Tree	Old England	363246	1873015	2005	5	11
<i>Pachira</i>	<i>aquatica</i>	Provision Tree	Old England	363410	1872980	2005	5	11
Pachira	aquatica	Provision Tree	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Passiflora</i>	<i>biflora</i>		Old England	363246	1873015	2005	5	11
Passiflora	biflora		Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Passiflora</i>	<i>biflora</i>		Dangriga	369795	1876580	1976	4	16
Passiflora	ciliata		Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Passiflora</i>	<i>ciliata</i>		Gragra lagoon beach	369400	1873250	2005	5	10
<i>Passiflora</i>	<i>ciliata</i>		Dangriga	369479	1877108	1997	3	11
<i>Passiflora</i>	<i>foetida</i>	Cottonleaf						
<i>Passiflora</i>	<i>foetida</i>	Passionflower	Gragra lagoon beach	369400	1873250	2005	5	10
<i>Passiflora</i>	<i>foetida</i>	Fetid Passionflower	Dangriga	369479	1877108	1997	3	11
<i>Pinus</i>	<i>caribaea</i>	Caribbean Pine	Dangriga Carib Reserve	363299	1876420	2005	3	1
<i>Pontederia</i>	<i>cordata</i>		Old England	363246	1873015	2005	5	11
<i>Pterocarpus</i>	<i>officinalis</i>	Kaway	Old England	363246	1873015	2005	5	11
<i>Pterocarpus</i>	<i>officinalis</i>	Kaway	Old England	363410	1872980	2005	5	11
Rhabdadenia	biflora	Mangrove Vine	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
Rhabdadenia	biflora	Mangrove Vine	Gragra lagoon north of in forest	367126	1873343	2005	3	5
<i>Rhabdadenia</i>	<i>biflora</i>	Mangrove Vine	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
Rhizophora	mangle	Red Mangrove	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Rhizophora</i>	<i>mangle</i>	Red Mangrove	Gragra Lagoon on low scrub towards beach	366434	1872210	2005	5	10
Rhizophora	mangle	Red Mangrove	Gragra lagoon north of in forest	367126	1873343	2005	3	5
Rhizophora	mangle	Red Mangrove	Gragra lagoon	368600	1873700	2005	3	4
<i>Rhizophora</i>	<i>mangle</i>	Red Mangrove	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
<i>Scleria</i>	<i>bracteata</i>	Cutting Grass	Old England	363246	1873015	2005	5	11
<i>Selenicereus</i>	<i>donkelaarii</i>		Gragra lagoon beach	364230	1879020	2005	5	10
<i>Symphonia</i>	<i>globulifera</i>	Yellow Sangre	Old England	363246	1873015	2005	5	11
<i>Thespesia</i>	<i>populnea</i>		Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
<i>Typha</i>	<i>domingensis</i>		Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
<i>Vochysia</i>	<i>hondurensis</i>	Yemeri	Old England	363246	1873015	2005	5	11
<i>Vochysia</i>	<i>hondurensis</i>	Yemeri	Dangriga Carib Reserve	363299	1876420	2005	3	1
<i>Zamia</i>	<i>polymorpha</i>		Dangriga Carib Reserve	363299	1876420	2005	3	1

Appendix 9. Species list Gra Gra Lagoon and Surroundings
b) Butterflies. Data in Bold indicate specimens found INSIDE the Protected Area.

genus	species	colloquialname	locality	easting	northing	year	month	day
<i>Morpho</i>	<i>peleides</i>	Morpho	Old England	363246	1873015	2005	5	11
<i>Kricogonia</i>	<i>lyside</i>	Lyside Sulphur	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Agraulis</i>	<i>vanillae</i>		Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Junonia</i>	<i>evarete</i>	Buckeye	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Morpho</i>	<i>peleides</i>	Morpho	Gragra lagoon low swamp forest	365345	1871800	2005	5	10
<i>Ascia</i>	<i>monuste</i>	Great Southern White	Dangriga	370140	1876360	1986	4	1
<i>Phoebis</i>	<i>argante</i>	Apricot Sulphur	Dangriga	370140	1876360	1993	6	26
<i>Phoebis</i>	<i>philea</i>	Orange-barred Sulphur	Dangriga	370140	1876360	1993	6	26
<i>Aellopos</i>	<i>ceculus</i>		Dangriga	370140	1876360	1993	6	26
<i>Caligo</i>	<i>memnon</i>	Owl Butterfly	Dangriga	370140	1876360	1993	6	26
<i>Phoebis</i>	<i>philea</i>	Orange-barred Sulphur	Dangriga	370140	1876360	1993	6	26
<i>Phoebis</i>	<i>argante</i>	Apricot Sulphur	Dangriga	370140	1876360	1993	6	26
<i>Heraclides</i>	<i>thoas</i>	King Swallowtail	Dangriga	370140	1876360	1993	6	26
<i>Opsiphanes</i>	<i>quiteria</i>		Dangriga	370140	1876360	1993	6	26

Appendix 9. Species list Gra Gra Lagoon and Surroundings

b) Fishes, Amphibians, Reptiles and Mammals. Data in Bold indicate specimens found INSIDE the Protected Area.

Class	genus	species	colloquialname	locality	easting	northing	year	month	day
Fishes									
	<i>Belonesox</i>	<i>belizanus</i>	Topminnow Pike killifish	Old England	363246	1873015	2005	5	11
	<i>Gambusia</i>	<i>sexradiata</i>	Teardrop Mosquito	Old England	363246	1873015	2005	5	11
	<i>Poecilia</i>	<i>orri</i>	Mangrove Molly	Old England	363246	1873015	2005	5	11
	<i>Cichlasoma</i>	<i>urophthalmus</i>	Mexican Mojarra Mayan Cichlid	Old England	363246	1873015	2005	5	11
	<i>Sphoeroides</i>	<i>testudineus</i>	Checkered puffer	Gragra lagoon	369250	1973800	2005	3	4
Amphibians									
	<i>Leptodactylus</i>	<i>labialis</i>	White-lipped Frog	Old England	363246	1873015	2005	5	11
	<i>Smilisca</i>	<i>baudini</i>	Common Mexican Treefrog	Old England	363246	1873015	2005	5	11
Reptiles									
	<i>Ctenosaura</i>	<i>similis</i>	Black Iguana	Gragra lagoon beach	368820	1872670	2005	5	10
	<i>Norops</i>	<i>sagrei</i>	Brown Anole	Gragra lagoon tall mangrove	367126	1873343	2005	3	5
	<i>Mabuya</i>	<i>unimarginata</i>	Central American Mabuya	Gragra lagoon tall mangrove	367126	1873343	2005	3	5
	<i>Crocodylus</i>	<i>moreletii</i>	Morelet's Crocodile	Old England	363410	1872980	2005	5	11
	<i>Crocodylus</i>	<i>moreletii</i>	Morelet's Crocodile	Old England	363246	1873015	2005	5	11
	<i>Crocodylus</i>	<i>moreletii</i>	Morelet's Crocodile	Gragra lagoon	368960	1873580	2005	3	4
	<i>Crocodylus</i>	<i>moreletii</i>	Morelet's Crocodile	Gragra lagoon	368960	1873580	2005	3	4
	<i>Staurotypus</i>	<i>triporcatus</i>	Mexican Giant Musk Turtle	Old England	363246	1873015	2005	5	11
	<i>Trachemys</i>	<i>scripta</i>	Slider	Old England	363246	1873015	2005	5	11
Mammals									
	<i>Noctilio</i>	<i>leporinus</i>	Greater Fishing Bat	Gragra lagoon	369250	1973800	2005	3	4
	<i>Procyon</i>	<i>lotor</i>	Raccoon	Gragra lagoon tall mangrove	368690	1873630	2005	3	4
	<i>Pecari</i>	<i>tajacu</i>	Collared Peccary	Old England	363246	1873015	2005	5	11
	<i>Tapirus</i>	<i>bairdii</i>	Baird's Tapir	Old England	363246	1873015	2005	5	11

Appendix 9. Species list Gra Gra Lagoon and Surroundings

c) Birds. Data in Bold indicate specimens found INSIDE the Protected Area. Migratory species marked with an "X".

order	genus	species	colloquialname	locality	easting	northing	year	month	day
Chicken-like Birds									
	Ortalis	vetula	Plain Chachalaca	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Ortalis	vetula	Plain Chachalaca	Old England	363246	1873015	2005	5	11
Coots, Cranes and Rails									
	Aramus	guarauna	Limpkin	Old England	363246	1873015	2005	5	11
	Heliornis	fulica	Sungrebe	Old England	363246	1873015	2005	5	11
	Laterallus	ruber	Ruddy Crane	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Laterallus	ruber	Ruddy Crane	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
Cuckoos, Hoatzins, Turacos and Relatives									
	Crotophaga	sulcirostris	Groove-billed Ani	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Crotophaga	sulcirostris	Groove-billed Ani	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Piaya	cayana	Squirrel Cuckoo	Gragra lagoon north of in forest	367126	1873343	2005	3	5
Ducks									
X	Anas	discors	Blue-winged Teal	Gragra lagoon	368600	1873700	2005	3	4
Falcons & Allies									
	Accipiter	bicolor	Bicolored Hawk	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Buteo	magnirostris	Roadside Hawk	Gragra lagoon	368600	1873700	2005	3	4
	Buteo	magnirostris	Roadside Hawk	Dangriga dump site	362380	1876783	2005	3	1
X	Buteo	platypterus	Broad-winged Hawk	Old England	363246	1873015	2005	5	11
X	Buteo	platypterus	Broad-winged Hawk	Gragra Lagoon National Park	369250	1973800	2005	5	10
	Buteogallus	anthracinus	Common Black-Hawk	Gragra lagoon	368600	1873700	2005	3	4
	Buteogallus	anthracinus	Common Black-Hawk	Gragra Lagoon National Park	369250	1973800	2005	5	10
	Elanus	leucurus	Black-shouldered Kite	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Elanus	leucurus	Black-shouldered Kite	Dangriga dump site	362380	1876783	2005	3	1
X	Falco	columbaris	Merlin	Dangriga dump site	362380	1876783	2005	3	1
	Falco	ruficularis	Bat Falcon	Gragra lagoon	368600	1873700	2005	3	4
X	Pandion	haliaetus	Osprey	Gragra lagoon	368600	1873700	2005	3	4
X	Pandion	haliaetus	Osprey	Dangriga	370140	1876360	2005	3	3
	Rostrhamus	sociabilis	Snail Kite	Gragra Lagoon National Park	369250	1973800	2005	5	10

Hummingbirds & Swifts									
	Amazilia	rutila	Cinnamon Hummingbird	Dangriga	370140	1876360	2005	3	3
	Amazilia	tzacatl	Rufous-tailed Hummingbird	Gragra lagoon north of in forest	367126	1873343	2005	3	5
Kingfishers & Allies									
X	Ceryle	alcyon	Belted Kingfisher	Gragra lagoon	368600	1873700	2005	3	4
X	Ceryle	torquata	Ringed Kingfisher	Gragra lagoon	368600	1873700	2005	3	4
X	Ceryle	torquata	Ringed Kingfisher	Gragra Lagoon National Park	369250	1973800	2005	5	10
	Chloroceryle	aenea	Pygmy Kingfisher	Gragra lagoon	368600	1873700	2005	3	4
Nightbirds									
	Caprimulgus	badius	Yucatan Nightjar	Gragra lagoon	368600	1873700	2005	3	4
Parrots & Allies									
	Amazona	autumnalis	Red-lored Parrot	Gragra lagoon	367000	1873670	2005	3	5
	Aratinga	nana	Olive-throated parakeet	Old England	363246	1873015	2005	5	11
	Aratinga	nana	Olive-throated parakeet	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Aratinga	nana	Olive-throated parakeet	Gragra lagoon	367000	1873670	2005	3	5
	Pionus	senilis	White-crowned Parrot	Gragra lagoon	368600	1873700	2005	3	4
Pelicans & Relatives									
	Anhinga	anhinga	Anhinga	Gragra lagoon beach	369400	1873250	2005	3	4
	Anhinga	anhinga	Anhinga	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Fregata	magnificens	Magnificent Frigatebird	Gragra lagoon	368600	1873700	2005	3	4
	Fregata	magnificens	Magnificent Frigatebird	Dangriga	370140	1876360	2005	3	3
	Fregata	magnificens	Magnificent Frigatebird	Gragra Lagoon	369250	1973800	2005	3	4
	Pelecanus	occidentalis	Brown Pelican	Gragra lagoon beach	369400	1873250	2005	5	10
	Pelecanus	occidentalis	Brown Pelican	Gragra lagoon	368600	1873700	2005	3	4
	Pelecanus	occidentalis	Brown Pelican	Dangriga	370140	1876360	2005	3	3
	Phalacrocorax	auritus	Double-crested Cormorant	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Phalacrocorax	auritus	Double-crested Cormorant	Dangriga	370140	1876360	2005	3	3
	Phalacrocorax	brasilianus	Neotropical Comorant	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Phalacrocorax	brasilianus	Neotropical Comorant	Gragra lagoon	368600	1873700	2005	3	4
	Phalacrocorax	brasilianus	Neotropical Comorant	Dangriga	370140	1876360	2005	3	3
Perching Birds									
	Amblycercus	holosericeus	Yellow-billed Cacique	Gragra lagoon	367000	1873670	2005	3	5

	Cyanocorax	morio	Brown Jay	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Cyanocorax	morio	Brown Jay	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
X	Dendroica	coronata	Yellow-rumped Warbler	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Dendroica	dominica	Yellow-throated Warbler	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Dendroica	magnolia	Magnolia Warbler	Gragra lagoon	368600	1873700	2005	3	4
X	Dendroica	palmarum	Palm Warbler	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Dendroica	petechia	Yellow Warbler	Gragra lagoon	368600	1873700	2005	3	4
	Dives	dives	Melodius Blackbird	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Dives	dives	Melodius Blackbird	Gragra lagoon north of in forest	367126	1873343	2005	3	5
X	Dumetella	carolinensis	Gray Catbird	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Elaenia	flavogaster	Yellow-bellied Elaenia	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Elaenia	flavogaster	Yellow-bellied Elaenia	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Elaenia	flavogaster	Yellow-bellied Elaenia	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Elaenia	flavogaster	Yellow-bellied Elaenia	Gragra Lagoon National Park	369250	1973800	2005	5	10
	Euphonia	affinis	Scrub Euphonia	Gragra lagoon north of in forest	367126	1873343	2005	3	5
X	Geothlypis	trichas	Common Yellowthroat	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Helmitheros	vermivorus	Worm-eating Warbler	Gragra lagoon north of in forest	367126	1873343	2005	3	5
X	Hirundo	rustica	Barn Swallow	Dangriga dump site	362380	1876783	2005	3	1
	Icterus	prothemelas	Black-cowled Oriole	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Mimus	gilvus	Tropical Mockingbird	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Mimus	gilvus	Tropical Mockingbird	Dangriga	370140	1876360	2005	3	3
X	Mniotilta	varia	Black-and-White Warbler	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Myiarchus	tuberculifer	Dusky-capped Flycatcher	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Myiarchus	yucatanensis	Yucatan Flycatcher	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Myiozetetes	similis	Social Flycatcher	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Myiozetetes	similis	Social Flycatcher	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Myiozetetes	similis	Social Flycatcher	Gragra lagoon	368600	1873700	2005	3	4
	Passer	domesticus	House Sparrow	Dangriga	370140	1876360	2005	3	3
X	Passerina	cyanea	Indigo Bunting	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Piranga	rubra	Summer Tanager	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Pitangus	sulphuratus	Great Kiskadee	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Pitangus	sulphuratus	Great Kiskadee	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Pitangus	sulphuratus	Great Kiskadee	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Pitangus	sulphuratus	Great Kiskadee	Gragra Lagoon National Park	369250	1973800	2005	5	10
X	Progne	subis	Purple Martin	Gragra lagoon north of in forest	367126	1873343	2005	3	5
X	Progne	subis	Purple Martin	Gragra lagoon	368600	1873700	2005	3	4
	Pyrocephalus	rubinus	Vermillion Flycatcher	Dangriga	370140	1876360	2005	3	3
	Quiscalus	mexicanus	Great-tailed Grackle	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10

	Quiscalus	mexicanus	Great-tailed Grackle	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Quiscalus	mexicanus	Great-tailed Grackle	Gragra lagoon	368600	1873700	2005	3	4
X	Seiurus	noveboracensis	Northern Waterthrush	Old England	363410	1872980	2005	5	11
X	Seiurus	noveboracensis	Northern Waterthrush	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
X	Seiurus	noveboracensis	Northern Waterthrush	Gragra lagoon north of in forest	367126	1873343	2005	3	5
X	Setophaga	ruticilla	American Redstart	Gragra lagoon	368600	1873700	2005	3	4
	Sporophila	torqueola	White-collared Seedeater	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Sporophila	torqueola	White-collared Seedeater	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Sporophila	torqueola	White-collared Seedeater	Gragra lagoon	368600	1873700	2005	3	4
	Synallaxis	erythrothorax	Rufous-breasted Spinetail	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Synallaxis	erythrothorax	Rufous-breasted Spinetail	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Tachycineta	albineata	Mangrove Swallow	Gragra lagoon	368600	1873700	2005	3	4
	Tachycineta	albineata	Mangrove Swallow	Gragra Lagoon	369250	1973800	2005	3	4
	Thraupis	abbas	Yellow-winged Tanager	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Thryothorus	maculipectus	Spot-breasted Wren	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Todirostrum	cinereum	Common Tody-flycatcher	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Tyrannus	forficatus	Scissor-tailed Flycatcher	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Tyrannus	forficatus	Scissor-tailed Flycatcher	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Tyrannus	melancholicus	Tropical Kingbird	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Tyrannus	melancholicus	Tropical Kingbird	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Tyrannus	melancholicus	Tropical Kingbird	Gragra lagoon	368600	1873700	2005	3	4
X	Vireo	griseus	White-eyed Vireo	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Vireo	pallens	Mangrove Vireo	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Vireo	pallens	Mangrove Vireo	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Volatinia	jacarina	Blue-black Grassquit	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Wilsonia	citrina	Hooded Warbler	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Xiphorhynchus	flavigaster	Ivory-billed Woodcreeper	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Xiphorhynchus	flavigaster	Ivory-billed Woodcreeper	Gragra lagoon north of in forest	367126	1873343	2005	3	5
Pigeons & Doves									
	Columba	cayennensis	Pale-vented Pigeon	Gragra lagoon	368600	1873700	2005	3	4
	Columba	cayennensis	Pale-vented Pigeon	Dangriga dump site	362380	1876783	2005	3	1
	Columba	cayennensis	Pale-vented Pigeon	Gragra Lagoon National Park	369250	1973800	2005	5	10
	Columba	leucocephala	White-crowned Pigeon	Gragra lagoon	368600	1873700	2005	3	4
	Columba	livia	Feral Pigeon	Dangriga	370140	1876360	2005	3	3
	Columbina	minuta	Plain-breasted Ground-Dove	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Columbina	passerina	Common Ground-Dove	Gragra lagoon	368600	1873700	2005	3	4

Shorebirds & Relatives

X	Actitis	macularia	Spotted Sandpiper	Old England	363410	1872980	2005	5	11
X	Actitis	macularia	Spotted Sandpiper	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Actitis	macularia	Spotted Sandpiper	Dangriga	370140	1876360	2005	3	3
X	Actitis	macularia	Spotted Sandpiper	Gragra Lagoon National Park	369250	1973800	2005	5	10
X	Arenaria	interpres	Ruddy Turnstone	Dangriga	370140	1876360	2005	3	3
X	Calidris	alba	Sanderling	Dangriga	370140	1876360	2005	3	3
X	Calidris	minutilla	Least Sandpiper	Dangriga	370140	1876360	2005	3	3
X	Catoptrophorus	semipalmatus	Willet	Gragra lagoon beach	369400	1873250	2005	5	10
X	Catoptrophorus	semipalmatus	Willet	Dangriga	370140	1876360	2005	3	3
X	Charadrius	semipalmatus	Semipalmated Plover	Dangriga	370140	1876360	2005	3	3
X	Charadrius	vociferus	Killdeer	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Jacana	spinosa	Northern Jacana	Old England	363410	1872980	2005	5	11
	Jacana	spinosa	Northern Jacana	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Larus	atricilla	Laughing Gull	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Larus	atricilla	Laughing Gull	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
X	Limnodromus	griseus	Short-billed Dowitcher	Dangriga	370140	1876360	2005	3	3
X	Numenius	phaeopus	Whimbrel	Gragra lagoon	367000	1873670	2005	3	5
X	Pluvialis	squatarola	Black-bellied Plover	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Pluvialis	squatarola	Black-bellied Plover	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
X	Pluvialis	squatarola	Black-bellied Plover	Dangriga dump site	362380	1876783	2005	3	1
	Sterna	antillarum	Least Tern	Gragra Lagoon National Park	369250	1973800	2005	5	10
X	Sterna	caspia	Caspian Tern	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
X	Sterna	maxima	Royal Tern	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
X	Sterna	maxima	Royal Tern	Dangriga	370140	1876360	2005	3	3
X	Sterna	sandvicensis	Sandwich Tern	Dangriga	370140	1876360	2005	3	3
X	Tringa	melanoleuca	Greater Yellowlegs	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
X	Tringa	solitaria	Solitary Sandpiper	Dangriga	370140	1876360	2005	3	3

Stork & Relatives

	Ardea	herodias	Great Blue Heron	Gragra lagoon	368600	1873700	2005	3	4
	Ardea	herodias	Great Blue Heron	Gragra Lagoon National Park	369250	1973800	2005	5	10
X	Bubulcus	ibis	Cattle Egret	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
X	Bubulcus	ibis	Cattle Egret	Dangriga dump site	362380	1876783	2005	3	1
	Butorides	virescens	Green Heron	Dangriga	370140	1876360	2005	3	3
	Butorides	virescens	Green Heron	Dangriga dump site	362380	1876783	2005	3	1
	Butorides	virescens	Green Heron	Gragra Lagoon National Park	369250	1973800	2005	5	10

	Cathartes	aura	Turkey Vulture	Dangriga	370140	1876360	2005	3	3
	Cathartes	aura	Turkey Vulture	Dangriga dump site	362380	1876783	2005	3	1
	Cathartes	aura	Turkey Vulture	Gragra Lagoon National Park	369250	1973800	2005	5	10
	Cochlearius	cochlearius	Boat-billed Heron	Old England	363246	1873015	2005	5	11
	Coragyps	atratus	Black Vulture	Gragra Lagoon Beach + marsh	369400	1873250	2005	5	10
	Coragyps	atratus	Black Vulture	Dangriga	370140	1876360	2005	3	3
X	Egretta	alba	Great Egret	Old England	363246	1873015	2005	5	11
X	Egretta	alba	Great Egret	Gragra lagoon	368600	1873700	2005	3	4
X	Egretta	alba	Great Egret	Gragra lagoon	369060	1874000	2005	3	4
X	Egretta	alba	Great Egret	Dangriga dump site	362380	1876783	2005	3	1
	Egretta	caerula	Little Blue Heron	Old England	363410	1872980	2005	5	11
	Egretta	caerula	Little Blue Heron	Dangriga	370140	1876360	2005	3	3
	Egretta	caerula	Little Blue Heron	Dangriga dump site	362380	1876783	2005	3	1
	Egretta	caerula	Little Blue Heron	Gragra Lagoon National Park	369250	1973800	2005	5	10
X	Egretta	thula	Snowy Egret	Dangriga	370140	1876360	2005	3	3
X	Egretta	thula	Snowy Egret	Dangriga dump site	362380	1876783	2005	3	1
X	Egretta	thula	Snowy Egret	Gragra Lagoon National Park	369250	1973800	2005	5	10
	Egretta	tricolor	Tricolored Heron	Gragra lagoon	368600	1873700	2005	3	4
	Eudocimus	albus	White Ibis	Gragra lagoon	368600	1873700	2005	3	4
	Mycteria	americana	Wood Stork	Dangriga dump site	362380	1876783	2005	3	1
	Nyctanassa	violaceus	Yellow-crowned Night Heron	Gragra Lagoon National Park	369250	1973800	2005	5	10
	Nycticorax	nycticorax	Black-crowned Night Heron	Gragra lagoon	368600	1873700	2005	3	4
Trogon									
	Trogon	melanocephalus	Black-headed Trogon	Old England	363246	1873015	2005	5	11
	Trogon	melanocephalus	Black-headed Trogon	Gragra lagoon north of in forest	367126	1873343	2005	3	5
Woodpeckers & Relatives									
	Campephilus	guatemalensis	Pale-billed Woodpecker	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Dryocopus	lineatus	Lineated Woodpecker	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Melanerpes	aurifrons	Golden-fronted Woodpecker	Gragra lagoon strip of land between the lagoon and the sea	386730	1873000	2005	3	4
	Melanerpes	aurifrons	Golden-fronted Woodpecker	Gragra lagoon north of in forest	367126	1873343	2005	3	5
	Melanerpes	aurifrons	Golden-fronted Woodpecker	Gragra Lagoon National Park	369250	1973800	2005	5	10