CARIBBEAN COMMUNITY CLIMATE CHANGE CENTRE/
SPACC PROJECT

MORNE TROIS PITONS NATIONAL PARK WORLD HERITAGE SITE – IMPROVED MANAGEMENT PLAN

PREPARED FOR THE GOVERNMENT OF THE COMMONWEALTH OF DOMINICA

Marie - José Edwards

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Technical Report

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EXECUTIVE SUMMARY

The review and development of the Morne Trois Pitons National Park World Heritage Site (MTNP WHS), is one of several initiatives being undertaken by the Government of Dominica under the Global Environment Facility, GEF-funded "Special Programme for Adaptation to Climate Change, SPAAC", a regional programme, implemented by the World Bank and executed by the Caribbean Community Climate Change Centre, CCCCC, as part of a strategy to reduce the vulnerability of Dominica's ecosystems to the impact of climate change.

Morne Trois Pitons National Park World Heritage Site (MTNP WHS) is characterized by its ecological biodiversity with rare and unique natural features, a variety of natural attractions and a number of watershed areas and domestic water catchments.

The **MTPNP WHS** is located in the central portion of southern volcanic complex of the island, covering an estimated 6,900 ha (17,000 acres) that includes four of Dominica's seven mountain ranges, Morne Trois Pitons, the highest peak at 1,387 m (4,550 ft), Watt Mountain (1,224 m or 4,017 ft), Morne Macaque (1,221 m or 4,006 ft), and Morne Anglais (1,113m or 3,650 ft), three lakes - the Freshwater and Boeri Lakes and the Boiling Lake described as the largest in the western hemisphere. Other features include the Emerald Pool, Middleham Falls and the Valley of Desolation with its several fumaroles.

The Morne Trois Pitons National Park (MTPNP) was established in 1975 under the National Parks and Protected Areas Act. In 1997 it was established as a UNESCO World Heritage Site - Inscribed on the World Heritage List under Natural **Criteria viii**- "To be outstanding examples representing major stages of the earth's history, including the record of life, significant on-going geological processes in the development of landforms or significant geomorphic or physiographic features" and **criteria x.** "To contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation".

The present status of the boundary of the National Park indicates the following:

- The Archbold Preserve comprising of 940 acres though considered part of the park has not yet been legally incorporated within the National Park. As such, this has to be written into the schedule, demarcated on the ground and included on the map.
- The boundaries that have been gazetted for the National Park do not correlate to what is actually seen on the ground and in many cases the discrepancy is not only large, there is absolutely no cut lines or demarcation especially in the east and southeast areas
- A large percentage of the boundaries of the National Park have not been maintained over the years. As such, much work has to be done to re-establish these boundaries.

CONSERVATION VALUE

The United Nation Environment Programme, UNEP, World Conservation Monitoring Centre, describes the

conservation value of the MTNPWHS thus:

“Morne Trois Pitons National Park includes large highly scenic tracts of the most extensive almost undisturbed tropical forest in the Lesser Antilles and the headwaters of most of the major streams and rivers in the southern half of the island. These support a high level of biodiversity. The Park lies within a Conservation International-designated Conservation Hotspot, a WWF/IUCN Centre of Plant Diversity and a BirdLife-designated Endemic Bird Area”.

The operational guidelines for the implementation of the World Heritage Convention clearly states that the boundaries of a World Heritage Site should ‘include sufficient areas immediately adjacent to the area of outstanding universal value in order to protect the site’s heritage values from direct effects of human encroachment and impacts of resource use outside of the nominated area”

It defines a buffer zone as “an area surrounding the property which has restrictions placed on its use to give an added layer of protection: the area consisting of a buffer zone should be determined through technical studies. Details on the size, characteristics and authorized uses of a buffer zone as well as a map indicating its precise boundaries, should be provided”

The Morne Trois Pitons National Park has three (3) visitor centres located at the Freshwater Lake, the Emerald Pool and the Middleham Falls. The centres are managed by the Ministry of Tourism & Legal Affairs.

MANAGEMENT

The Park is currently managed by the Forestry, Wildlife & Parks Division of the Ministry of Agriculture, Fisheries and Forestry. The National Park legislation makes provisions for the establishment of a National Park Service, NPS. However, to date, this has not been established and the function of management and development of the Park has been integrated into the work of the Forestry Division. A Forest Officer has been designated as Parks Superintendent and undertakes the overall supervision of the Park together with 10 park wardens.

There are plans to establish a new management structure for the national parks. The Government of Dominica with support from the Caribbean Development Bank, CDB, plans to establish and operationalize the National Parks Service. This is being undertaken in 2 phases. The first phase includes a review of the legal framework for national parks and protected areas and the implementation of amendments to the existing legislation to address the identified deficiencies. The second phase entails the development of an institutional framework for the establishment and operationalization of the Parks.

The proposed new management structure seeks to bring all protected areas under one common governance system. The Project is expected to be completed by January 2011. As such, it is futile to make recommendations with respect to the financial and institutional framework of the Park in light of the

proposed structure which is currently being developed.

In terms of staff complement, some recommendations will be made with respect to the overall plan and work programme of the Park.

VISION AND OBJECTIVES

Vision

The vision for the MTNPWHS as a world heritage site is primarily that of a unique and pristine ecological area which belongs to the people of Dominica whose responsibility is to protect, use wisely and cherish for the benefit of all mankind.

Objectives

Guided by this vision, the specific management objectives for which the Park was established are as follows:

- To manage this natural area in such a way that the essential characteristics and values remain.
- To ensure that the plants and animals are not negatively impacted by human interference.
- To promote and regulate appropriate park use by tourists and local visitors and to strive to continually upgrade the quality of this use in such a manner as to preserve the Park's natural character for future generations
- To provide visitors with a wide range of interpretation and recreational opportunities
- To provide a wide variety of visitor services to the extent that they are essential to visitor use and safety and in keeping with the purpose of the area
- To gradually eliminate or control damaging or incompatible uses
- To secure adequate capacity for effective Park Management.
- To encourage and develop applied research programmes to improve public knowledge of park values and resources as well as improved park management
- To work closely with the public and private sector organizations on educational programs related to conservation and public use
- To develop appropriate policies for sustainable utilization of the Park and its resources.

PARK ZONING PLAN

Zoning is used as a tool for giving spatial dimension to specific management objectives. The zoning system recommended for the MTPNPWHS (see Annex A, Map 13) consists of 7 zones as follows:

- Special Use zone
- Intensive Use
- Extensive Use Zone
- Environmental Zone
- Research Zone
- Wildland Management Zone

- Buffer Zone

The proposed buffer zone consists of the establishment of a 305m (1000 ft.) buffer in the northern area of the park in the Pont Casse' areas where approved building development has been granted to land owners. In other areas of the Park a 200 m (656.2 ft.) buffer is being recommended.

PARK VISITATION

Visitation to the Park is very high in some locations like the Emerald pool. There has been minimal monitoring of the impact of visitors to the National Park. However, as a result of the user fee system, there is available data on visitation to the various sites.

IMPACT OF CLIMATE CHANGE

There have been no scientific studies on the impact of climate change in the MTNPWHS. The impact of natural disasters triggered by extreme weather events may cause severe and irreversible impact on biological and geomorphological characteristics of the Park which could over time destroy the integrity of the Park as a World Heritage Site if adaptation measures are not implemented.

While there is no scientific data to establish the effects of climate change on the MTNPWHS, some observations on the impacts of Hurricane David (1979) on the biodiversity of the Park indicated that the hurricane-force winds caused significant destruction to the fauna and flora of the Park. There was damage to 60% of tropical forests in the southern half of the island. 42 % of the standing volume was damaged and 11% completely destroyed. Other climate- related impacts included flooding, landslides and soil erosion, drought, impact on watersheds and water for domestic use and hydroelectricity, as well as plant disease. All of these had an impact on the social and economic landscape of Dominica

PROPOSED MANAGEMENT OF CLIMATE CHANGE

Presently, there are no scientific studies on the impact of climate change on the national parks in Dominica or on Dominica's forests. There is need to develop an understanding of the current and future fluctuations in the weather, the climate and in the water levels in the various rivers within the national Parks so as to develop an effective management strategy for climate change. Equally important is the need to develop baseline information on the resources of the Parks as well as the ecological processes so as to monitor and evaluate changes resulting from the impact of climate.

Management of climate change requires a multi-pronged, integrated approach that includes preventive and corrective actions, exchange of information and development of mitigation measures based on sound scientific principles. Any future studies on climate change must involve all the major players responsible for collating and managing overall climate in Dominica including the Dominica Meteorological Service. As such, an effective management framework for monitoring and management of climate change is required.

The following guiding principles with respect to managing the impact of climate change on national parks are being recommended for adoption by the Government of Dominica :

- The need to utilize available scientific information and traditional knowledge in the decision making process
- Undertaking assessment of impacts through appropriate research, monitoring, vulnerability assessment and risk preparedness measures
- Building public support for managing the impact of climate change through the establishment of partnerships with policy makers, the communities and other stakeholders in the development and implementation of appropriate programmes
- Minimizing the impact on gene pool, on species and their diverse habitat
- Increasing the resilience of sites by reducing non-climatic sources of stress.
- Capacity building, research, and sharing of information
- Developing successful and appropriate management responses to include climate change vulnerability analysis, risk assessment and preparedness and adaptation management strategies
- Developing and implementing best practices and sharing of information with management partners and key stakeholders.

PROPOSED ACTIVITIES FOR MANAGING CLIMATE CHANGE

Some basic programmes and activities must be implemented to monitor, assess and develop adaptation measures to climate change.

- Development of a policy on climate change so as to mainstream adaptation to climate change into the development planning and decision making process in Dominica
- The establishment of a hydro-meteorological monitoring programme for the Parks that will provide information for monitoring of climatic trends and changes. This will entail upgrading of the current hydrological monitoring programme and equipment, establishment of an efficient data collection, management and retrieval system, purchase of the relevant instrumentation, software and hardware and relevant training for staff.
- Development of a research and monitoring programme that seeks to improve knowledge of the physical and biological characteristics of the park. This will serve as baseline for monitoring the impact of climate change on the biodiversity of the Park and to assess current and future trends in resource conditions.
- Implementation of an effective public awareness and sensitization programme on climate change and its impacts so as to strengthen collaboration between the public and private sectors, to sensitize policy makers, stakeholders and the communities and to galvanize support for its effective management.

Other important activities for mitigating any future impacts of climate change must seek, among other things, to maintain the genome of endemic and indicator species of the Parks through ex-situ research and the establishment of seed-gene banks, to manage watersheds in the Park, establish buffer zones to reduce the

impact of anthropogenic activities on the Park, development of a disaster management plan for the Park to include forecasting capability, early warning systems as well as information exchange, collaboration, co-operation and sharing of best practices locally, regionally and internationally. In addition to this capacity building and access to technology at the national level are also important prerequisites for implementing mitigation and adaption measures with respect to climate change

PARK MANAGEMENT PROGRAMMES

Park management is to be built around 2 major management programmes.

1. The Resource Management Programme
2. Education and Outreach Programme which includes communication, education and public awareness and community outreach and livelihood development.

1. The Resource Management Programme

The objective of the Resource Management Programme is to safeguard the integrity of the biological resources, natural features, and watersheds of the Park through actions that build public support and counter specific threats. These threats include impacts of climate change, illegal hunting, visitor impacts, agricultural encroachment and contamination of water sources. This programme has the following 3 sub- components :

- **1A - Natural Resource Conservation Programme**

The objective of this programme is to maintain and protect the biological diversity of the park, watersheds, geological and landscape elements through implementation of activities geared at averting threats to the park and by encouraging community support for the park through education and involvement. This includes a number of sub-programmes as follows:

- The physical demarcation of the park boundaries
- Establishment of the Park zonation programme including buffer zones,
- A visitor Use and Monitoring Programme
- A Programme for adaptation to climate change

- **1B - Natural Resource Management Programme**

The objective of this programme is to provide the necessary staff, equipment and other relevant resources for effective management of the natural resources of the Park

- **1 C - Scientific Research and Monitoring Programme**

The objective of this programme is to provide management with scientific information for decision-making so as to ensure that the objectives of conservation and management of the resources are achieved.

2. Education and Outreach Programme

The objective of the Education and Outreach Programme is to develop and coordinate the flow and variety of information within the park so as to increase awareness among relevant publics of the ecological and bio-physical significance of the Park, and to emphasize its contribution to national development and to global biodiversity conservation. The programme has 2 sub-components as follows:

- **2A - Public Awareness and Education**

The objective of this programme is to sensitize stakeholders on the value of the MTPNPWHS and to foster a sense of ownership participation in its operations.

- **2B - Community Outreach and Livelihood/ Alternative Livelihood Development**

The objective of this programme is to include communities adjacent to the park in the management, research, monitoring and development of the park and to assist them in the sustenance and development of livelihood / alternative livelihoods compatible with the protection and sustainable use of Park

Studies of management effectiveness will be carried out at the beginning and end of the planning period in order to determine progress and highlight management requirements for the subsequent planning period.

MANAGEMENT AND FINANCIAL FRAMEWORK

The annual operational costs of the management activities of the Parks have exceeded the average annual budget that has been available in recent years. Sustainable finance for Park management is a major constraint that will be dealt with by increasing visitation to the Park through increased marketing and upgrading visitor amenities and facilities.

Presently the total amount collected through user fees in the MTNPWHS for the period 2009 - 2010 is approximately E.C. $ 755, 774.00. Visitors to the site “Morne Trois Pitons” have dwindled from 11,000 in 2007 to 58 in 2008 and 13 in 2009. Except for Emerald Pool, visitation to all the sites has been low and much below their carrying capacity.

Using the Emerald Pool as an example, in 2009 there were 63, 558 visitors which amounted to 174 persons per day. If the other 5 sites that make up the MTNPWHS were able to attract 100 persons /day at (the new price structure of the user fees (Organized tour – US $3.00), (Private Tours – US $5.00), using an average of $U.S 4:00- the park could generate an additional E.C. $M1.98 and an overall annual E.C$M 2.63 just from user fees.

Another method for generating revenue for the Park is by establishing a Conservation Trust Fund in Dominica. Dominica. It is expected that the Fund will be able to begin supporting Park management costs in 2012. In this way, it is expected that all components of the Plan can be implemented by 2014.

INTRODUCTION

Background

The Government of the Commonwealth of Dominica has undertaken several initiatives to protect its natural resources which constitute an integral component of its social and economic development strategy. Following the ratification by government of the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), the United Nations Framework Convention on Climate Change (UNFCCC), the Stockholm Convention on Persistent Organic Pollutants (the Stockholm Convention), and the Montreal Protocol on Substances that Deplete the Ozone Layer (the Montreal Protocol, a number of programmes are being undertaken combat the impact of climate change on the biodiversity of Dominica.

Under the Special Programme for Adaptation to Climate Change (SPACC) project funded by the GEF, implemented by the World Bank and executed by the Caribbean Community Centre for Climate Change, (CCCCC) a number of initiatives including this one are being undertaken as part of a strategy to reduce the vulnerability of Dominica's ecosystems to the impact of climate change. These include the following:

- Design of buffer zones for the Morne Trois Pitons and Morne Diablotin National Parks
- The development of a Sustainable Land Management Plan (SLM) as a mechanism to assist in the design of elements of the buffer zone through the engagement of key target communities adjacent to the boundary of the MTPNP and MDNP considered as critical points for anthropogenic pressure on the two park
- Data Collection and Monitoring aimed at achieving the following:
    - An assessment of existing meteorological data and recommended data needs of the National Parks
    - Development of an asset Mapping legend to capture all ecological information relevant to SLM
    - Development of a database on biodiversity in Dominica to include the procurement of computer equipment and software for data repository to inform the Park management process and to serve as baseline data against which future data collection could be assessed
- Procurement, installation and testing of meteorological instruments and training of relevant personnel in the use and management of these instruments.
- The development of projects in communities adjacent to the Park aimed at reducing negative impacts of communities on the national parks. One such project is a "Feasibility Study and Design for the Installation of Storage and Distribution System for Irrigation Water"

Other studies undertaken include the development of a National Forest Policy in 2010 to guide the sustainable management of the forest resources while maintaining or improving the present area of forest cover as well as a number of programmes under the OECS (Organization of Eastern Caribbean States) Protected Areas and

Associated Sustainable Livelihoods (OPAAL) Project funded by the GEF- World Bank and Fond Francais pour l'Environnement Mondial, FFEM. This project is aimed at developing a framework for managing protected areas so that the biodiversity of the OECS region will be protected from further degradation. Some of the projects included the following:

- A Review of National Protected Areas Policy, Legal and Institutional Framework.
- The development of a Communication Plan for the Cabrits National Park in 2006.
- Opportunities for Sustainable Livelihoods in the Cabrits National Park (Espeut, 2006),
- Cabrits National Park Marine Section Management Plan 2007-2012. (Edwards, 2007),
- Environmental and Socio-Economic Studies for Cabrits National Park, Dominica (Ecoengineering, 2007)
- Cabrits National Park (Marine Section) Sustainable Livelihood Project, (NICE/SIE, 2008).
- Implementation of a livelihoods sub-projects for the communities in the vicinity of the national park 2009-2011).

The Commonwealth of Dominica has been selected as one of the beneficiary countries to implement pilot adaptation projects under the Special Programme for Adaptation to Climate Change, SPACC Project. One such project is to review and revise the management plans of the Morne Trois Pitons National Park World Heritage Site and the Morne Diablotin National Park (MDNP) and their neighbouring communities and to recommend detailed designs and implementation of adaptation measures.

The goal of the SPACC project is "to implement specific (integrated) pilot adaptation measures addressing primarily, the impacts of climate change on the natural resource base, focused on biodiversity and land degradation along coastal and near-coastal areas. This will be achieved through: (i) the detailed design of pilot adaptation measures to reduce expected negative impacts of climate change on marine and terrestrial biodiversity and land degradation; and (ii) the implementation of these pilot adaptation measures".

The project also seeks to "produce knowledge of global value on how to implement adaptation measures in small island states that can be applied in other countries in the region".

The current management plan for the Morne Trois Pitons National Park covers the period 2002 to 2012.
A review of the recommendations outlined in the management plan indicated that no substantial activities outlined in the plan have been implemented over the last 8 years. Discussions with the Forestry and Parks personnel indicated that the main reasons for this were as follows:

- The absence of a management structure
- Limited financial resources and personnel for management of the National Park
- In addition, the plan was never presented to Cabinet for adoption.

The plan has been updated to incorporate the following:

- Emerging social, economic, and environmental (including climate change) parameters
- Changing land use of lands adjacent to the park

- Establishment of a buffer zone.
- Adaptation to climate change

A 5-year management plan is recommended.

DOMINICA: CLIMATE TRENDS AND PROJECTIONS

The report "Future Climate for the Caribbean in the late 21st Century using a super-high resolution AGCM at MRI"[1] -Model simulations of future climate change scenarios for the last half of the twenty first (21st) century for the Caribbean" was carried out using data obtained from a super-high resolution Atmospheric General Circulation Model (AGCM) developed at the Meteorological Research Institute (MRI), Tsukuba, Japan. Model simulations were done for 25 years present day scenario, 1979 – 2003, and projections were made for the 25 year period, 2075 – 2099, following the SRES A1B scenario.

The following was predicted with respect to future climate for the Caribbean and by extension Dominica.

In terms of rainfall, the rainfall annual cycle of the Caribbean is characterized by four distinct rainfall regimes, namely an early dry season, an early wet season, a mid dry season and a late wet season.
In terms of annual rainfall projections, the central Caribbean to include Dominica will become drier by 10-20% which is statistically significant. Caribbean rainfall indicate a gradual march from the early dry season in December to March with steady increases from April to June with a lessening of the rainfall in July August and the subsequent second rainy season from September to November. For future projections the annualized pentad (5-day running mean) rainfall shows that the early dry season for the Caribbean will become slightly wetter in November to January and from January to March northward of 15˚N.

It is projected on a seasonal level that the early dry season will become drier by 10%. In the early wet season the entire Caribbean will become drier by 10-20%.

In terms of temperature, the report indicates that future projection from the annual cycle suggests that surface temperature over the Caribbean will rise by 2.5°C. In terms of temperature extremes, there are projections of extremely hot days and tropical nights for the Caribbean.
Overall the report concluded the following:

- There is projected overall rainfall deficiency for most of the Caribbean during rainy seasons of 10-20%.
- The early dry season is expected to get wetter by 10%

[1]Future climate for the Caribbean in the late 21st Century using a super-high resolution AGCM at MRI, Trevor C Hall Climate Studies Group Mona (CSGM) Department of Physics.UWI, Mona Campus Meteorological Research Institute (MRI).Tsukuba, Japan, September 6-17, 2010

- The model shows warming over the region by 2-2.5°C, which is a yearlong signal.
- There is a hint that rainfall deficits for the future might be consequential of changing large-scale dynamics.

Reports have indicated that the hurricane intensity is likely to increase (as indicated by stronger peak winds and more rainfall) but not necessarily hurricane frequency; that Caribbean sea levels are projected to rise by up to 0.24 m by mid century and sea surface temperatures in the Caribbean are projected to warm up to approximately $2^{o}C$ by the end of the century.

GREENHOUSE GAS EMISSIONS

The 1994 GHG Inventory for Dominica indicated the following:
Dominica's INC described Dominica as a net sink of Greenhouse Gases (GHG) in 1994. The data showed that Dominica had gross emissions of 76.53Gg of CO2, which were offset by removals from changes in forest and other woody biomass stock and from the abandonment of managed lands, resulting in a net sink of 295.14 Gg of carbon dioxide.

There were also small quantities of methane, nitrous oxide and non-methane volatile organic compounds – 2.73 Gg, 0.042 Gg and 6.13 Gg respectively.

The key sources of carbon dioxide emissions were as follows:

- Transport – 50%
- Energy Industries – 26%
- Commercial and Industrial Uses – 10%
- Industry – 5%
- Residential – 4%
- Other – 5%

Dominica as a source of carbon dioxide emission and its contribution to GHG emissions is negligible as a result of the vast forest cover of the island.

INCOMPATIBLE USES IN THE PARK

The following represent a number of activities that are incompatible with the objectives of the MTNPWHS

Legally sanctioned activities

- A rock quarry, north of the Park above the Emerald Pool area

- An inactive rock quarry at Freshwater Lake
- DOMLEC's Hydropower station- Trafalgar Falls and Padu which utilize water originating from the FWL with its rock and earthen dam and spillway, open air canal systems and a woodstave pipeline system, the water diversion intake all of which impair the scenic and visual impact of the area.
- A shooting range in the northern area of the park in "Williams Area"

Illegal activities

Agricultural activities occur in the western, eastern and southern areas of the Park. Some of these areas were cultivated with agriculture prior to the establishment of the National Park.

PART A

DESCRIPTION

1. BACKGROUND

1.1 LOCATION AND BOUNDARIES

The Commonwealth of Dominica is the largest and most northerly of the Windward Islands in the Lesser Antilles, lying between Guadeloupe and Martinique. The island measures 29 miles (40 km.) by 14 miles (22 km), extending from l5º10'N-15º40'N and 61º15'W-61º30'W, and covers an area of 289 square miles {751 km²). Dominica is the most mountainous of the Eastern Caribbean islands, rising to 4,747 ft (1,422 m) at Morne Diablotin. The national park has been named after the second highest mountain in Dominica that is located in the Park, Morne Trois Ptions.

The MTPNPWHS is located in the central portion of southern volcanic complex of the island, (Annex A map 1) covering an estimated 6,900 ha (17,000 acres) that includes four of Dominica's seven mountain ranges, Morne Trois Pitons, the highest peak (of the Park) at 1,387 m (4,550 ft), Watt Mountain (1,224 m or 4,017 ft), Morne Macaque (1,221 m or 4,006 ft), and Morne Anglais (1,113m or 3,650 ft). These mountain peaks and their connecting ridges form the backbone of the Park lands. The eastern slopes face the Atlantic Ocean and the western slopes face the Caribbean Sea.

Other major features of the Park consist of three lakes, the Freshwater, Boiling and Boeri Lakes. The Boiling Lake has been ascribed the largest in the western hemisphere. Other features include the Middleham Falls the Emerald Pool and the fumaroles within the Valley of Desolation.

The Park is made up of former crown lands and the privately-contributed Middleham Estate.

1.2 ACCESS

Official Access Points

There are several access routes to the national park ranging from official access points by vehicle and trails to unauthorized access from neighbouring villages, and private lands bordering the Park.

The western boundary of the Park has a number of access points.

Vehicular access to the NPWHS is available from the village of Laudat east of Roseau towards the Freshwater Lake

A number of pedestrian trails provide access as follows:

- From the Titou Gorge where the trail leads to the Boiling Lake
- From the Laudat Road where the trail leads to the Middleham Falls
- Between Laudat and Grand Fond, a foot path cuts through the park joining the two villages.
- From Cochrane and Sylvania where individual trails lead to the Middleham Falls

- From the village of Giraudel/ the Giraudel government school to the summit of Morne Anglais

On the Northern boundary

Vehicular access is available to the Park / Emerald Pool section from the Pont Casse' / Castle Bruce Road

On the Eastern boundary

An ancient pedestrian trail from Delices to Pichelin

The newly-constructed Waitukubuli Trail passes only through the north western tip of the park. (Annex A, Map 4)

UNOFFICIAL ACCESS POINTS

There are a number of unofficial access points to the Park as follows:

- At locations where the Park borders on agricultural lands
- At points on the Delices / Soufriere road.
- From locations on the Pont Casse' to Castle Bruce Road where there are trails leading to the Emerald Pool.
- At the summits of Morne Trois Pitons as well as Bwa Diable and Newfoundland

In future development and planning, it is important that the Department of Forestry establish official entrances and exits with opening and closing times as per existing Park regulation

1.3 Existing Legal and Regulatory Framework

Legal Framework

The National Parks & Protected Areas Act 1975 is the major legal instrument for the establishment of National Parks in Dominica. Section 5 outlines the following criteria for designation of an area as a national park. It authorizes the Minister for Agriculture to set aside any state lands as "protected areas" for the following:

A. Preserving the natural beauty of such area, including flora and fauna
B. Creating a recreational area
C. Commemoration of an historic event of national importance; or
D. Preserving any historic landmark or any area or object of historic, pre-historic, archaeological or scientific importance."

The Schedule attached to the Act describes the boundaries of the Park.

Regulatory Framework

Under section 16 of the National Parks and Protected Areas Act, the Minister may make regulations for inter alia the preservation of flora and fauna, the regulation of hunting and fishing, the preservation of water catchments areas, the prevention of encroachment, the prevention of soil erosion, the control of fire, the charging of fees and as well as the control of the entry and movement of persons within the parks system area.

These regulations have been passed and gazetted as well as regulations with respect to vending in the park and the implementation of user fees.

The Government of Dominica with support from the Caribbean Development Bank, CDB, plans to establish and operationalize the National Parks Service and is presently reviewing the legal framework for National Parks and Protected Areas and preparing amendments to the existing legislation to address the identified deficiencies.

1.4 PARK ESTABLISHMENT

The Morne Trois Pitons National Park was established in 1975 under the "National Parks and Protected Areas Act, 1975". At the time of establishment, the Act sought to protect natural resources in the area, focusing especially on water resources since all the headwaters of the streams and rivers in the southern half of the island are located in the Park.

The original concept of the Park was as follows:

1. To develop the park primarily as a wild land park containing outstanding examples of island tropical vegetation and a wide variety of wildlife species. To protect and maintain the topography of the Park, the high rainfall and other ecological factors that influence and support the abundance and diversity of plant and animal life.
2. The Park should be managed as "a day use pedestrian preserve" since all areas in the Park are accessible within a day. To facilitate this, a network of foot paths and rain shelters will be developed.

1.5 ORGANIZATIONAL ISSUES

The following are some of the major organizational and institutional issues with respect to the MTNPWHS

- Inadequate levels of man- power
- Inadequate technical expertise
- Limited financial resources
- Overlapping jurisdiction with the departments of Lands & Surveys, Ministry of Tourism and Legal and DOWASCO, Dominica Water and Sewerage Company.

2. PARK ENVIRONMENT

2.1 SUMMARY OF PHYSICAL ASPECTS

2.1.1 Elevation

The altitude in the Park ranges from 152 -1424 m. The topographical map highlights the elevation of the Morne Trois Pitons National Park (Annex A, Map 2). When compared to the geological map, the areas of highest elevation are those of the younger pelean formation found in the centre of the park in a north to south direction. Moving towards the park boundaries, the elevation decreases.

2.1.2 Climate

The climate of the Park is dominated by four characteristics:

- Very high rainfall over most of the area through most of the year
- A consistent cover of low cloud for much of the year
- High Wind speeds
- Annual mean temperatures estimated at 16 to 20^{O} C

Average temperature varies within the park from 21^{o} C. at the highest elevations to 25 ^{o} C. at the lowest, and there is little seasonal variation.

Rainfall averages 10,000 mm. per year at the highest elevations to 4,000 mm. per year at the lowest (see Annex A, Map 5).

The effects of the prevailing easterly winds are evident in the Park in the sheared-off shapes of trees on some easterly slopes. However, wind speed records are not available.

The driest season occurs between February and May, but humidity seldom falls below 85%. The NE trade winds blow during most of year, but there is a SE pattern from July to September when tropical storms can hit the island. There is an average of one hurricane every 15 years.

2.1.3 Geological and Geomorphic Processes

Geology

Information on the geology of the Park has been limited to the following geological investigations:

- A survey of the Valley of Desolation with the primary intent of documenting the location and activity of the numerous fumaroles in preparation for a geothermal survey undertaken by Martin-Kaye & Lang (1961), and an earlier survey by Robson and Willmore in 1955.
- A semi-detailed geological survey of the south of Dominica by Wills, 1974

- Preparatory survey work for the hydro- power system
- Seismic survey and monitoring of the La Plaine area in the early 1960's and work done in the southwest which focused on Morne Canot just outside the Park, Morne Anglais east of the Park and the Valley of Desolation within the Park, in late 1990.

Dominica is a summit of a submerged mountain chain at the eastern edge of the Caribbean Tectonic Plate. Dominica consists almost entirely of volcanic rocks. The oldest formations exposed are massive basaltic lava flows and breccias of Miocene age, found between Rosalie and Pagua with numerous Pliocene age dykes cutting through them.

The majority of the park is underlain with a pyroclastic apron, above which younger pelean domes are situated, highlighting the mountain peaks within the park. (Annex A Map 3). Pleistocene volcanoes, approximately 400,000 to 500,000 years old, morphologically well preserved, of composite nature with very many flows cover much of Dominica. They are represented in the Park by the mountains- Mornes Watt, Nicholls and Anglais.

The latest major events of the geological record are the defining ones for the southern Dominica and the Park. Towards the middle of the Park, around Wotten Waven, is an ignimbrite flow cutting the park almost in half. This ignimbrite flow occurred about 30,000 years ago originating from the locus of Morne Trois Pitons producing 60km^3 of material which filled the middle and lower Layou Valley and some tributaries, the Roseau valley and some eastern valleys with partly welded ignimbrite, columned ash and pumice flow. This can be traced southward off the west coast for some 250 km.

Following this eruption, Morne Micotrin, Trois Pitons and Grand Soufriere Hills within the Park as well as Morne Patate southwest of the Park were formed as a result of an eruption of a large dome complex 25,000 years ago. The predominant composition is andesitic. (Maximea, Edwards, Lang)

There are ongoing signs of volcanic activity within the Park in the Valley of Desolation and on its fringes at Wotton Waven in the form of a Soufriere activity. Signs of these were reinforced in the 1960 and 1990 when the Grand Soufriere Hills and the southwestern fringes of the Park produced sufficiently seismic activities to cause concern that eruptions were imminent (in geological time scales).

Geomorphic Processes

The landforms of the Park are mainly composed of structures modified by landslides processes. In the case of pyroclastic flows, dominated by pumiceous material, the high rates of weathering accompanied by high permeability and high rates of leaching indicate that soil material starting with bases and silica is leached out of the system in solution.

The dense vegetal cover and the usual amorphous clay minerals formed, lead to the unusual phenomenon of slope collapse when water contents of the ash-soil material exceeds 300 percent and

triggers “flow slides”- a fairly rare process. Undercutting of cliffs and overloading of summits or loss of roots holding the mass together, produce the rock falls characteristic of ignimbrites illustrated very clearly when there was a rock fall at Trafalgar Falls in 1998.

The Foundland area differs in not only being primarily a basalt lava mountain but having landslides and rock falls of a different type with low permeability and represent the more common forms of erosion.

Landslides in the kandoid materials developed here are more likely to be simple planar or rotational Slides and the various lava forms including pillow lavas and autobrecciated forms may fall without cutting.

2.1.4 Soils

In the northern section of the Park and around Morne Micotrin, allophanoids podzolic type soils are found. These are normally related to wet climates and as indicated in the rainfall map, these areas receive a tremendous amount of rain. Allophanoid latosolics make up the rest of the Park, except for Morne Micotrin which is mainly phytogenic.

There are two main areas of differing soil types which are related to geological differences. The larger of the two areas is covered by soils derived from fairly recent material. This is the area of the domes and ash showers from the Morne Trois Pitons/ Morne Macaque episodes. The following soil types are found in this area;

- Allophane podsolic soils
- Allophane latosolic soils
- Protosols
- Soils of the Soufriere affected areas
- Poorly drained soils

The other much smaller area comprises soils developed over the relatively ancient rocks of Foundland. Many of these soils have a variable local cover of the more recent ashes. The following types are found

- Immature kanditic latosols
- More mature allophone latosolics

Other soil types found are in areas like the Valley of Desolation which have pHs of 2 or less. These soils have been leached by dilute sulphurous or sulphuric acids from the nearby vents. (Annex A, Map 6) shows soil types found in the Park)

2.1.5 Hydrology

Rivers and Streams

The drainage of the Park is almost radial from the large mountain massifs. The backbone of the Park divides the major watershed/ river basins of the south of the island with the headwaters of the Geneva, Gillon, Roseau,

Boeri, Belfast, Layou, Castle Bruce, Rosalie, Taberi, Ouayaneri, Sari Sari, La Ronde, Boetica, Pointe Mulatre, Savanne and Malabuka rivers, all within the Park. All these are mountain streams with steep gradients and narrow valleys. These watersheds provide potable water to almost the entire south, south east and south west of the island. (Annex A, Map 9)

Most of the small radial streams from the various peaks respond very quickly to rainfall events and may dry up completely within thirty six (36) hours of a heavy rainfall. The larger streams of higher order which form the major headstreams of the various watershed, while mostly perennial, are also subject to large variations in flow and sudden floods (flash floods) and can be a source of danger to unwary walkers in the Park.

Lakes

The Park has 3 lakes, the Freshwater, Boeri and Boiling Lakes. The Boeri and Freshwater lakes are both found in the moat or trough between the massifs of the Morne Macaque dome and the rim of the old crater. The Boeri Lake has steep sides virtually all around and is relatively deep. The Freshwater Lake lies in a relatively broad depression and was not deeper than fifty feet prior to being dammed.

The Boiling Lake is more than 250 feet across with a raised rim and steep sides and lie in a tributary of the Valley of Desolation. It contains a liquid which has been described as dilute sulphuric acid to a level of about 20 feet below the rim and it is usually boiling at a temperature of approximately 92^{O} C. The ring of upwelling water in the centre gives an indication of the convection resulting from a steam vent below.

2.1.6 NATURAL HAZARDS

Hurricanes

Dominica is located in the hurricane belt and is susceptible to hurricanes. It is to be noted that, in general, north Atlantic hurricane frequency is characterized by a multidecadal cycle which yields active and inactive phases lasting 10 or more years (Goldenberg et al. 2001). Since 1995, the north Atlantic has swung into an active hurricane phase. Some of the country's most devastating recent hurricane experiences (e.g. Marilyn, Lenny, Dean) have occurred in the current active phase of the north tropical Atlantic.

There is also significant year to year modulation of hurricane frequency and track by El Niño Southern Oscillation (ENSO) events.

A report undertaken by Brian Challenger 2004, "Climate Change Technology Transfer Needs Assessment for the Commonwealth of Dominica -Environmental Coordination Unit Ministry of Agriculture", indicated that Dominica's location in the hurricane belt makes it susceptible to tropical storms and hurricanes. Since 1979, tropical systems of note (storms and hurricanes) which have impacted Dominica

include David (1979), Gert (1981), Gilbert (1988), Hugo (1989), Iris (1995), Marilyn (1995), Hortense (1996), Lenny (1999) and Dean (2007). The island is impacted (brushed or hit) approximately once every four years.

Landslide Risks

Landslides are a potential hazard throughout Dominica and especially in the high rainfall steeper areas. The majority of the MTPNP is susceptible to high risk landslide. West and South of Morne Micotrin are within the high landslide risk including the entire village of Laudat. Boiling Lake, Fresh Water Lake and Boeri Lake fall within medium risk. To the south of the park is an extreme landslide risk zone at Perdu Temps. (Annex A Map 7)

Volcanic Eruptions

There is no certainty of imminent volcanic eruptions in the Park. There are possible hazards based on 2 or 3 probable volcanic centres in the Park. One in the south of the Park that is classified as low, another in the south central area around Titou Gorge, the Boiling Lake and the Valley of Desolation classified as high and a third are north of the Park classified as intermediate. The effect of a probable eruption would likely result in profound changes to the Park which would result in closure of the Park.

All these natural hazards must be considered in relation to safety of personnel and visitors. As such the development of a disaster mitigation plan for the National Park is of utmost importance in the management of the Park.

Flooding

Floods, particular flash floods, can occur in many streams in the Park and are a phenomenon of rapid run-off after intense storms when the land is saturated- a similar condition to those which favour landslides.

2.2 BIOLOGICAL ASPECTS

2.2.1 Flora and Vegetation Types

A number of studies have been undertaken on the flora of Dominica which describes the vegetation of the Park. These date back to the earliest in 1949 by J.S. Beard, to the most recent, (1995) undertaken by Peter Evans. The most extensive research on the vegetation of the island, “Flora of Dominica” was carried out by W.H. Hodge (1954). In his publication, he identified over 5000 species of vascular plants, twenty of which are endemic to Dominica. This serves as a comparative basis for measuring the plant diversity or floral richness of an area. The most recent ecological study of the Morne Trois Pitons National Park was undertaken by Dunn, Williams and Edwards in 1979 entitled “Vegetation Study of the Morne Trois National Park”. Six vegetation types have been identified in the Park. (Annex A, Map 8).

Elfin Woodland/Cloud Forest

This zone occurs at the highest elevation, above 3000feet (914m) and is almost constantly in mist and subject

to high winds, rain and cold temperatures. The vegetation consists of mosses, ferns, shrubs and stunted trees covered by lichens. Many of the leaves are rubbery or leathery to protect the plants from the harsh climate. The trees form a gnarled impenetrable growth. They lack a definite trunk and generally have very small leaves. The two predominant species found in this zone are *Clusia venosa (Kaklin)* (about 50% of the growth) and *Lobelia cirisifolia.* Also present are plant species such as *Schefflera sp. and Oreopanax sp., Weinmannia pinnata* and *Viola stipularis,* and palm species such as *Prestoea montana* and *Geonoma dussiana.*

Montane Thicket

This zone occurs in areas that are in transition from the Elfin to the Montane rain forest. The trees tend to occur in single stratum reaching heights of between 30 and 50 feet (10 – 15 m) attaining much shorter heights than they would in the rainforest. The most common species found are *Tovomita plumieri, Byrsonima martinicensis, Podocarpus coriaceus, Richeria grandis* and *Euterpe dominicana. In flatter areas, Amanoea caribea* tend to dominate.

This type of forest tends to form on ridges and well-drained slopes between elevations of 1500-3000 feet (455 m – 915 m). Dunn, Edwards and Williams (1979) estimate that there may be approximately 2233 ha (5582 acres) of montane rain forest thicket in the Park.

Montane Rain forest

The Montane Rain Forest is a transitional community between Rain Forest and Elfin Woodland. This formation is found predominantly along the high ridges and summits of lesser peaks on soils with impeded drainage, generally on Red Earth soils but also on the deeper phases of the Mountain Podsolic soil.

This zone occurs above 2000 ft (700 m) and is frequently in cloud cover of fog. Steep slopes retain minimal soil. The species composition is similar to that of mature rain forest, yet much reduced in stature. Non-vascular epiphytes characteristically cover the montane forest. Variations of rainforest associations are found in this area due to ecological conditions. In the wetter, swampy areas, *Dacryodes excelsa and Symphonia globulifera* are the dominant and sub-dominants species respectively. *Licania-Oxythece* association can also be found in this area as well as typical rainforest trees like *Amanoea caribaea.*

This type of forest can be found at elevations ranging from 455 m to 915m (1500 ft.-3000ft.). Three variations (sub-types) of Montane Rain Forest exist, namely: Lower Montane Rain Forest, Montane Thicket, Montane Swamp Forest and Palm Brake. Index species are *Podocarpus coriaceus (gymnosperm), Richeria grandis, Cyrilla racemiflora, Tovomita plumierii, Amanoa caribaea, Brysonima trinitensis, Cyathea imrayana and Ilex macfadyenii.* A high proportion of palms exist within the Montane Rain Forest.

Montane Swamp Forest is found in regions of water-logged soils. It covers 465 ha (1212 acres) in the World Heritage Site and is restricted to the eastern portion of the Park. It is found between 600 –700 m (2000- 2500 ft.) in areas of poorly drained soils that receive at least 7620 mm (300 in) of rain annually. The floristic

composition is a variation of Podocarpus-Richeria association and with *Amanoa caribaea* being also a dominant species, *Sloanea spp. and Sterculia caribaea.* The structure of the forest is typically two well- defined strata with an open canopy.

Palm Brake occurs in montane rain forest on stable soils and consists of *Euterpe globosa* and *Cyathea spp.* Other species found are *Richeria grandis, Byrsonima martincensis.* These are described as seral communities that will eventually change to rainforest thicket phase.

Mature Rain Forest

The rain forest of Dominica is a climax community occurring between elevations of 60 – 915m (200 – 3000 feet) where the annual rainfall combined with the fertile yellow earth soils, and protection from the wind, provide the optimum conditions for plant growth.

The mature rain forest contains the most luxuriant growth of all the zones because climate and soil conditions here are the most favourable. The general structure consists of three to four strata. The *Dacryodes-Sloanea* association is the purest form of this forest type on the island. The dominant trees *Dacryodes excelsa* and *Sloanea spp. reach a height of 27 – 30m (90 – 100 feet).* Other species typical of the rain forest are *Tapura latifolia, Sterculia caribaea, Licania ternatensis, Pouteria fabrilis, Amanoa caribaea, Symphonia globulifera, Clusia plunkenetii, Geonoma pinnatifrons, Richeria grandis, Osmosia monosperma, Chimarrhis cymosa, Dussia martinicensis and Eugenia species.* Because of greater sunlight and flatter topography, a certain amount of humus can collect. The lower level of this forest type is normally dominated by epiphytes and fern species and climbers.

Secondary Rain Forest

This zone constitutes former mature forests that have experienced some disturbance, primarily logging or shifting agriculture, and the impact of hurricanes especially Hurricane David. Vestiges of old stands often remain, surrounded by smaller re-growth. These areas are normally characterized by a large diversity of smaller trees that are light demanding and a larger amount of undergrowth (grasses, bushes, etc.) Typically found in this area are invaders like *Cyathea spp. Cecropia sp.*, a variety of *Miconia sp.* including *mirabilis, striata and guanensis, Inga ingoides, Chimarrhis cymosa and Simarouba amara* among others. The lower elevation limits are usually defined by agriculture. However, at many locations on the south-eastern side of the park, the lower reaches of secondary growth mix with semi-evergreen forest.

Semi-Evergreen Forest

This zone is subject to drought that causes leaf loss. Trees grow to medium height. Undergrowth lacks epiphytes and lianas. *Tabebuia pallida and Lonchocarpus pentaphyllus* are two common species in the semi-evergreen areas.

Fumarole Vegetation

Fumarole Vegetation is a specialized type of vegetation that inhabits the Valley of Desolation, above the Boiling Lake and the vicinity of other fumaroles like the Soufriere and Wotten Waven. In the Valley of Desolation, almost all the vegetation has been blasted by the sulphurous fumes up to a considerable height on the slopes, but pockets of elfin woodland persist here and there at the base of the valley. Clusia venosa and an *Ilex spp*. seem best able of the elfin flora to withstand the poisonous gases. Nearer to the vents can be found clumps of the endemic bromeliad, *Pitcairnia microtrinensis,* that evidently has a high tolerance for the harsh conditions, and persists quite close to active hot springs and fumaroles.

2.2.2 Fauna

The most comprehensive survey on wildlife in Dominica took place in 1975. (Swank, Wendell G. & Julien, Cuthbert R.-Distribution and Status of Wildlife in Dominica). Peter R. Evans, Forest Officers, M. Zamore and A. James have also conducted studies in specific areas. A review of published reports indicates that up to 14 species of mammals, 12 species of reptiles, 2 amphibians, 6 species of freshwater shrimps, 5 species of crabs and over 50 species of birds occupy park land at different times in their life cycles.

The largest mammal residing in the park is the agouti. There are impressive numbers of bird species in the Park including local and Antillean endemics. Once common inhabitants, the Red-necked parrot, "Jaco" *Amazona arausiaca* and the *Sisserou parrot, Amazona imperialis,* are seen in the Park though not in large numbers.

VERTEBRATES

Amphibians

Three (3) species of frogs, two of which are endemic to Dominica, can be found in the park. The amphibian fauna in Dominica consists of three species of frogs, one of which is endemic to the island while two are regionally endemic. The most prominent is *Leptodactyllus fallax* a large frog commonly referred to as the Crapaud or Moutain Chicken, which is endemic to Dominica and Montserrat but is not found in the Park. Also included among Dominica's amphibian fauna are two species of small frogs, consisting of one single-island endemic species the Dominican Piping Frog *(Eleutherodactylus amplinympha)* which is restricted to higher elevation sites, and one regionally endemic species, the Tink Frog *(Eleutheorodactylus martinicensis).*

Reptiles

Ten (10) species of lizards and four species of snakes have been recorded in Dominica. Three (3) species of Lizards are found in the park including two endemics. The tree lizard is endemic to Dominica and *Iguana delicatissima* is endemic to the Lesser Antilles. Four (4) species of snakes can be found in the Park including two Antillean endemics. Two (2) species of geckos, *Sphaerodactylus vincenti,* and the tree gecko*, Thecadactylus rapicauda,* are found in the rainforest leaf litter and in secondary lowland forest within the park.

Fishes

Various studies undertaken by the Forestry Division Personnel and Kim Bell indicate that there are a number of freshwater fish found in various watercourses occurring in the Park. This includes the mountain mullet *Agonostomus monticola, the American eel Anguilla rostrata, Goby Sicydium punctatum, Stippled clingfish Gobiesox punctulatus, and the Tilapia Tilapia mossambica* were introduced to Dominica.

Birds

Of the 176 species of birds recorded in Dominica, over 50 % occur in the Park. This includes endemics to Dominica as well as the Lesser Antillean and regional endemics. Of the endemics are the two endangered species of parrots, the "Sisserou" or Imperial parrot and the "Jaco" or Red-necked Parrot. There has been no systematic recording of birds in the Park.

Mammals

Of the mammals which occur in the Park, the bats constitute the largest population. Three of the bats found in the Park are Lesser Antillean endemics.

Rodents including the marsupial mammal, *Didelphis marsupialis "manicou" the "Agouti" Dasyprocta antillensis and the black rat, Rattus rattus are common.* The largest of the terrestrial mammal, the feral pig, is also found in rain forest areas but is not present in the MTNPWHS

Eighteen species of terrestrial mammals have been recorded for Dominica. The wild mammalian population includes twelve native species of bats, one species of opossum, one species of feral pig and four species of rodents including the agouti.

Of the twelve bat species recorded on the island, Dominica has one single-island endemic species, mouse-eared bat *(Myotis dominisensis).* Three (3) species are regionally endemic, namely: the Lesser Antillean tree bat*, Ardops nichollsi,* the Lesser Antillean long-tongued *Monophyllus plethodon* and the Antillean cave bat *(Brachyphylla cavernum)* are endemic to the Antilles. All four species are can be found in the park.

However, some researchers have listed *Ardops nichollsi* as endemic to Dominica (Evans and James, 1997). Diversity and density of bats are highest in and around rain forests. The impacts of agricultural cultivation and hurricanes have reduced bat species populations and diversity.

The other six wild terrestrial mammalian species found in Dominica were all introduced. The Agouti *(Dasyprocta atillensis)* was introduced from South America possibly by the pre-Columbian Arawak and Carib Indians. The Opposum *(Didelphis marsupialis insularis),* the Wild Pig *(Sus scrota),* two species of rats, the Brown Rat *(Rattus norvegicus)* and the Black Rat *(Rattus rattus)* and one species of Mouse - the House Mouse *(Mus musculus)* were all introduced on the island , and have become naturalized.

INVERTEBRATES

A survey undertaken by F. Chace & H. Hobbs under the Bredin-Archbold collecting expeditions in the 1960's is still the most comprehensive on Dominica's crustacea.

Evans and James "Wildlife Checklist 1997" noted that twenty species of terrestrial and freshwater crabs of the Order Portunidae, Pseudothelphusidae, Gecarcinidae and Ocypodidae and eleven species of freshwater shrimps of the Order Penaeidae and Palaemonidae, have been recorded in Dominica.

There has been no specific collection of crabs in the Park. However based on the ecological habitats typical of these crabs and shrimps, 3 species of crabs and six species of shrimps can be found in the rivers and streams occurring in the Park.

Crustaceans

The terrestrial and freshwater decapod crustaceans in Dominica include eleven species of freshwater shrimps and twenty species of freshwater/terrestrial/semi-terrestrial crabs (Chace & Hobbs, 1969); (Swank & Julien, 1975). There are no crustaceans endemic to the island and most are widely distributed in the Caribbean. The twenty crab species occur in ecologically diverse habitats but most occur in coastal habitats.

Freshwater shrimps are common in Dominica with a distribution ranging from cascading mountain streams to slow flowing river mouths. Eleven species of shrimps from the following genera Atya, Jonga, Micratya, Potimirim, Xiphocaris and Macrobrachium, have been recorded in Dominica. Several of the larger species are used as food.

Insects

The class Insecta has not been fully surveyed on the island and as a result the species list is incomplete. Most of the surveys were conducted in the 1960s by the Bredin-Archbold-Smithosonian survey and many of the species are listed as new species. Orders listed include Hymenoptera, *Hemiptera, Diptera, Coleoptera, Lepidoptera,* and *Tricoptera.* The population status of most of the species listed is not known.

Fifty-five species of butterflies have been recorded in Dominica. Two species, the Dominican Snout *(Libytheana fulvescens)* and Dominican Hairstreak *(Electrostrymon dominicana)* are endemic to Dominica, while seven species are endemic to the Lesser Antilles, namely, Godman's Leaf *(Memphis dominicana),* St. Lucia Mestra *(Mestra cana),* Godman's Hairstreak *(Allosmaitia piplea),* Bronze Hairstreak *(Electrostrymon angerona),* Stub-tailed Skipper, *(Astraptes anaphus),* Broken Dash Skipper *(Wallengrenia ophites)* and Lesser Whirlabout *(Polites dictynna).*

Based on recorded localities by Dr. Peter Evans 1982-2000 and David Spencer Smith (1991) and J.Y. Miller (1993) there are about 20 species of butterflies found in the National Park.
This includes at least one species of the *Lycaenidae* family, the Monarch *(Danaidae),* some species of the

Whites and Sulphurs *(Pieridae),* the Frittillaires *(Nymphalidae)* and the Skippers *(Hesperidae).*
Eleven species of Phasmids (stick insects) have been recorded for Dominica. *Diapheromera saussurei* is a confirmed endemic of Dominica while two other species, *Diapherodes gigantea dominicae* and *Lamponius dominicae* are believed to be endemic but need further investigation (ASPER 2000).

The Hercules Beetle *(Dynastes hercules hercules)* which occurs in montane areas in Dominica is also found in Guadeloupe. It is the largest of eight recognized races of the hercules beetle whose distribution extends south from Guadeloupe into much of South America.

2.3 IMPORTANT ECOLOGICAL RELATIONSHIPS

Hurricanes and rainfall have shaped the composition of flora and fauna in the Park. Forest vegetation and soils absorb most of the rainfall, which is gradually lost through evapo-transpiration and evaporation thereby keeping humidity high and promoting further rain. The radiation climate of the Park indicates that small areas of the Park can receive direct sunlight and other areas receive it for only short periods in the morning or evening. These are steep north facing slopes in basins which provide early and late shadows. These habitats contain some interesting ecological systems. Droughts are rare.

The soils of the Park are nutrient poor since most of the nutrients are bound up in the plant material. There are tight plant-animal interactions for pollination, seed dispersal, feeding by mammals and birds.
Introduced spp. probably cause damage to native vegetation, but this has not been documented. Rats are probably the most damaging. The area has been hunted for centuries, but the effects on populations are unknown though it is probable that in the past it has depressed parrot populations.

The Park lies within a Conservation International-designated Conservation Hotspot, a WWF/IUCN Centre of Plant Diversity and a Bird Life-designated Endemic Bird Area.

2.4 Summary of Cultural Aspects

There has been no in-depth study on the cultural aspects of the Park. In the Emerald Pool area in the northern section of the Park is an old Carib trail used by the Carib Indians to traverse from north to south before the main road to Castle Bruce was built in the 1960's. There is also an old trail from the Freshwater Lake to Grand Fond that was used for access by horseback or walking before motorable access was available.

3.0 SOCIO ECONOMIC AND LIVELIHOOD CHARACTERISTICS OF THE PARK

3.1 PRESENT POPULATION AND SETTLEMENT PATTERNS AROUND THE PARK

Table 1: Population and settlement around the Park

Parish/ Name of Community	Population	Approximate Area (Mi 2)
St. George	20, 538	21.7
(Roseau) (15,167) --	15, 167	
(Rest of St. George) –		
Trafalgar/ Shawford/ Fond Canie	**302**	
Laudat	**336**	
Morne Prosper	**529**	
Bellevue Chopin	**526**	
Laudat	**336**	
Copthall		
Giraudel	**553**	
St. Paul	8,522	25.2
St. Mark	1,895	4.0
St. Patrick		33.8
Petite Savanne	**800**	
Pichelin/ Geneva	**580**	
Stowe/Dubic	**153**	
Bagatelle	**437**	
Victoria/ Point Mulatre	**147**	
Delices	**201**	
Boetica	**192**	
La Plaine	**671**	
St. David- north east		50.8
Rosalie/Newfoundland	24	
Morne Jaune	204	
St. Andrew	10,495	68.8
Total	**71,727**	**289.5**

Office, Ministry of Finance and Planning, Population and Housing Census – 2001, Preliminary Results, August 2001.

Dominica has an average population of 72,000 people. Villages in close proximity to the Park contain over 10% of Dominica's population and area as follows:

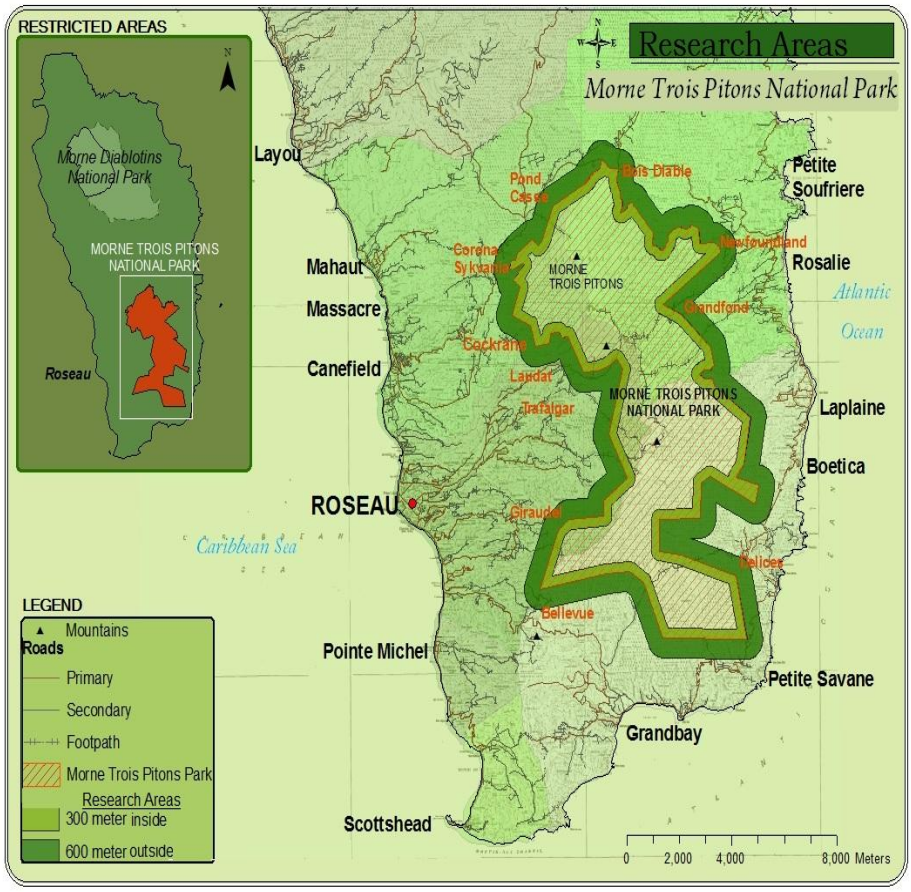

Figure 1:location of communities in Morne Trois Pitons National Park

EAST OF THE PARK:

- Victoria
- Delices
- Boetica
- La Plaine
- Morne Jaune
- Grand Fond
- Rosalie

WEST OF THE PARK:

- Sylvania
- Cochrane
- Laudat
- Morne Prosper
- Wotten Waven
- Copt Hall

- Giraudel
- Trafalgar
- Shawford

NORTH OF THE PARK

- Pont Casse'
- Fond Melle
- Crete Palmiste
- Terre Ferme
- Bois Diable

SOUTH OF THE PARK

- Bellevue Chopin
- Pichelin
- Geneva
- Stowe
- Dubique (dubuc)
- Bagatelle
- Petite Savanne

3.2 PATTERNS AND POVERTY ASSESSMENT

"IMF Country Report No. 06/289 of August 2006, **Dominica: Poverty Reduction Strategy Paper" indicated** that poverty in Dominica is high – about 29% of households and 39% of the population. The report stated that approximately 10% of households and 15% of the population are indigent, i.e. very poor. Poverty exists in urban and rural areas. Three quarters of poor households live in rural areas where one in every two households is poor. The remainder (24%) is to be found in the main towns of Roseau and Portsmouth.

The report also indicated that some of the catchment areas adjacent to the Parks namely, St. David and St. Patrick have the highest incidence of poverty.

The incidence of poverty in Dominica varies considerably from parish to parish. According to the report, "The highest incidence is in St. David, north east of the Park where over half the households are poor followed by St. Patrick (the southeast). St David also contains over twice as many indigent households (28%) as any other parish.

The geographic distribution of the poor population is similar to that of poor households; in all cases, the percentages are higher as poor households tend to be larger. In St. Mark and St. David, this means that the overall incidence of poverty exceeds 60% of the population.

The overall unemployment rate is 25% compared to around 16% in 1999 and 10% in 1991. The main economic activities of the majority of workers in poor households in the catchment area are in the construction and

agricultural sectors. Differences between the other sectors are far less significant. In terms of occupation, over half the employed poor are to be found in the skilled and unskilled manual sectors and another quarter is farmers.

A survey undertaken indicates that in the main catchment areas of the park there a large number of farmers indicating that farming is a significant activity in and around the Park. Of significance are the main parishes around the NPWHS - St David, St. Patrick and the Rest of St. George.

Table 2: Registered farmers by Parish and Farm Size

Parish	Size of Farms (acres)							
	>1	1.5	5.1 -10	10.1-25	25.1-50	50.1-75	75.1-100	
St. George	34	41	8	8	2	-----	---	
Rest of St. George	99	96	12	11	2	---	---	---
St. Paul	44	206	47	17	5	2	----	60
St David	95	818	87	28	3	-----	------	
St. Patrick	138	401	24	4	2	-------	-------	

Source: Central Statistical Office- Visitation records 2001 Population and Housing Census

3.3 CURRENT RESOURCE USE AND DEVELOPMENT

3.3.1 TOURISM AND RECREATION

There are a large number of visitors to the various ecological sites to the Park. Visitation to some areas like the Emerald Pool is very high. The impact of these visitors on the MS/CNP should be

Table 3: Forestry, Wildlife & Parks Division Summary Visitation to MTNPWHS 2008 - 2009

Sites	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Emerald Pool	97486	82440	52094	61306	116732	77499	93950	78626	74210	63558
Middleham Falls	4242	5088	4251	4783	7873	6030	5197	2525	7348	6220
Boiling Lake	11858	14201	14013	13969	13966	14018	12392	14810	16853	4785
Freshwater & Boeri Lake	10422	14863	10852	16128	19170	12504	17466	16242	16434	9968
Morne Trois Pitons	3824	4898	5034	4712	6018	9168	16517	11310	58	13
TOTALS	127,832	121,490	86,244	100,898	3789	14392	14422	13699	249752	**84,544**

(Source: Forestry & Wildlife Division)

evaluated in terms of the limits of acceptable change, LAC. The visitor numbers to the Emerald Pool are indicative of the need to undertake this evaluation. The major tourism activities taking place are hiking, bird watching, mountain climbing,

Total visitors to the park decreased from 127,832 in 2000 to 84, 544 in 2009 by 34%.

HOTELS, BAR AND RESTAURANT

There are no hotels in the National Park. However, there are two restaurants/coffee shops each located in the visitor centres of the Emerald Pool and the Freshwater Lake respectively. There are a number of hotels and guest houses in communities adjacent to the Park.

RECREATION

Swimming takes place in a number of locations in the Park-the Emerald Pool, Freshwater and Boeri Lakes and the numerous rivers in the Park. Fishing and hunting are not permissible in the Park.

EXISTING FACILITIES AND AMENITIES

The MTNPWHS consists of a number of visitor facilities and trails in various areas of attraction within the Park as follows:

Table 4: Amenities and facilities in Morne Trois Pitons National Park

Facilities/amenities	Emerald Pool	Fresh Water Lake	Boeri Lake	Boiling Lake	Middleham Falls
Trailhead	❖ 1	❖ 2		1	❖ 3
Trails	❖	❖	❖	❖	❖
Parking areas	❖	❖	1		
Signs & Interpretation	❖	❖			❖
Floating jetty					
Lake access		2	1		
Picnic/ rain shelter	❖ 1	1		Rain shelter	❖ 2
Research station					
Maintenance					
Visitor Centres	❖ 1	❖ 1			
Campsite					
Landscape rehabilitation		❖			
Toilets	❖ 1	❖ 1			1
Snack bar	❖ 1	❖ 1			

❖ **- Indicates the presence of amenities and facilities**

3.3.2 Potable Water consumption

Water systems within the Watershed that emanate from the Park consist of the following:

- Roseau Watershed , Area: 3,172.5 ha Rain Fall: 5388.3 mm
- Morne Prosper Water System / River Claire
- Wotten Waven/Trafalgar/ Copthall Water System (River Blanc River/River Padu
- River Douce Intake
- Bulk Water Supply (Padu River)
- Stewart Hall
- Desports
- Campbell

There are also plans for WA-1 Water Supply Augmentation for the River Claire, Boeri River and Fresh Water Lake catchments.

3.3.3 Hydroelectricity

Dominica Electricity Company Ltd., DOMLEC currently operates three (3) hydro stations on the Roseau River Watershed (Annex A, Map11) as follows:

- Laudat
- Trafalgar
- Titou Gorge / Padu

Maximum water extraction capacity at the above mentioned sites is 1.09m3/sec (Titou Gorge), 0.71m3/sec (Laudat) and 1.39m3 m3/sec (Trafalgar) (DOMLEC pers. comm.) Currently the water abstracted from these sites returns to the river at Trafalgar.

The average yearly output is estimated at 27gwh which constitute approx 30% of national production(Reference, DOMLEC)

3.3.4 Research

A number of scientists, mostly biologists, have carried out research in and around the Park. The following represent some of the research programmes undertaken

- Research on Forest Dynamics – Forestry Division
- Smithsonian Research on Hummingbirds
- Policy Document for Integrated Water Resource Management
- Monitoring of Mountain Chicken and other Frogs
- Global Water Partnership Agreement (GWPA)
- CREPDZ – Mini Hydro Project
- Feasibility Study on Checkhall River

- Yale University automated weather stations, DOMEX Project:
    - To understand the physics of mountain triggered convection and precipitation in the tropics, using Dominica as a natural laboratory
    - To develop data sets that can be used to test and improve numerical models of convection and precipitation in the tropics
    - To better understand and predict the weather and climate of the Lesser Antilles including Guadeloupe, Dominica and Martinique
    - The principal investigator of DOMEX is Professor Ronald B. Smith from Yale University, with support from the USA National Science Foundation. Participating institutions include: Dominica Division of Forestry, MeteoFrance DIRAG, University of Reading, University of Wyoming, and the Max Planck Institute.

3.4 GENDER ISSUES

The major form of employment of women in the Park is vending. At the 2 major sites where vendors are located, 90% of vendors are women. Other areas of employment are the restaurant which is dominated by women.

Park management in Dominica is still male-dominated. At present, there is only one female professional in the Forestry & Parks Service

3.5 LAND OWNERSHIP AND LAND USE

LAND USE

Most of the lands immediately bordering the Park are under agriculture: Some areas are forested with limited utilization by the land owners. (Annex A, Map 5). In many areas of the Park there has been shifting agriculture which involves the clearing of trees and other vegetation that can lead to erosion, silting of waterways and destruction of wildlife habitat.

AREAS OF THE PARK WITH SPECIAL IN-HOLDINGS

LEGAL IN-HOLDINGS

- Freshwater Lake -Approximately one parcel of 17 acres of land is privately owned.
- The south east boundary of the park is part of the motorable road to the village of Delices
- La Plaine area- 2parcels of land in the area are privately owned- No information on acreage is available

- In the Northern section of the Park in the area of Emerald Pool, there is a quarry where tarrish is extracted for road construction. This area has been a constant source of silting of the Emerald Pool
- A police shooting range in the northern area of the park in “Williams Area” north of the Park
- An inactive rock quarry at Freshwater Lake

ILLEGAL IN-HOLDINGS

- Grand Fond- there are approximately 9 squatters farming in the area
- In the Petite Savanne/Morne Toupie squatters are planting Bay trees

Land Ownership

95 % of the Park lands are state-owned.
There are a number of estates bordering the park some of which are state-owned (refer to map below)

Table 5: Estates and settlements bordering the MTNPWHS

LOCATION IN THE PARK			
East	**West**	**North**	**South**
Guayaneri &Taberi Estates	Middleham Estate	Pont Casse Settlement	Rosehill
Pointe Mulatre	Stewart Hall Estate	William settlement	New Florida
Bois Belvue Estate	Rose Hill Estate	Bwa Diable/ Fond Melle Settlement	Perdu Temps South Settlement
Palmiste Estate	Providence Estate	Petit Terre Ferme	Stowe
Plaisance Estate	Sandringham	Terre Ferme Settlement	Lisdara
	Brigandy Estate		
	Castleton Estate		
	Curbin and Berlin Estate		
	Laudat Settlement		

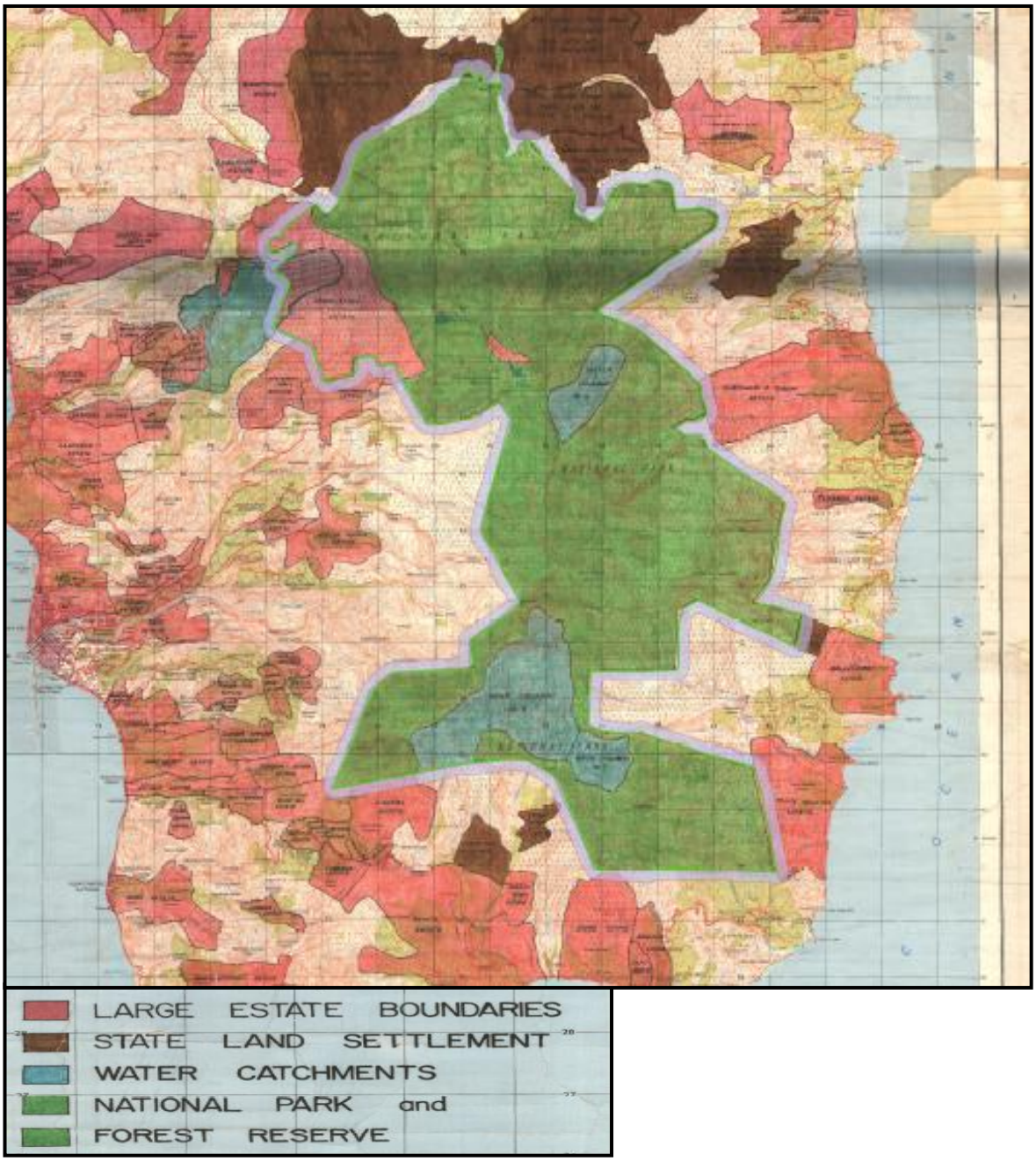

Figure 2: Morne Trois Pitons National Park - Land Ownership

4. LEGAL STATUS AND MANAGEMENT FRAMEWORK

4.1 CURRENT MANAGEMENT

The Ministry of Agriculture and Forestry is the primary institution with direct responsibility for national Parks through the department of the Forestry, Wildlife & Parks Division, (FWP)

The administration, management and control of the national parks system is vested under section 3(3) of the National Parks and Protected Areas Act. No. 16, 1975 to the Minister responsible for the national park system. In this case the Minister for Agriculture & Forestry through its department, the Forestry, Wildlife and National Parks. The Ministry develops the broad policy framework to guide the development of these resources.

Budgetary allocation for the management of the National Parks for 2008 – 2009 and for 2009 - 2010 and proposed budget for 2010 – 2011 respectively, is as follows:

Fiscal Year	Allocation
2008/09	1,49,842
2009/10	1,175,701
2010/11	1,282,205

Section 7 of the Act provides for the appointment of a Director of National Parks, a Superintendent of Parks, Park wardens and such other officers who shall constitute the “National Parks Service” The Director is empowered under section 7(2) of the Act, to employ casual workers as may be necessary for the administration of the national parks system.

The Act also provides for the appointment of a National Park Advisory Council consisting of the Director of National Parks, three members appointed by the Minister and one on the recommendation of the Dominica Conservation Society (section 8)

The function of the Council is to advise the Minister on matters relating to the administration, management and control of the national parks system.

To date, the “National Park Service” including the recommended management staff, has not been fully established. The existing permanent staff for the National Park consists of a Park Superintendent/ Forest Officer, who is responsible for the Park supported by a finance Officer, 12 Park wardens and 5 non-technical staff- 1 receptionist, 1 secretary, 1 cleaner, 1 labourer and 1 clerical assistant. To date, no one has been appointed as Director of National Parks. The Director of Forestry takes on the responsibility of Director of National Parks. A national parks advisory council has never been appointed and no park management plan has

been submitted for public review or approval as required by the Act. In terms of the MTNPWHS, there are 10 non-established officers directly responsible for this component

Regulations with respect to the National Parks and Protected Areas Act have been developed through "Statutory Rules and Orders No. 54 of 2003 and gazetted in January 2004.

Some sites within the Park- Emerald Pool, Freshwater and Boeri Lakes are managed by the Ministry of Tourism and Legal Affairs

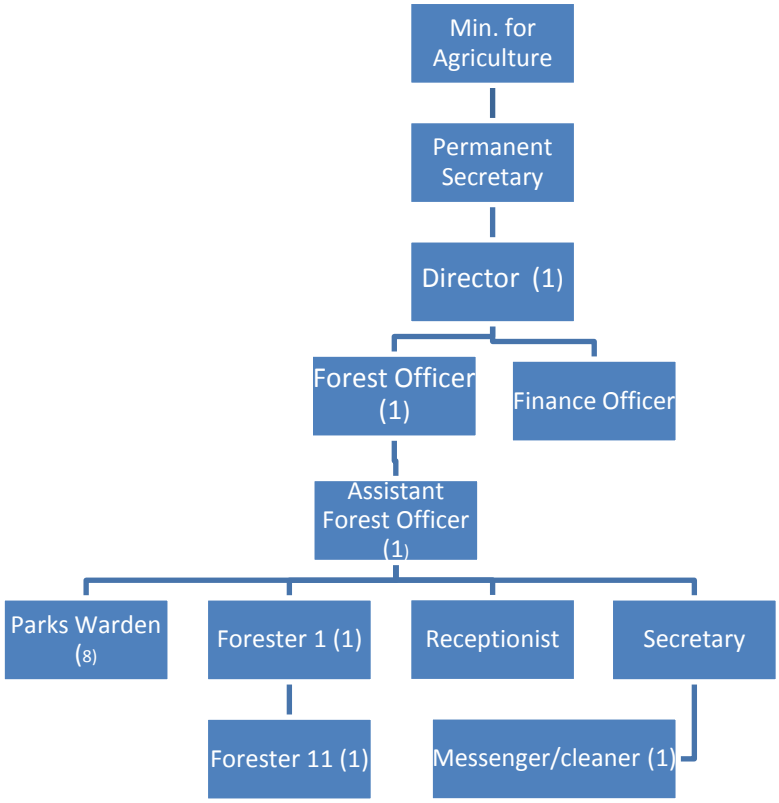

Figure 3: Current Morne Trois Pitons National Park Organizational Structure

4.2 PROPOSED MANAGEMENT

Actions are underway to establish a semi-autonomous National Park Service (NPS), for Dominica, which would then become the management authority for the MTNPWHS. Creation of the NPS is called for under the National Parks and Protected Act of 1975. However, there are plans to review all legislation with respect to protected areas and to review and manage all protected sites under one entity, the Dominica Protected Area Authority. As such all legislation with respect to national

Park and protected areas are being reviewed. The current target date for establishment is January, 2011.

4.3 WORLD HERITAGE STATUS

The Morne Trois Pitons National Park (MTPNP) was established in 1975 under the National Parks and Protected Areas Act. In 1997 it was established as a UNESCO World Heritage Site - Inscribed on the World Heritage List under Natural *Criteria viii- "to be outstanding examples representing major stages of the earth's history, including the record of life, significant on-going geological processes in the development of landforms or significant geomorphic or physiographic features" and criteria x. "To contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation".*

4.4 POLICY AND LEGAL AND REGULATORY FRAMEWORK

4.4.1 Development of Policies

There are no written policies with respect to the Park. It is recommended that policies are formulated to deal with a number of important issues that impact on Park management and conservation of its resources. The following are some of the issues identified:

- Climate change
- Utilization and management of User fees generated from the Park
- Management of the Waitukubuli National trail and its relationship to the Park
- Physical Development Guidelines, architectural styles and standards
- Relationship with utility companies
- Involvement of community Organizations in decision making
- Concessionaires
- Use of visitor centres
- Establishment of buffer zones
- Maintenance plan
- Visitor Safety, Security and Rescue operations
- Accommodation facilities/ camping etc.

4.4.2 Legal and Regulatory Framework

Morne Trois Pitons National Park WHS was legally established in 1975 under the National Parks and Protected Areas Act. No. 16, 1975 and is currently managed by the Division of Forestry, Wildlife and National Parks.

Other aspects of the legislation and agreements affecting the Park include the:

- National Parks and Protected Areas Act. No. 16, 1975 which outlines the purpose, permitted and "not-permitted" uses for National Parks and also permits the Minister of Agriculture to grant licenses to water and electric companies of Dominica to construct any road or maintain any structure within the boundaries of a National Park for the purposes of carrying out their respective business; and,

- Agreement for researchers operating in Dominica

Under the Statutory Rules & Orders, (SR&O) The national Park regulation SRO No. 54 of 2003 provides for the following in the National Park

- Opening and closing hours
- Prohibited activities
- Selling of goods
- User Fees -The national Park and Protected Area Eco-tourist Site, User Fee Regulation SRO No. 27 of 1997 and Regulation SRO No. 22 of 2008 authorizes the National Park to generate revenue from the following: user fee ticket sales, license fees from tour operators, vendors and tour guides. Permits for researchers, media personnel and impounding fees from animals in the Parks as well as Park fines for illegal activities in the Park.

4.5 COMPLEMENTARY PROJECTS

GEF-World Bank Special Programme for Adaptation to Climate Change (SPACC) project is currently undertaking a project for the establishment of buffer zones for the National Park.

Additionally, the Government of the Commonwealth of Dominica (COD) with support from the Caribbean Development Bank (CDB) is currently implementing a project aimed at establishing and operationalizing a National Parks Service (NPS). The project comprises two phases with Phase I focusing on a review of the legal framework for the management of national parks and protected areas as well as the conduct of amendments to existing legislation to address identified deficiencies. Phase II focuses on the institutional framework including the establishment and operationalization of a NPS.

A "Sustainable Land Management Plan" is currently being developed under the UNDP GEF programme that is expected to be complete by 2011.

PART B

EVALUATION

5. IMPORTANCE OF THE PROTECTED AREA

Morne Trois Pitons National Park was Dominica's first national park and by an act of parliament was established in July 1975. It was also the first in the Eastern Caribbean to be enlisted as a "World heritage site" by UNESCO in 1997.

There are a number of characteristics that contribute to the importance of the Park.

Natural Features to be protected are as follows:

- The Park contains the largest and most diverse and pristine forest in the Eastern Caribbean.
- It has been listed by Birdlife International as "Important Bird Areas, IBA" because it supports

3 globally threatened species- two endemic species of the Amazona parrots and the Forest thrush, Cichlherminia herminieri thus reinforcing the critical biodiversity of the area.19 Lesser Antilles, EBA, Endemic Bird Area- restricted ranges birds

- Protection of other endemic plant and animal species

- The Park lies within a Conservation International-designated Conservation Hotspot, a WWF/IUCN Centre of Plant Diversity and a Birdlife-designated Endemic Bird Area.

- Protection of watersheds - Contains the headwaters of most of the major streams and rivers in the southern half of the island and provides potable water to approximately 60% of Dominica's population.

- Elfin Woodland occurs at the highest elevation, above 3000feet (914m). As such these areas are always targeted by telecommunication companies for establishment of communication towers and potential radar or electronic sites. There is at present one such site on Morne Micotrin where this type of vegetation is found. Such access has been responsible for the loss of significant elfin woodland in some countries and Dominica must guard against this.

- Fumarolic vegetation-One of the rarest formations on Dominica covering a total of 31 ha (Shanks & Putney 1979). Significant areas are found in the Valley of Desolation. It may be impaired by geological investigations. The occurrence of and potential impact to rare or endemic species of fumaroles associated vegetation should be considered when evaluating geothermal drilling

- A UNESCO-designated World Heritage Site under Criteria viii- "to be outstanding examples representing major stages of the earth's history, including the record of life, significant on-going geological processes in the development of landforms or significant geomorphic or physiographic features" and

Under criteria x. "To contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation".

6. STATEMENT OF SIGNIFICANCE

Morne Trois Pitons National Park is a world heritage site and contains some of the most diverse and pristine forest in the Eastern Caribbean. It has been listed by Birdlife International as "Important Bird Areas, IBA" on the basis of support of three globally threatened birds, 19 restricted ranges and six congregatory seabirds " and according to "Birdlife International", the park contain populations of all the restricted-range species and the majority of the population of all 3 globally threatened species of the two endemic species of the Amazona parrots and the Forest thrush, Cichlherminia lherminieri thus reinforcing the critical biodiversity of the area.

7. ANALYSIS OF ISSUES

7.1 IMPLEMENTATION OF THE 2001-2012 MANAGEMENT PLAN

The "Management and Development Plan, 2002- 2012 was never ratified by government. Discussions with Park Superintendent, David Williams, indicated that less than 5% of the recommendations of the plan have been implemented due to institutional, manpower and budgetary limitations.

7.2 ANALYSIS OF CURRENT MANAGEMENT SITUATION

(SEE SWOT ANALYSIS ON FOLLOWING PAGE)

7.3 CONFLICT

The major conflict in the Park has been in areas zoned as Special Use where the following activities have been legally endorsed:

- The shooting range and the quarry located in the north of the Park close to the Emerald Pool
- The Hydro power infrastructure and transmission lines
- An active quarry located north of the Park above the Emerald Pool.

These activities are of economic importance but it is also recognized that any expansion of these could affect the biological integrity of the Park and its status as a World Heritage Site.

SWOT Analysis for Morne Trois Piton National Park

Strengths

- Park legally established.
- Land owned by government.
- A designated World Heritage Site
- High biodiversity and range of habitat types.
- Presence of a diverse set of endemic, endangered, and rare species.
- Existing trails and signage.
- Brochure for the nature trail.
- Linkage of park trails to the proposed national trail.
- Nature Centre administered by concessionaire.
- Fee system in place.
- Trained guides are available
- High quality water resources.
- Complementary ecotourism potentials exist
- Few threats to natural resources.

Weaknesses

- Boundaries of Park not fully demarcated
- Boundaries with private lands are not demarcated.
- No buffer zones established for the Park
- Too many access points
- Inadequate signage
- High maintenance of trails
- Insufficient facilities and amenities and interpretation.
- Inadequate financial resources for management.
- Limited on-site staff
- Limited community and environmental education programmes
- Too many government agencies with overlapping responsibilities
- Inadequate demarcation and signage for boundaries in some areas.
- Inadequate research and scientific information
- Some components of the trail present significant dangers for visitor use and urgently require maintenance and upgrading.
- No established monitoring program for the Parks resources especially with respect to visitor impacts.
- Underutilization of the Park's resources for ecotourism, research, and education.

Opportunities

- Development of alternative financing mechanisms- National Parks Fund capitalized by:
- Debt-for-nature-swaps;
- The GEF and FFEM;
- The Caribbean Development Bank;
- Contributions from multi- and bi-lateral development agencies;
- The private sector; and,
- Park concessions and fees.
- Improvement and diversification of ecotourism activities within the Park
- Maintenance and improvement of the trails.
- Tie-in of Park trails to the National Trail.
- Visitor accommodations (campsites in intensive use zone
- Coordinated work programs with surrounding communities especially with respect to trail development and maintenance, reforestation and visitor accommodations (including researchers).
- Cooperative research with universities.
- More frequent use of the Park for environmental education for teachers and students.
- Research to estimate the contribution of MDNP and the entire Park System to the economy of Dominica.

Threats

- Impacts of climate change on the biodiversity of the Park
- Continuing inadequate financial resources prevents Park from meeting its goals and objectives
- Inadequately maintained trails may lead to visitor injuries.
- Lack of staff capacity and finance reduces Park protection, the attention to visitors
- Threat of overcapacity of the Park from day visitors especially cruise ships
- Inadequate environmental education causes local people and politicians to be ignorant of the Park, its assets, and potentials, and unaware of the importance of the Park as a major source of foreign exchange and overall economic development.
- User conflicts (hydroelectricity, water, tourism, conservation, and agriculture).

It is important that a coordination mechanism is instituted for exchange of information, monitoring and research with these respective users of the Park to ensure that biodiversity of the Park is not compromised as a result of the utilization of the resources

Other areas of conflict include agricultural activities in some areas of the park through encroachment or land ownership and the use of herbicides and pesticides by those person persons who have private in-holdings in the Park or those undertaking agricultural activities on private land bounding with the Park.

7.4 SENSITIVITY TO DISTURBANCE

7.4.1 Anthropogenic Activities

The following represents some anthropogenic activities in the park which make the park more susceptible to the impacts of climate change:

- Agricultural encroachment
- Ecosystem manipulation –diversions of rivers
- Installation of commercial and industrial infrastructure
- Debarking of trees
- Fires
- Illegal hunting
- Quarrying

The major activities as outlined below are agricultural. This is predominantly subsistence agriculture mainly to support households. There is no commercial agriculture taking place within the Park except for Bay oil production. The growth of Bay Leaf, *Pimenta racemosa,* for the production of bay oil is very important to the economy of the villages of Petite Savanne and Bagatelle where these are grown in abundance. Dominica is the largest exporter of Bay oil which is used as a base in the production of perfumes for men. As such, the growth and harvesting of Bay leaf trees within the vicinity of the Park must be evaluated within the context of sustainable livelihoods of the community. Figures on export of Bay Oil are not available. However, it is envisaged that cultivation of bay leaf trees within the Park will continue to be part of the vegetation of the Park in these areas.

WESTERN SECTION OF THE PARK

Agricultural activities are being undertaken on private land within the Park in the vicinity of the Fresh Water Lake where approximately one parcel of land consisting of 17 acres, is privately owned.

In the western area of the Park in Corona/Sylvania there are visible signs of landslides within 300m inside the boundary of the Park and signs of agricultural activity within 600 m external to the boundary of the Park.

Hydro - power infrastructure is also located at the Freshwater Lake. The drainage flow of Boeri and Freshwater Lakes has been diverted via a weir and pipeline, to feed the hydroelectric power stations at Laudat and Trafalgar Falls at the headwaters of the Roseau River.

Other infrastructure include Communication Towers erected in the highest area of the park commonly vegetated by Elfin woodland. A trail was constructed in the area of Morne Micotrin for installation of communication towers and related structures. These contribute to land degradation and soil erosion and may have an impact on elfin woodland.

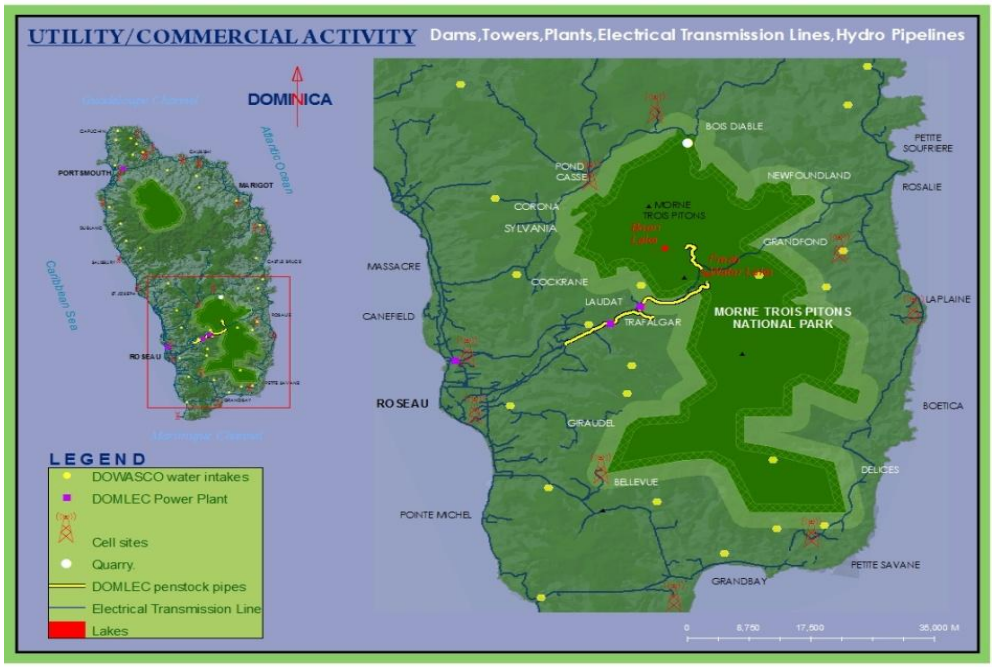

Figure 4: Utility and Commercial Activity in the Morne Trois Piton National Park Area

There is human settlement within the Park in the area of Corona (one residential building) and within 600m external to the Park boundary in the villages of Laudat and in Giraudel where new houses are being developed

IN THE EASTERN AREA OF THE PARK

Most of the activity in this area is agricultural- In La Plaine, intense farming is taking place within the boundaries of the Park on private land. In the village of Grand Fond 98% of which is located within 600m of the boundary of the Park, there are approximately 9 squatters farming within the boundaries of the Park.

IN THE NORTHERN SECTION OF THE PARK

North of the Park in the Pont Cassé area bordering the MTNPWHS there has been clearing of land and provision of access to facilitate residential development as a result of government's approval to a land owner to

sub-divide land for residential purposes. This is also evident in the Crete Palmiste area where sparse residential settlement is visible very close to the boundary of the Park and in Sylvania NNW of the Park.

Marginal agricultural production is evident in the Brantridge and William settlements adjacent to the Park as well as shifting agriculture in the "William Settlement" where agriculture occurred previously but has been abandoned for over 20 years.

In the area of Emerald Pool, there is an active quarry where tarrish is extracted for road construction. This area is a constant source of silting of the Emerald Pool. There is also shooting range near Emerald Pool which can have an effect on the wildlife.

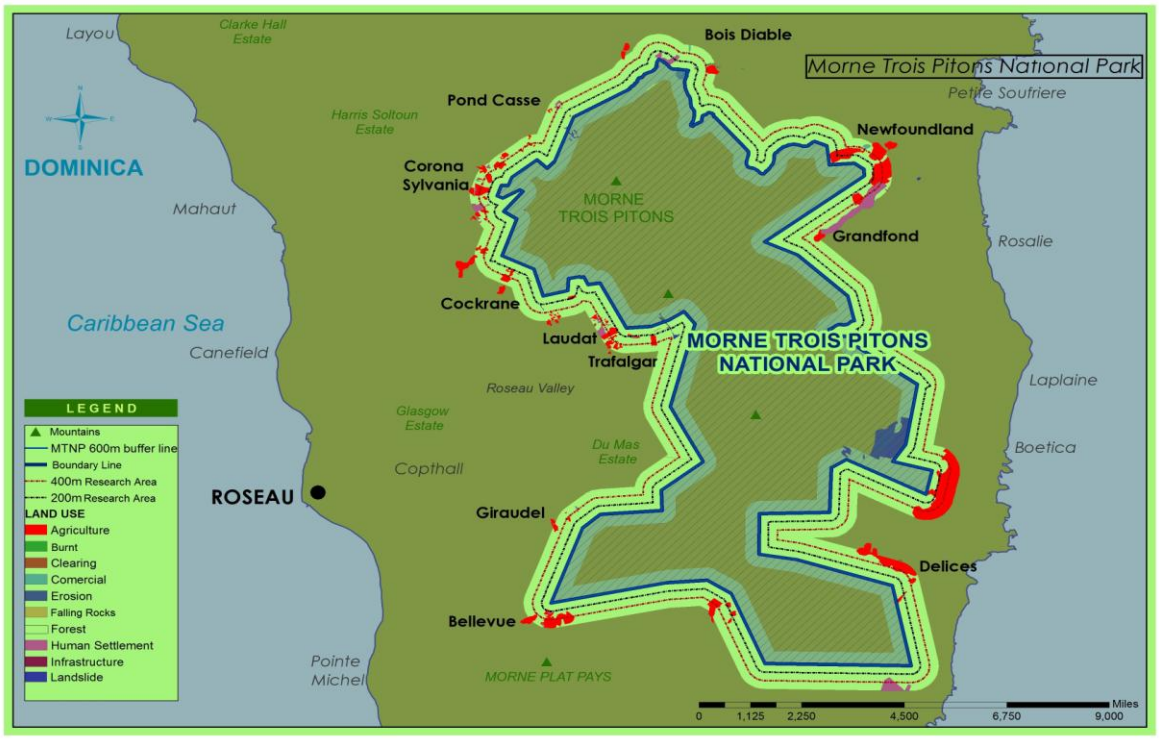

Figure 5: Map Indicating Activities in 200 & 400m research area external to the Park

In spite of the fact that felling of trees or other such activities are prohibited in the Park, there is still illegal activities like debarking of Gommier,(Dacryodes excels), Bwa Bande',(Richeria grandis) trees as well as felling of the Gommier tree for boat construction.

There is also a major problem of clearing of forest land for the growth and cultivation of marijuana and evidence of fire on the Morne Trois Pitons NPWHS Trail.

SOUTHERN SECTION OF THE PARK

South of the Park in the Geneva/ Perdu Temps area land adjacent to the park is predominantly untouched forest except for the clearing to a cell site area owned by Cable & Wireless. Agriculture is evident in this area

as well as some very scattered human settlement. In the other communities of Bagatelle, Pointe Mulatre and Delices agricultural activities are taking place within 600m of the boundary lines.

In the communities of Petite Savanne, La Roche and Victoria intense farming is taking place within the boundaries of the Park. The main cash crop in Petite Savanne is Bay oil. Farmers have expanded into extremely steep land into the National park to farm thus increasing the high erosion risk associated with the area.

In the communities of Laroche and Victoria some small scale human settlement is taking place within 600m of the Park boundary lines.

Southeast of the Park, the main access road to the villages of Delices and Point Mulatre is constructed on the Boundary of the Park.

7.4.2 Impact of Climate Change

Management Issues

The issue of climate change has taken international significance because of current research indicating the ongoing rapid changes that are affecting the social and economic fabric of society and the major adverse impacts to biodiversity worldwide.

Presently, there are no scientific studies on the impact of climate change on the national parks in Dominica or on Dominica's forests. As such, an effective management framework for monitoring and management of climate change is required.

Equally important is the need to develop an understanding of current and future fluctuation in the weather, the climate and the water levels in the various rivers within the national Parks so as to develop an effective management strategy for climate change. Baseline information on the resources of the Parks as well as the ecological processes is required for evaluating and monitoring changes resulting from the impact of climate.

Management of climate change will require a multi-pronged, integrated approach that includes preventive and corrective actions, exchange of information and development of mitigation measures based on sound scientific principles. As such, the following guiding principles and objectives with respect to managing the impact of climate change on national parks are being recommended for adoption by the Government of Dominica :

GUIDING PRINCIPLES

- The need to utilize available scientific information and traditional knowledge in the decision making process
- Undertake an assessment of impacts through appropriate research, monitoring, vulnerability assessment and risk preparedness measures
- Build public support for managing the impact of climate change through the establishment of partnerships with policy makers, the communities and other stakeholders and ensuring their active involvement in the development and implementation of appropriate programmes.
- Minimize the impact on gene pool, species and their diverse habitat
- Increasing the resilience of sites by reducing non-climatic sources of stress
- Undertake capacity building, research, and sharing of information.
- Develop successful and appropriate management responses to include climate change vulnerability analysis, risk assessment and preparedness and adaptation management strategies
- Develop and implement best practices and share this information with management partners and key stakeholders.

OBJECTIVES

- To understand the impact of climate change and to sensitize policy makers, communities and other stakeholders
- To work with all stakeholders to undertake research and monitoring and to develop and implement adaptation measures to increase the resilience of the parks to the impact of climate change.
- Increase the resilience of the Parks by reducing non-climatic sources of stress, re-designing boundaries and buffer zones to facilitate migration of species, and reducing the carbon footprint.
- To undertake ex-situ research to maintain the genome of endemic and indicator species of the Parks
- To collaborate, co-operate and share best practices and knowledge

Impact of Climate Change on Key Ecological Values of the Park

Dominica's INC under the UNFCC 2001 indicates the following with respect to the impact of climate change on Dominica's vegetation types:

"Dominica's vegetation type, especially in its mountainous interior exhibits a pronounced altitudinal zonation due to climate. Any changes in climate are likely to affect these. For example, assuming a lapse rate of 1^{O} C per 500 ft, the low scenario of 1.7^{O}C would elevate vegetative zones by 850 ft and the high scenario (3.5^{O}C) by 1750 ft. Under high temperature scenarios elfin woodlands could disappear completely, and some species unique to Dominica could be lost. (Parry, 2001. personal communication)".

Hurricanes and Tropical Storms

While there is no scientific data to establish the effects of climate change on the MTNPWHS, some observation on the impacts of Hurricane David on the biodiversity of the Park will be outlined.

High winds negatively impact on wildlife through destruction of feeding grounds, nesting sites and roosting areas. This can be further exacerbated by droughts, floods and increased hurricanes. Some of this was manifested in the Parks post- hurricane David in 1979.

Hurricane David in 1979 did significant damage to the forest resource by damaging 60% of the tropical forests in the southern half of the island. Most of the trees were debranched hence the loss of habitat and food supplies for wildlife species which resulted in wildlife mortality. 42 % of the standing tree volume was damaged and 11% completely destroyed. The climax rainforest association of Dacryodes / Sloanea suffered the least while palm brakes suffered the most. Trees of larger diameter were uprooted with greater frequency.

D.H. Kulkarni (1981) noted that two years following the hurricane there was a plethora of “epicormic twigs or invasive climbers” among the stems of the damaged forest trees.

Impact on Elfin Woodland

Elfin woodland occupies a narrow range which is influenced by climate and geography. Major changes in temperatures and rainfall could shift the range and /or cause destruction of this ecosystem.

DH Kulkarni, 1981 indicated that Hurricane David severely damaged elfin woodland in the MTNP “where after a trashing and defoliation these trees died outright en masse in big patches”. He indicated that after 2 years there were ample seedlings beneath the thick suppression of weeds and vines which “seem to be trying hard to penetrate”. He recommended simple treatment of weeding and vine cutting to ensure their rescue and to quicken the restoration to the original growth.

The impact on elfin woodland or “cloud forest” was also noted by the Forestry Division. Discussion with forestry personnel indicated that this forest type decreased as a result of impact of the hurricanes, mainly because of the slow process of natural re-vegetation since this area is exposed to wind erosion, soil erosion and landslides especially when stripped of its vegetation as was the case after Hurricane David. Observation from some of forestry personnel also noted excessive dryness and cracking of the soil in some areas in the elfin woodland.

Other Impacts

An indirect effect of tropical weather systems such as Hurricane David is the conversion of wildlife habitat to agriculture. In accessible areas the toppled trees provided an opportunity to more easily clear land for farming thus resulting in a further reduction and fragmentation of wildlife habitat. These natural disasters particularly hurricanes can be attributed to one of the root causes of land degradation in Dominica.

Forestry and Parks personnel also indicated signs in the change in phenology of some plant species after hurricanes. There were changes in the flushing of flowers and fruits with implications of reduced food supplies for some bird species.

Flooding

Watersheds emanating from the Park feed almost the entire south, south east and south west of the island. Most of the small radial streams from the various peaks respond very quickly to rainfall events and may dry up completely within thirty six (36) hours of a heavy rainfall. The larger streams of higher order which form the major headstreams of the various watersheds, while mostly perennial, are also subject to large variations in flow and sudden floods (flash floods) and can be a source of danger to unwary walkers in the Park.

Additionally, flooding will have an impact on the water quality of potable water supply as a result of soil erosion and silting of rivers and streams.

Drought

Drought on the other hand can lead to fires, increase in disease and invasive species as well as decrease availability of water for hydroelectricity as well as reduction in the volume of potable water

Landslides and Soil Erosion

These are triggered by extreme rainfall as well as the impact of man through deforestation and road construction. Overall, Dominica is susceptible to major landslides because of its rugged terrain and high precipitation. In terms of the geomorphology of the Park, large areas of the park are prone to landslides as was evidenced in the number of landslides which have occurred in the Park. There have been major landslides in the Park as follows:

- On the Boiling Lake trail descent into the Valley of Desolation on both slopes there were 4 slides in the Valley of Desolation between the months of April and May, 2010
- On the southern face of Morne Micotrin on the road to the FWL. A major landslide occurred in 1991and 1991 and in 2007 and the area remains unstable with smaller landslides occurring in the area.
- On the northern face of Morne Watt descending to the Valley of Desolation
- On the trail around the Fresh Water Lake

Landslide analysis indicates that the majority of the MTPNP is susceptible to high risk landslide especially in the west, south and east of the Park. Overall, the area can be described a high erosion hazard. It is important that in the future, landslide frequency within the Park is monitored within the context of the impact of climate change on the resources of the Park.

7.4.3 Proposed Activities for Managing Climate Change

Monitoring Climate Change in the National Park

An evaluation of monitoring of climatic variables in the National park indicates that there has been some monitoring of rainfall. The Forestry and Wildlife Division monitors rainfall in the vicinity of the Park in the areas of the Emerald Pool, Delices and Pont Casse' utilizing standard rain gauges. Rainfall data is also measured by a private electricity company, Domlec in the areas of Laudat, Trafalgar and the Fresh Water Lake while Yale University currently has ten recording rainfall stations installed at La Plaine, Freshwater Lake, Springfield, Canefield Airport, Rosalie, Botanical Gardens, Pont Cassé, Grand Fond, Laudat Village and Boeri Lake. However none of these are harmonized or coordinated to meet the needs of the Park

A report by Boyce[2] indicates that a thorough understanding of the current and future fluctuation in the weather, climate and river water levels within the Park must be a prerequisite for managing the impact of climate change. Consequently, he recommends the following:

- The installation of a weather station in the Park located in such a way that data can be collected from both the windward and leeward slopes of the mountainous interior and that "at a minimum the wind direction, wind speed, air temperature, solar radiation and humidity sensors are installed to enable the estimation of evapo-transpiration fluxes at the installation locations and wider surroundings which is a necessary step for water budget calculations".

- The installation of one rain gauge above the forest canopy of the Park to study the rainfall interception process.

- Continuous monitoring of water levels within the National Parks is recommended in order to provide data on water level trends that are needed to manage the resource

- The determination of rainfall trigger values and soil moisture content required for the initiation of landslides so as to manage fresh water resources both within and exterior to the confines of the National Park System.

[2] Data Collection and Management Strategy for the Commonwealth of Dominica Final report (Prepared by Caribbean Institute for Meteorology and Hydrology)

PART C

PRESCRIPTION

8. VISION AND OBJECTIVES

Vision

The vision for the MTNPWHS as a world heritage site is primarily that of a unique and pristine ecological area which belongs to the people of Dominica whose responsibility is to protect, use wisely and cherish for the benefit of all mankind.

Objectives

Guided by this vision, the specific management objectives for which the Park was established are as follows:

- To manage this natural area in such a way that the essential characteristics and values remain.
- To ensure that the plants and animals are not negatively impacted by human interference.
- To promote and regulate appropriate park use by tourists and local visitors and to strive to continually upgrade the quality of this use in such a manner as to preserve the Park's natural character for future generations
- To provide visitors with a wide range of interpretation and recreational opportunities
- To provide a wide variety of visitor services to the extent that they are essential to visitor use and safety and in keeping with the purpose of the area
- To gradually eliminate or control damaging or incompatible uses
- To secure adequate capacity for effective Park Management.
- To encourage and develop applied research programmes to improve public knowledge of park values and resources as well as improved park management
- To work closely with the public and private sector organizations on educational programs related to conservation and public use
- To develop appropriate policies for sustainable utilization of the Park and its resources.

9. PARK ZONING PLAN

Objectives

The objectives in delineating zones within the Park is to divide the Park into areas of differing functions, each compatible with the principles guiding the establishment of the Park and its designation as a world heritage site Specifically it is intended to achieve the following:

- To define different management objectives, regulations, and activities in identified zones within the World Heritage Site.
- To allow for multi-use management of the Park taking into account the different ecological features and aspects

- To ensure that boundaries are adequately defined on the ground and to encourage the development of buffer zones so as to protect the integrity of the various zones

Zoning for the MTPNPWHS (Annex A, Map 13) consists of 6 zones as follows:

- Special Use
- Intensive Use
- Extensive Use
- Environmental Study
- Research
- Wildland Management
- Buffer Zone

9.1 SPECIAL USE ZONE

This zone is defined as areas with activities that are not compatible with the functions of the Park

Objectives

To strictly confine or to phase out where possible these identified activities so as to ensure that the integrity of the Park is not further compromised.

Activities and areas identified are as follows:

- The shooting range and the quarry located in the area close to the Emerald Pool
- The Hydro power infrastructure and transmission lines

9.2 INTENSIVE USE ZONE/ PRIMARY VISITOR USE ZONE

This is defined as areas where visitor numbers are sufficient to justify a facility with permanent personnel at all times when the site is open. Programmes will be put in place to provide services to visitors and to monitor visitor numbers and limits of acceptable change to these zoned areas. The Emerald Pool and Freshwater Lake have the highest visitation rates and are particularly popular with cruise visitors because of the distance and easy access.

Objectives

- To provide and manage facilities and amenities to visitors to the park to enhance their experience and to put measures in place to ensure that the natural resources of the Park are not compromised as a result of these activities.
- To orient visitors to the Park, its resources and values (both material and non-material), and to its role in the sustainable development of Dominica;
- To stimulate business opportunities at the visitor centres and in the adjacent buffer zone to

generate income for the Park, local communities and northern Dominica in general; and,

- To serve as a focal point for infrastructure in support of educational and recreational activities.

Activities

- Research and monitoring
- Park administration,
- Outreach to neighbouring landowners and communities.

Two sites within the Park have been identified for this as follows:

- Emerald Pool
- Freshwater Lake

9.3 EXTENSIVE USE ZONE/ SECONDARY VISITOR USE ZONE

These are defined as zones where visitors are expected and encouraged but where visitor volume is insufficient to justify a permanent staff presence.

Objectives

- To provide basic facilities and services to users of the Park so as to enhance their recreational experience and to educate them on the values and resources of the park so as to ensure that their activities are in harmony with the Park's vision and overall objectives

The following areas have been zoned for this activity as follows:

- The Boeri Lake
- Boiling Lake
- The Morne Trois Pitons Trail from Pont Casse'
- The Middleham/Sylvania/Cochrane Trail to Middleham
- The Delices/ Pichelin(Victoria –PerduTemps) trail
- The Morne Anglais trail
- Sections of the Waitukubuli trail

9.4 ENVIRONMENTAL STUDY ZONES

These zones can be defined primarily for day visits by school, undergraduates and adults with an interest in some basic knowledge of the natural history of the area but with no desire for in-depth study. These areas should be the subject of handbook guides with description of localities. These areas are also selected according to ease of access and diverse landscapes

Objectives

To encourage research in the national park by national and non-nationals including schools research students and individuals to enhance the knowledge of the resources of the Park so as to highlight the need to protect and conserve the resources of the Park.

Areas zoned are as follows**:**

- The Middleham Falls area consisting of mature rain forest, the waterfalls and the special bat habitat - the “stinking hole”.
- Chemin Letang from the Freshwater Lake to Grand Fond that traverses interesting rain forest and geological resources
- The trail from Victoria Falls to Perdu Temps bordering the Foundland massif

9.5 RESEARCH ZONE

These areas are defined as areas containing natural value about which further research is needed to develop an appropriate management response. There is need for ongoing research in the botanical inventory of the Park, the history of the development of the landscape and geomorphology, climatic data and climate change as well as the flora and fauna.

Objectives

To encourage research into the biological, cultural, geological and geomorphic elements of the Park to include the impact of climate change so as to develop appropriate management programmes for use, protection and conservation of these resources

Areas identified are as follows:

- The Valley of Desolation with its geological, volcanic and geothermal characteristics
- The parrot habitat areas,
- Geology and geomorphology especially detailed geology of the formation of the domes within an older crater exemplified by that which exists between the Freshwater Lake and the Emerald Pool.
- The ecosystems on the summits of Morne Micotrin and Morne Trois Pitons.
- Flora and fauna
- Volcanism, especially the areas of the Valley of Desolation and the seismic activity in the southwest of the Park.

It should be noted that some baseline studies have been conducted in the Park. However, additional studies are needed to adequately characterize the present status of the Park. As such, the entire Park should be considered a “zone for research”

On-going research and monitoring must be undertaken to evaluate the number and impact of visitors on the Park so that effective management decisions can be taken.

9.6 WILDLAND MANAGEMENT / WILDERNESS ZONE

This zone includes the large area of undisturbed natural forest that was once characteristic of all the mountains of Dominica, and is critical to conserving the biological and genetic diversity and ecological integrity of this ecosystem. The Wilderness Zone, which covers 98% of the Park, is managed to achieve:

Objectives

- Maximum conservation of natural habitats and genetic material of the forest ecosystem;
- The protection of the endangered and endemic populations of the plant and animal species
- The maintenance of intact watersheds;
- The provision of opportunities for non-manipulative research and basic environmental monitoring;
- The provision of opportunities for motivated visitors to experience the forest wilderness on its own terms, without facilities other than basic trails.

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9.7 BUFFER ZONE

Overall, there has been a significant threat of encroachment in the parks, particularly due to agricultural and residential development. The development of a buffer zone (Annex A- Map 12) must as a priority, provide some level of protection to the biodiversity of the Park while enabling adjacent stakeholder communities to sustain livelihoods that are environmentally safe.

The depth of the proposed buffer would be 1000ft. / 305m “in areas where the land is under forest, marginal and state owned in the northern section of the Park in the Petite Terre Ferme area; 152.4 m (500 feet) “in localities where residential development is dense and in close proximity to the boundaries of the park (Sylvania). South of Corona the buffer should follow the existing forest edge.
In other areas of the Park, a 200 m (656.2 ft.) buffer zone is being proposed for adoption. (Refer to the document “Design of Buffer Zones for the Morne Diablotin and Morne Trois Pitons National Parks”)

Objectives of the Buffer zone

- To ensure that management of the MTNPWHS buffers the Park from threats to it resources and to its integrity; and,
- To work with stakeholder communities to avert incompatible developments on private lands that represent a threat to Park values and to maximise the potential for development of these lands that complement the Park's use for ecotourism, research, and production of water and to minimize conflicts.
- To meet the WHS criteria.

10. MANAGEMENT PROGRAMMES

The specifics of "WHAT" is required for management of the Park are articulated through the following management programmes on resource protection, visitor use, research, environmental education, and community outreach.

10.1 RESOURCE PROTECTION PROGRAMME

The programme objective is to establish an effective management structure, visitor use and non-intrusive infrastructure that safeguard the integrity of the biological resources, natural features, and watersheds of the Park through actions that build public support and counter specific threats. These include among other things, reducing illegal activities, managing and monitoring visitor impacts, agricultural encroachment, and contamination of water sources.

10.1.1 Sub-programme 1A- Natural Resource Conservation

Objectives: To maintain and protect the biological diversity of the park, watersheds, geological and landscape elements through implementation of activities geared at averting threats to the park and by encouraging community support for the park through education and involvement.

ACTIVITIES

1. Physical Demarcation of Boundaries and Establishment of a Buffer Zone

Objectives

To legally incorporate the Archbold Preserve comprising of 940 acre as part of the MTNPWHS and establish the boundaries of the park using standardized, internationally accepted signage so as to ensure that boundaries that have been gazetted for the National Park correlate with what is actually seen on the ground.

A 3- year demarcation renewal programme should be established for clearing of the boundary lines and buffer zones of the Park. It is recommended that hardy, showy perennials like the African Tulip or Agave sp. should be planted along the lines especially at corner points for easy location.

Activities to be undertaken for Boundary demarcation are as follows:

- Re-establish and formalize the boundaries of the Park with the use of GIS methods to develop a marker database of information
- Implement demarcation programme utilizing appropriate markers and developing effective signage. This will also take into consideration identified zoned areas
- Reforest and restore degraded areas of the Park and buffer zones to increase the resilience of the Park

- Develop a 3- year boundary maintenance programme

Implementation -This should be implemented within the first 3 years of implementation of the Management Plan followed by continuous maintenance

2. Establish and Implement a Park Zoning Plan

Objectives

To establish effective use and functionality of the Park by dividing the Park into areas with differing functions, each compatible with the principles guiding the establishment of the Park

Policy

To protect the resource and disallow activities that are not compatible with the preservation of the biological integrity of the resource.

Activities

- To undertake a inventory of the resources in the zoned areas
- Demarcate the various zones of the park on the ground
- Develop a management Plan for the various zones of the Park
- Develop a maintenance programme

The visitor use programme developed for the Park must be compatible with the Park Zoning plan

Implementation - The zoning plan should be implemented within the first 3 years of the implementation of the management plan of the Park followed by continuous maintenance. Inventory of the resources will be ongoing and will be part of the research programme for the Parks.

3 Public/Visitor Use Programme

Objectives

The objective of the Public Use Programme is to facilitate the understanding and enjoyment of the Park and its resources by the general public, provide excellent outdoor recreation opportunities, and contribute to the sustainable ecological and economic development of the Park and Dominica. The issue of visitor safety while using park resources is integral to the public use programmes especially in light of the impact of climate change on the Park where flash flooding and landslides can occur during inclement weather.

The public / visitor use programme will also take into account the objectives of the Park zoning plan

Policy

The policy for the Visitor Use Programme is to contribute to the sustainable development of Dominica by providing the necessary amenities and services for visitors within the context of the objectives and resources of the Park and the development of visitor management programmes. The issue of safety of visitors using park facilities are also an important component of the Park's visitor use policy.

Activities

- Development of visitor services and amenities
- Establish visitor safety programmes to include the establishment of forecasting capability and an early warning systems and the development of a disaster management plan
- Establish visitor monitoring programmes
- Establish indicators of Limits of Acceptable Change, LAC, for the Park
- Undertaking bi-annual visitor survey programme.

4 Infrastructure design, implementation, and maintenance

Objectives

To develop and maintain quality facilities, infrastructure and recreational opportunities consonant with the Park's objectives of resource protection and in keeping with visitor expectation of quality facilities and services.

Policy

Park infrastructure and design will complement and not compromise the objectives of the Park and its World Heritage status and will not contribute to climate change

Activities

- Access:

Review current access and finalize main access points to the park.

- Trails:

Upgrading of existing trails and development of new trails where necessary will be undertaken. All trails will be adequately signed and maintained on an annual basis. Management of the Waitukubuli National Trail will be incorporated into the management system of the National Parks.

- Visitor Centres

Existing visitor centres will be upgraded and new visitor centres constructed where necessary.

- Car parks

Existing car parks will be upgraded and maintained and new car parks developed where necessary.

- Picnic Shelters/ washroom facilities

All existing picnic shelters and washroom facilities will be upgraded if required and new facilities developed where necessary.

Implementation - The zoning plan should be implemented within the first 2 years of the implementation of the management plan of the Park. Inventory of the resources will be ongoing and will be part of the research programme for the Parks. The development of a visitor use programme will be ongoing.

5 Adaptation to Climate Change

Objectives

- To understand the impact of climate change through scientific research and monitoring and to sensitize policy makers, communities and other stakeholders
- To work with all stakeholders to develop baseline information on the biota, physical features, and natural processes of the Park as a basis for measuring the impact of climate change and to implement necessary adaptation measures
- Increase the resilience of the Parks by reducing non-climatic sources of stress, establishing the buffer zones to facilitate migration of species, and reducing the carbon footprint.
- To undertake ex-situ research to maintain the genome of endemic and indicator species of the Parks
- To collaborate, co-operate and share best practices and knowledge

Activities

- To develop public awareness and community outreach programmes so as to sensitize and educate the stakeholders and communities adjacent to the Park to understand and manage the impact of climate change. - this will be incorporated in “Programme 2A”
- Research and monitoring (This will be incorporated into Programme 1C- Scientific Research and Monitoring)

In-situ Research

- To collate and evaluate climate data within the Park - Establish of hydro-meteorological monitoring in the Park. This will entail the following:
    - Upgrade the current hydrological monitoring programme and instrumentation of the Forestry Division
    - Establishment of a database management system- Establish an efficient data collection, management and retrieval system in the Forestry Division
    - Install a weather station in the Park to monitor and assess climate data for water budget calculations data as a long term strategy
    - Install one rain gauge above the forest canopy of the Park to study the rainfall interception process.

- Monitoring of water levels within the National Parks to provide data on water level trends that are needed to manage the resource
- Determination of rainfall trigger values and soil moisture content required for the initiation of landslides so as to manage fresh water resources both within and exterior to the confines of the National Park System.

- Develop baseline data on the resources of the Park so as to monitor changes in these resources including the impact of climate change

    - Species inventories of fauna and flora, especially invertebrates (particularly moths), coleopterans, crustaceans, freshwater fish, mosses and liverworts; life histories, and population and distribution studies of key species

    - Identification of critical sites and habitats of endangered and endemic species;

- Undertake watershed management techniques

Ex-situ

- Establish seed-gene bank and collect and store seeds and plant materials of all endemic species
- Establish a living collection of plants – ex-situ field gene banks and indicator plant species.

Other Activities

- Train staff responsible for research, monitoring and collation of climate data
- Review legislation and policy of the National Park to allow for restoration of degraded areas of the Park and the management and impact of climate change.
- Establish forecasting capability, early warning systems in collaboration with the Disaster Management Office
- Increase the resilience of the Park by reducing non-climatic sources of stress – (These activities will be incorporated under the specific management Programmes)
    - Establish boundaries and buffer zones to facilitate migration of species
    - Retrofit all building in the parks to make them energy efficient
    - Reforest and restore degraded areas of the Park and buffer zones
    - Provide incentives to land owners with land adjacent to the Parks to reduce impact on the Park
    - Close down and rehabilitate the quarry in the Park and relocate shooting range in the Park

- Strengthen the co-operation between Forestry and national parks service, land owners and the private sector

Implementation – Research and monitoring will be undertaken under Programme "1C". Other programmes will be subsumed under the relevant management programmes e.g. "Physical Demarcation of Boundaries and Establishment of Buffer Zones", "Infrastructure Design and Implementation" etc.

Programme Monitoring and Evaluation - This will be assessed on effectiveness and efficiency of the established data base, the development of baseline data on the resources of the Park and hydro-meteorological data collected.

6 Management Regulations

Objectives:

To develop a comprehensive policy and an effective regulatory system for the MTPNPWHS in keeping with existing legal and regulatory regimes, as to ensure the protection of the resources of the park, the use of the park, as well as users of the resource.

Activities:

- A detailed review of all relevant legal instruments will be undertaken with a view to updating all the necessary laws and regulations. Consideration should be given to amending the present legislation of the National Park to allow for restoration of degraded areas of the Park in light of the potential impact of climate change.
- A review of the Park legislation is currently being undertaken under a CDB funded programme that commenced in January 2010

A regime of policies should be developed that will address the following:

- Climate change
- Funding of the Park- user fees, development of special funds etc.
- Development of Park facilities- design, use of construction materials
- Activities within zones
- Leasing and franchising
- Safety
- Research
- National ecological security policies for sovereignty and protection of genetic resources and bio-piracy
- Relationship with Communities bordering the Park
- Incentives to land owners within and adjacent to the Park

(Refer to 4.4 Policy and Legal and Regulatory Framework- Development of Policies for complete listing).

Implementation: This will be incorporated upon completion and ratification by Government

Programme Monitoring and Evaluation: This will be assessed on the number of regulations that are actually developed and legally adopted and circulated to park users and stakeholders.

7 Development of a Surveillance and Enforcement Programme

Objectives:

To develop an effective surveillance and enforcement mechanism that will ensure compliance with the rules and regulations of the Park

Goals:

To attempt to prevent incidents or accidents through effective patrolling and surveillance as opposed to infraction while establishing a system to deal with unavoidable infractions as stipulated by Law.

Activities:

- Establish the power of authorized officers-Section 17 (1) of the NPPAA
- Establish protocol for enforcement procedures
- Training of park wardens
- Developing stakeholder relationship- cooperation with communities and land owner on the boundary of the park Refer to “Education and Outreach programme”
- Developing standard operating procedures, SOPs, with respect to fines, violations etc
- Implementing public awareness and education programmes to all stakeholders especially users of the resource

As recommended by A. Putney (MDNP management Plan 2008) “Regular patrolling of Park boundaries will be carried out to control hunting, encroachment, and/or contamination of water sources. An electronic data base will be established to archive incident reports, observation of endemic, rare, threatened and invasive species; and provide the raw data that will enable the identification of the most problematic areas, and the most effective programming and required frequency of patrols. Initially, patrolling of the boundaries will give priority to the boundaries that have been demarcated, and the known entry points into areas that have not yet been demarcated. As data is collected and analyzed, the routing and frequency of patrolling will be revised accordingly”.

Implementation schedule- This should be implemented within the first year of the implementation of the Management Plan followed by continuous monitoring.

Programme Monitoring and Evaluation- a monitoring and evaluation programme must be developed that will take into account the number of complaints, citations for violations and/or infractions. This would indicate the level of understanding of park regulations. Good record keeping and a standardized format must be developed for this.

10.1.2 Sub - Programme 1B. Natural Resource Management

Objective:

To provide the necessary staff, equipment and other relevant resources for management of the natural resources of the Park

Activities:

1. Establish the National Parks Service and equip offices for staff
2. Recruit staff (Refer to Section 11-Governance & Administration- for staffing)
3. Undertake capacity building programmes for existing staff (refer to Annex E)
4. Demarcate specific access points for users of the resource
5. Develop an effective maintenance management programme
6. Manage species and habitats
7. Provide the necessary equipment for undertaking hydro-meteorological research and monitoring
8. Develop standard operating procedures and develop best practices with respect to park operations and programmes- fines and violations.
9. Develop relevant policies to deal with pertinent issues affecting the Park

Implementation schedule- This will be ongoing

Programme Monitoring and Evaluation - Park is operational and functioning with a full cadre of staff and equipment. Relevant polices are developed.

10.1.3 Sub-Programme 1C.Scientific Research and Monitoring

Objectives: To provide management with scientific information for decision-making so as to ensure that the objectives of conservation and management of the resources are achieved.

In –situ Research

Activities

1. Setting standards and format and establishing protocol for research and monitoring programmes within the Park

2. Develop and Establish in collaboration with the users of the resource a research and monitoring programme taking into consideration the following:

- An inventory of species, especially invertebrates (particularly moths),coleopterans, crustaceans, freshwater fish, mosses and liverworts; Life histories, and population and distribution studies of key species;
- Identification of critical sites and habitats of endangered and endemic species; and threshold level for disturbances to wildlife populations.
- Undertake vulnerability assessment of the Park
- Undertake watershed management techniques

3. Undertake hydro-meteorological monitoring in the Park to entail the following:
    - Assess hydro-meteorological parameters of the Park for water budget calculations data as a long term strategy
    - Rainfall interception process.
    - Monitoring of water levels within the National Parks to provide data on water level trends that are needed to manage the resource
    - Determination of rainfall trigger values and soil moisture content required for the initiation of landslides so as to manage fresh water resources both within and exterior to the confines of the National Park System.

In order to achieve this, the current hydrological monitoring programme and equipment must be upgraded. Staff must be trained to effectively monitor, collate and store the data and the following must be installed to effect monitoring and collection of data:

- Installing a weather station in the Park to monitor and assess the hydrometeorology of the Park for water budget calculations data as a long term strategy
- Install one rain gauge above the forest canopy of the Park to study the rainfall interception process

4. Establish indicators for the following so as to assess any changes in their status
    - Natural resources- wildlife, freshwater water levels, climatic data etc.
    - For climate change and monitoring indicators and trends.

5. Ex – situ Research

Undertake ex-situ research to maintain the genome of endemic and indicator species of the Parks

- Establish seed-gene bank and collect and store seeds and plant materials of all endemic and indicator plant species

- Establish a living collection of plants – ex-situ field gene banks

6. Develop a database of information that is scientific, manageable and user friendly
   An efficient data collection, management and retrieval system must be established.
   Hydrometeorological monitoring instruments must be purchased to undertake the research and to monitor climatic parameters. Refer to Appendix I for list of instruments

7. Monitoring and Interpretation of Monitoring Data

The information generated will be stored in a data base and will be analyzed on a quarterly basis to detect trends and patterns that require actions by the Resource Protection Programme. The following data will be monitored:

- Status of endemic plants and animals
- Trail erosion;
- Declining water quality and water level of major rivers in the Park
- Agricultural encroachment
- Visitor Impact
- Trail conditions; and,
- Condition of the Visitor Centre interpretive exhibits.
- Indications of hunting within the Park.
- Hydro-meteorology of the Park
- Monitoring the impact of climate change on the Park through establishment of indicators
- Presence of invasive species
- Physical and biological resources of the Park.
- Rainfall trigger values and soil moisture content required for the initiation of landslides so as to manage fresh water resources both within and exterior to the confines of the Park.

(Refer to Appendix I for list of research and monitoring priorities)

Implementation Schedule- Ongoing

Monitoring and Evaluation- the effectiveness of the programme will be based on the establishment of a effective database for the park, the actual collation of information on the biological resources, hydro-meteorological parameters of the Park and the development of management initiatives to protect the resources of the Park.

10. 2 EDUCATION AND OUTREACH

10. 2.1 Programme 2 A. Communication, Education and Public Awareness

Goal

To develop and coordinate the flow and variety of information within the park so as to increase awareness among relevant publics of the economic, ecological and bio-physical significance of the Park, various issues affecting the resources to include the impact of climate change in an effort to sensitize policy makers, communities and other stakeholders on issues affecting the Park as well as the contribution of the Park to national development and to global biodiversity conservation.

Objectives

To sensitize stakeholders on the value of the MTPNPWHS and the various issues affecting the Park so as to galvanize support for, foster participation in the operations of and to encourage a sense of pride and ownership with respect to the Park.

Activities

- Awareness Raising
- Marketing
- Branding: Develop a "brand" and tagline for positioning of MTNPWHS
- Key messaging: Develop and deliver key messages to target audiences using the most cost-effective vehicles;
- Community Outreach
- Networking Media Outreach/Advocacy: develop strategic relationships with organizations and individuals and the media in Dominica
- School's Outreach: Launch a school's outreach programme, promoted through specially organized activities for schools and students in order to attract interest in and garner support for the MTNPWHS as a Protected Area;
- **Development of Public Awareness and Educational tools**
    - Printed materials
    - Audio-visual materials
    - Interpretive centre

Implementation

This should be started within the first year of the implementation of the Management Plan and should be on-going

Programme Monitoring and Evaluation

Indicators to be assessed will include the actual production of materials outlined above. The number of public awareness programmes implemented, the level of awareness of the target groups as well as evaluation of park

users in terms of knowledge of regulations, zoning etc. An evaluation programme specific to this must be developed e.g. a before and after survey on the level of perception of stakeholders/target groups.

10.2.2 Programme 2 B. Community Outreach and Livelihood/ Alternative Livelihood Development

Objectives

To include communities adjacent to the park in the management, research, monitoring and development of the park and to assist them to sustain and develop livelihood / alternative livelihoods compatible with the protection and sustainable use of Park

Activities

- Strengthening the co-operation between Forestry and national parks service, communities, land owners and the private sector
- Provide the technical assistance to land owners and adjacent communities to identify alternative livelihood opportunities
- Develop community –based programmes to mainstream climate change into community development programmes
- Train communities to assist in research, monitoring and management of the Park
- Reduce anthropogenic activities in and adjacent to the Park.

Implementation

This should be initiated within the first year of the implementation of the Management Plan

Personnel- 1 Public Awareness and Training officer in collaboration with the village councils and relevant CBOs, NGOs and government agencies.

11. GOVERNANCE AND ADMINISTRATION

The current organizational structure within the Forestry and National Parks Service is inadequate to manage and develop the National Parks. As such most of the core functions of the Park are not implemented. The current staff of the MTNPWHS consists of a total of 10 with 2 park wardens and 2 grounds men attached to the Emerald Pool and Freshwater Lake respectively and 2 caretakers attached to the Middleham Falls. The staff of the Forestry Division undertakes the dual duty of managing the Forestry and Park sites.

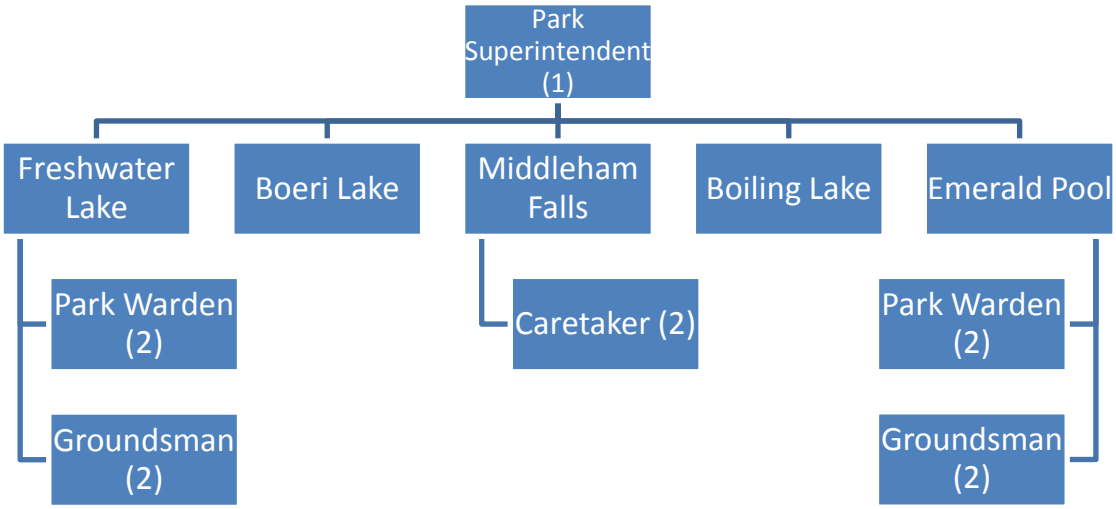


Figure 6: Current staff of the MTNPWHS ref: Min of Agriculture

In reviewing staffing for the National Park some additions must be considered in terms of technical staff as follows:

- Appointment of a Park Superintendent
- GIS Specialist / A geologist-The geology and geomorphic characteristics of the Park as well as land forms were considered crucial in its consideration for a WHS status. There is no research, evaluation or interpretation of these assets of the Park
- Research Officer
- Finance and Accounting Officer
- Human Resource and Training Officer
- Public Awareness Officer
- Maintenance Manager
- Additional Park wardens

A project currently being undertaken by the Government of Dominica and funded by the Caribbean Development Bank seeks to establish a new management structure for the National Parks and Protected Areas dubbed a "Protective Area Authority, PAA". The proposed organizational structure is comprised of 3 independent work units as follows:

- An Office of the Chief Executive Officer supported by a Finance & Accounting Division, a General Administration Division and a Human Resource Division;
- A Planning and Development Department supported by a Research & Planning Division and a Park Development Division; and
- An Operations Department supported by a Maintenance Division, a Sites & Services Division and an Enforcement Division.

This is currently being considered by the GoCD and as such it will be futile to make additional recommendations for a proposed management structure.

TRAINING

One of the main reasons for the underdevelopment of the National Park Service barring financial constraints has been the shortage of trained personnel. Advanced degree and certificate training is required in areas of Park Management, Site planning, Freshwater fisheries management, Wildlife management, General ecology and Environmental education. Formal educational opportunities are available in each of these areas at regional and international universities and institutes. Short- term specialized on-the- job training is also a desirable, short term alternative. Training must be properly coordinated with approved job positions. Approval and confirmation should be sought for the positions being planned and an integrated schedule should be adjusted accordingly.

ACCOMMODATION

Central accommodation for the Parks Service appropriate to the numbers and grade of staff should be provided at a single site with excellent phone and radio communications. A facility should also be constructed to house a library and laboratory space as well as a general office, emergency stores and a park telecommunications centre. A site superintendent should be required to live very close to the Park.

TRANSPORTATION AND EQUIPMENT

There is need for field officers to be mobile and as such appropriate 4-wheel drive vehicles should be provided to supplement the existing fleet of vehicles. There is also need for specialized transportation within the Park in order to facilitate trail construction, maintenance and security operations.

Motorized wheel barrows for moving materials and a small all-terrain-vehicle, (ATV, 4-wheel motorcycle) should be purchased to assist in park operations and emergency.

OTHER EQUIPMENT

Survey and drafting equipment, global positioning systems, GPS and instruments for geographic information systems, GIS should be purchased for the Park. Telecommunication equipment will be needed as per the proposed list:

- GIS hardware and software
- Hardware and software for database management
- Radio and communication equipment
- Building survey equipment
- Field GPS
- High resolution camera
- Equipment for sampling and measuring vegetation, soils, water etc.

12. PROGRAMME DEVELOPMENT SCHEDULE 2010- 2015

Natural Resource Conservation -1A	Timeframe (in years)				
1. Demarcation of boundaries	1	2	3	4	5
Archbold Preserve Boundary	❖				
Boundary check against 1975Act	❖				
Cut new lines/re-gazette boundary	❖	❖			
Develop definitive set of boundary data		❖			
Mark boundaries and develop signage	❖	❖	❖		
Develop boundary maintenance programme		❖	❖	❖	❖

Natural Resource Conservation - 1A	Timeframe (in years)				
2. Establishment of Buffer Zone	1	2	3	4	5
Finalize and obtain approval	❖	❖			
Legal guidance, implementation	❖		❖		
Funding for compensation	❖				
Finalize with land owners	❖	❖			
Funding, survey and demarcation			❖		
Reforest and restore degraded areas of the buffer zones.				❖	
Develop proposal for sites	❖	❖			

Natural Resource Conservation-1A	Time Frame (in years)				
3. Establishment and demarcation of Zoning Plan	1	2	3	4	5
Finalize zoning plan		❖			
Undertake a inventory of the resources in the zoned areas			❖		
Demarcate the various zones of the park on the ground		❖	❖		
Develop a management Plan for the various zones of the Park			❖	❖	
Develop a maintenance programme					

Natural Resource Conservation - 1A	Time Frame (in years)				
4. Public / Visitor Use Programme	1	2	3	4	5
Review and development of visitor services and amenities	❖	❖			
Establish visitor safety programmes to include the establishment of forecasting capability and an early warning system.	❖				
Establish and undertake visitor monitoring programmes	❖	❖	❖	❖	❖
Establish indicators of Limits of Acceptable Change, LAC, for the Park and monitor indicators	❖	❖			

Natural Resource Conservation – 1A	Timeframe (in years)				
Infrastructure Design and Implementation	1	2	3	4	5
Finalize access points to the Park and construct reception centre			❖		
Undertake site Improvement of existing sites		❖			
Upgrade existing trails			❖		
Close down and rehabilitate the quarry in the Park and the shooting range in the Park	❖	❖			
Retrofit all buildings in the park to make them energy and environmentally efficient. Establish “Green Globe” or other relevant programme.	❖				
Upgrade visitor centres, picnic shelters, washroom facilities.		❖			
Develop new visitor centres, picnic shelters or washroom where necessary				❖	❖
Development of new trails where necessary with signage				❖	❖
Maintenance of existing car parks and development of new car parks where necessary	❖	❖	❖		

Natural Resource Conservation - 1A Development of a Policy and Regulatory framework	Timeframe (in years)				
Develop a comprehensive policy and regulatory framework as identified in “5-. Management Regulation”	1 ❖	2	3	4	5
Review of legislation and existing regulations	❖				
Review policies	❖				
Develop and publish policies and regulation and disseminate to users and stakeholders		❖			

Natural Resource Conservation – 1A	Timeframe (in years)				
Development of a Surveillance and Enforcement Programme	1	2	3	4	5
Establish protocol for enforcement procedures	❖				
Training of park wardens	❖	❖			
Develop stakeholder relationship- cooperation with communities and land owner on the boundary of the park- refer to “Education and Outreach programme”	❖				
Develop standard operating procedures, SOP, with respect to fines, violations etc	❖				
Establish protocol for enforcement procedures	❖				
Develop data base system	❖				

Natural Resource Management - 1B	Timeframe (in years)				
Institutional Development	1	2	3	4	5
Establish the National Park Service, recruit staff and equip offices for staff	❖				
Recruit staff (Refer to Section 11-Governance and Administration for staffing)	❖				
Develop capacity of existing staff in identified areas (Refer to proposed staff training programme – Annex E)	❖	❖	❖	❖	
Demarcate specific access points for users of the resource	❖				
Develop an effective maintenance management programme	❖				
Develop standard operating procedures and develop best practices with respect to park operations and programmes-	❖				
Develop relevant policies with respect to issues outlined in section 4.4.1	❖	❖			

Natural Resource Management - 1B	Timeframe (in years)				
Sub-Programme 1C.Scientific Research and Monitoring	*1*	*2*	*3*	*4*	*5*
To undertake baseline assessment of the resources of the Park	❖	❖	❖		
Upgrade existing data monitoring equipment	❖				
Establish a scientific, efficient data collection, management and retrieval system.	❖	❖			
Purchase equipment for hydro-meteorological data monitoring	❖				
Design a participatory monitoring system with communities.	❖				
Undertake hydro-meteorological monitoring	❖	❖	❖	❖	❖
Install a weather stations in the Park to monitor and assess hydro--meteorological data	❖				
Install one rain gauge above the forest canopy of the Park to monitor and study the rainfall interception process.		❖			
Establish seed-gene bank. Establish physical infrastructure for housing of seed bank Collect and store seeds and plant materials of all endemic and indicator plant species	❖	❖ ❖ ❖	❖	❖	❖
Establish a living collection of plants – ex-situ field gene banks.		❖	❖	❖	❖
Upgrade existing nurseries and establish new ones	❖				
Develop and implement silvicultural techniques to promote forest productivity maintain genetic diversity and promote ecosystem health	❖	❖			
Manage watersheds and regulate extractive water use	❖	❖	❖	❖	❖
Undertake research based on research plan (Annex E) in collaboration with the relevant research organizations and the communities	❖	❖	❖	❖	❖

PROGRAMME 2 - EDUCATION AND OUTREACH	Timeframe (in years)				
Programme 2 A. Communication, Education and Public Awareness	*1*	*2*	*3*	*4*	*5*
Design and prepare education and public awareness programmes	❖	❖			
Prepare marketing and promotional materials	❖				
Upgrade and develop interpretive Programmes		❖	❖	❖	
Implement Programmes		❖	❖	❖	❖
Programme 2B - Community Outreach and Livelihood Development Programme					
Establish a co-operative Park management programme with communities/land owners- monitoring and research in the Park	❖	❖	❖		
Establish a register of communities and small businesses relative to Park objectives	❖				
Provide training and technical and financial resources to enhancing livelihood opportunities	❖	❖	❖	❖	❖
Strengthen the co-operation between Forestry and national parks service, land owners and the private sector					

13 FINANCIAL MANAGEMENT FRAMEWORK

A financial plan will not be prepared for the MTNPWHS because of the proposed new management structure that is being developed under a CDB/Government of Dominica-funded programme. This financial plan will entail costing for activities that are recommended including the climate change management plan but will not include staffing which is currently being undertaken under the CDB-funded project.

Budgetary allocations for the management of the National Parks for fiscal years, 2008 –2009 and for 2009-2010 and 2010-2011 respectively, were as follows:

Fiscal Year	Allocation
2008/09	1,49,842
2009/10	1,175,701
2010/11	1,282,205

Table 6: Budgetary Allocation 2008 -2011 (Ministry of Agriculture)

Existing Sources of Revenue for The Park

Revenue Source	Amount
Site/Attractions User Fees	US$3.00 for organized tours US$5.00 for private tours US$12.00 for a week pass
	US$2.00 for a site visit US$5.00 for a day pass US$10.00 for a week pass
Annual License Fee / Tour Operators	Not stated
Annual License Fee / Vendors	EC$100
Annual License Fee / Tour Guide	Not stated
Fees / Permits for film companies	
Fees for Researchers/Permits	Not stated
Permit/ fee for use of sites for weddings etc	
Sale of literature/ posters	
Animal Impounding Fee	From $100 to $250
Park Fines (penalties for offences)	Fines up to $350

Table 7- Existing Sources of revenue for the Park

FINANCIAL RESOURCES FOR THE PARK CAN BE OBTAINED FROM A VARIETY OF SOURCES INCLUDING THE FOLLOWING:

- An annual subvention from government through the Ministry of Agriculture.
- Medium to short term funding from international institutions especially for conservation management and research programmes are available.
- Development of a Conservation Trust Fund as recommended by Allen Putney (MDNP Management Plan 2008).

- User fees from visitors to the various sites within the National Park
- Revenue generated from sale of paraphernalia, concessions, donations and in-kind services and park literature.
- Research Fees
- Franchise fees

EXISTING AND POTENTIAL INCOME- GENERATING ACTIVITIES FOR THE NATIONAL PARK

Collection of User Fees

The fee for the national parks structure is as follows: Tourists may purchase a **Site Pass** (US$3) good for one entry to one park, a **Day Pass** (for US$5) good for entry into as many parks the person can manage to visit in that day; and a **Week Pass** (for US$10) good for entry as many times into as many parks the person wishes to visit. Dominica nationals are exempt from paying fees and certain categories of persons are also exempt-(e.g. guests of the government, or tourism promotional visits).

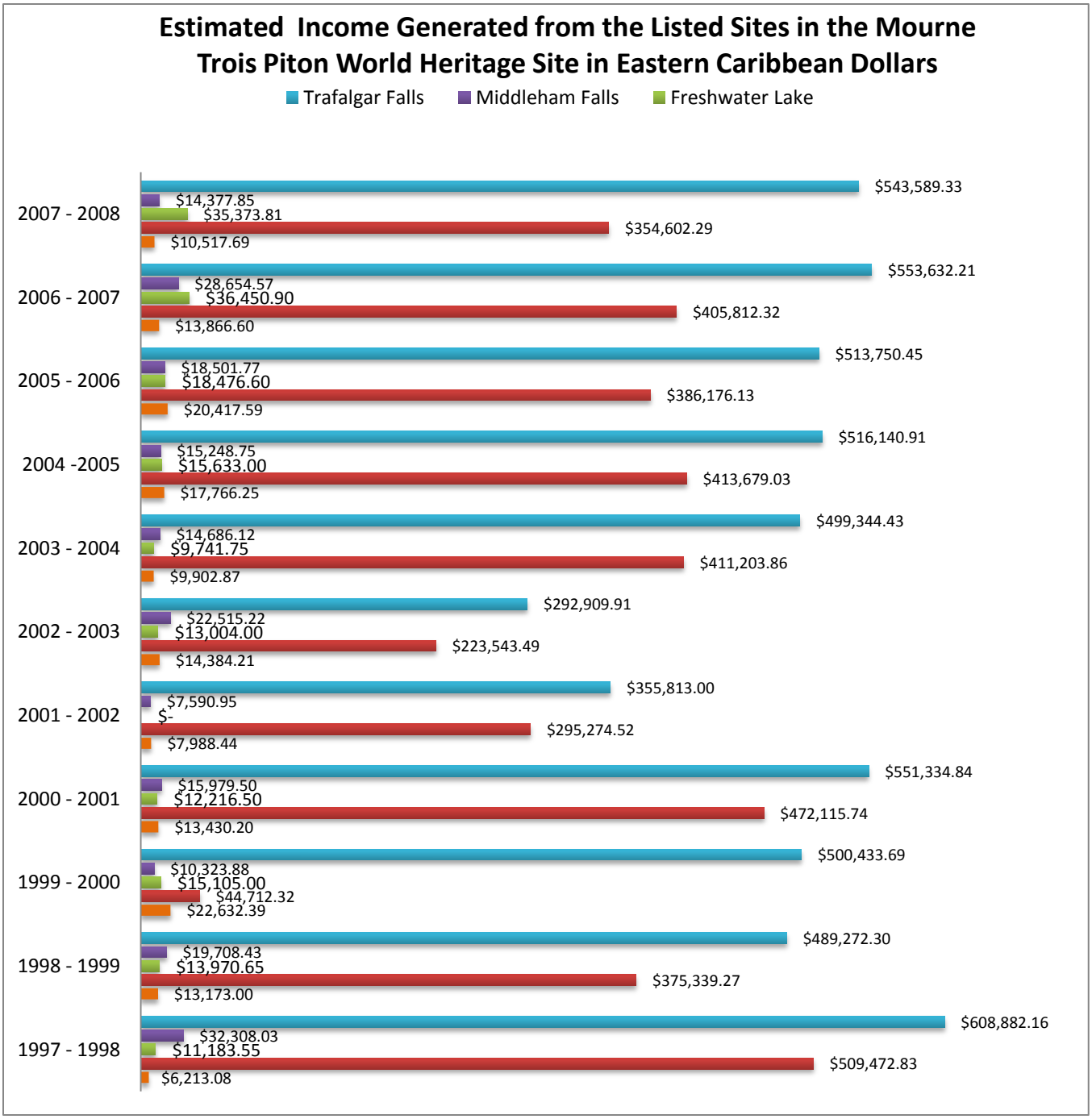
Visitation Level of the MTNP WHS

Forestry, Wildlife and Parks Division

Summary Visitation to National Parks and Eco-tourist Sites - 2000 – 2009

Sites	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Cabrits	3824	4898	5034	4712	6018	9168	16517	11310	10059	14159
Syndicate	12014	11361	9340	7183	16674	14392	14422	13699	10739	3841
*Emerald Pool	97486	82440	52094	61306	116732	77499	93950	78626	74210	63558
Trafalgar Falls	97694	85602	49052	66993	130843	96629	110879	107947	109155	119265
*Middleham Falls	4242	5088	4251	4783	7873	6030	5197	2525	7348	6220
*Boiling Lake	11858	14201	14013	13969	13966	14018	12392	14810	16853	4785
*Freshwater & Boeri Lake	10422	14863	10852	16128	19170	12504	17466	16242	16434	9968
Indian River	432	513	219	314	422	406	249	1905	745	13871
Soufriere Sulphur Springs	2995	2870	3653	3451	4302	3955	4410	4394	4109	7525
Morne Diablotin	240967	221836	148508	178839	316000	234601	275482	251458	42	43
*Morne Trois Pitons	3824	4898	5034	4712	6018	9168	16517	11310	58	13
TOTAL, MTPNPWHS	127,832	121,490	87,054	100,898	163795	119,197	145,522	123,513	114,905	**84,554**

Table 8 - Visitation Level of the MTNP WHS (Forestry & Parks & Wildlife Division)



Estimated Net Revenue Generated from Eco-Sites for Period 2009-2010

From the above graph, it should be noted that the sites generate income from user fees. The potential for increased generation of income can be realized if improved services and amenities are put in place and are supported by an effective marketing plan to increase visitation to the Park.

No.	Name of Eco-Site	Income E.C. $-2008/2009	Estimated Income-EC$	%Total Revenue
1	Trafalgar Falls	1,354,838.84	1,597,744.37	60
2	Emerald Pool	582,207.59	649,176.16	24
3	Indian River	99,860.09	111,077.94	4.2
4	Cabrits National Park	96,314.33	107,065.41	4
5	Boiling Lake	24,064.13	41,547.08	.6
6	Soufriere Sulphur Springs	23,467.64	40,839.20	1.5
7	Freshwater Lake	23,467.64	27,073.80	1
8	Middleham Falls	**20,830.51**	23,903.19	.9
9	Boeri Lake	23,467.64	23,903.19	.9
10	Syndicate Nature Trail	9169.54	22,271.52	.8
11	Morne Trois Pitons	9,769.83	14,073.28	.6
12	Morne Diablotin	9,769.83	14,046.58	.5
Total		2,277,722.71	**2,672,721.72**	**100**

Table 9- Estimated Net Revenue Generated from Eco-Sites - 2009-2010 (Forestry & Parks & Wildlife Division)

Presently the total amount collected through user fees in the MTNPWHS is approximately 755, 774.00. Assuming very little change in 2011 as a result of the depression in overall tourism arrival figures, visitors to the site “Morne Trois Pitons” have dwindled from 11,000 in 2007 to 58 in 2008 and 13 in 2009. Except for Emerald Pool, visitation to all the sites has been low and much below their carrying capacity.

Using the Emerald Pool as an example, in 2009 there were 63, 558 visitors which amounted to 174 persons per day.

If the other 5 sites that make up the MTNPWHS (indicated in red) were able to attract 100 persons /day at (the new price structure of the User Fee tickets (Organized tour – US $3.00), (Private Tours – US $5.00), using an

average of $U.S 4:00- the park could generate an additional E.C. $M1.98 and an overall annual E.C$M 2.63 just from user fees.

(500 persons/day x365 = 182,500 x US $4 =$U.S 730,000=$E.C $1.98M this would add up to an annual fee of EC $1.98M+ 649,176.16 (from the Emerald Pool) =$ 2.63M)

This indicates that with additional marketing the Park could attract many more visitors and sustain the cost of implementing the programme if it is assumed that staff emolument and other management activities would be paid from government's subvention.

INCOME PROJECTION BASED ON THIS CONSERVATIVE GROWTH FORECAST

Potential sources of income	Income Generated $E.C.					
	2010	2011	2012	2013	2014	2014
Govt. Subvention	**1,175,701**	**1,282,205**				
User fees	755,774.00	**755,774.00 Assuming no change**	**2.63**	**2.68**	**2.73**	**3.23**
Franchises Concessions	Info. NA					
Research	Info. NA					
Weddings etc.	Info. NA					
Sale of brochures/ Paraphernalia	Information NA					
Total						

Table 10- Project Income- MTNPWHS

Using a 2 % increase in growth the national park could generate sufficient income to meet all operating expenses outlined here. It should be noted that income generated from Trafalgar Falls was not included in this. Trafalgar Falls alone generated a total of E.C. $ 1.6 M in 2008/9 and is managed by the National Parks.

Summary by budget category						
Budget Category	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Subtotal**
Personnel						
Staff Training	60,000	60,000	75,000	75,000	60,000	330,000
Boundary Marking Program	180,000	100,000	80,000	20,000	20,000	400,000
Zoning Program	60,000		90,000	90,000	50,000	290,000
Visitor Use Programme		70,000				70,000
Infrastructure Design and Implementation	110,000	55,000	55,000	65,000	55,000	345,000
Legislation and Regulations		5, 000				5,000
Scientific Research and Monitoring						

	62,423	116,000	32,000	20,000	36,000	239,423
Monitoring	30,000	30,000	35,000	32,000	41,000	168,000
Surveillance and Enforcement	10,000	10,000	10,000	10,000	10,000	50,000
Communication, Education and Public Awareness	80,000	80,000	80,000	80,000	80,000	400,000
Community Outreach and Livelihood Development Programme	40,000	40,000	40,000	40,000	40,000	200,000
Other Operating Expenses	18,000	18,900	19,800	20,800	21,800	99,300
BUDGET CATEGORY TOTALS	**550,423**	**584,900**	**516,800**	**542,800**	**413,800**	**2,594,723**

Table 11- Total Operational Budget- 2011- 2015

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ACRONYMS

CANARI	Caribbean Natural Resources Institute
CARICOM	Caribbean Community
CBD	Convention on Biological Diversity
CCCCC	Caribbean Community Climate Change Centre
CCD	Convention to Combat Desertification
CDERA	Caribbean Disaster Emergency Response Agency
CEHI	Caribbean Environmental Health Institute
CERMES	Centre for Resource Management and Environmental Studies
Programme	
CIMH	Caribbean Institute of Meteorology and Hydrology
CPACC	Caribbean Planning for Adaptation to Climate Change Project
DOMLEC	Dominica Electricity Services
DOWASCO	Dominica Water and Sewerage Company
ENSO	El Niño Southern Oscillation
IWCAM	Integrating Watershed and Coastal Area Manage
FDD	Fisheries Development Division
FWD	Forestry, Wildlife & Parks Division,
FWL	Freshwater Lake
GIS	Geographic Information Systems
GOCD	Government of the Commonwealth of Dominica
GEF	Global Environment Facility
IWCAM	Integrating Watershed and Coastal Areas Management
IWRM	Integrated Water Resource Management
IUCN	International Union for the Conservation of Nature
MTPNPWHS	Morne Trois Pitons National Park, World Heritage Site
MDNP	Morne Diablotin National Park
NEPA	National Environment and Planning Agency
NSO	National Statistical Office
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
UNDP	United Nations Development Programme
UNEP	United Nations Development Programme
UNESCO	United National Educational Social Organization
WHS	World Heritage Site

Annex A - Maps

Map 1: Location of Morne Trois Piton National Park

Map 2: Topography

Map 3: Geology

Map 4: Access

Map 5: Rainfall

Map 6: Generalized Soils

Map 7: Landslide Hazard

Map 8: Vegetation

Map 9: Watersheds and Water Resources

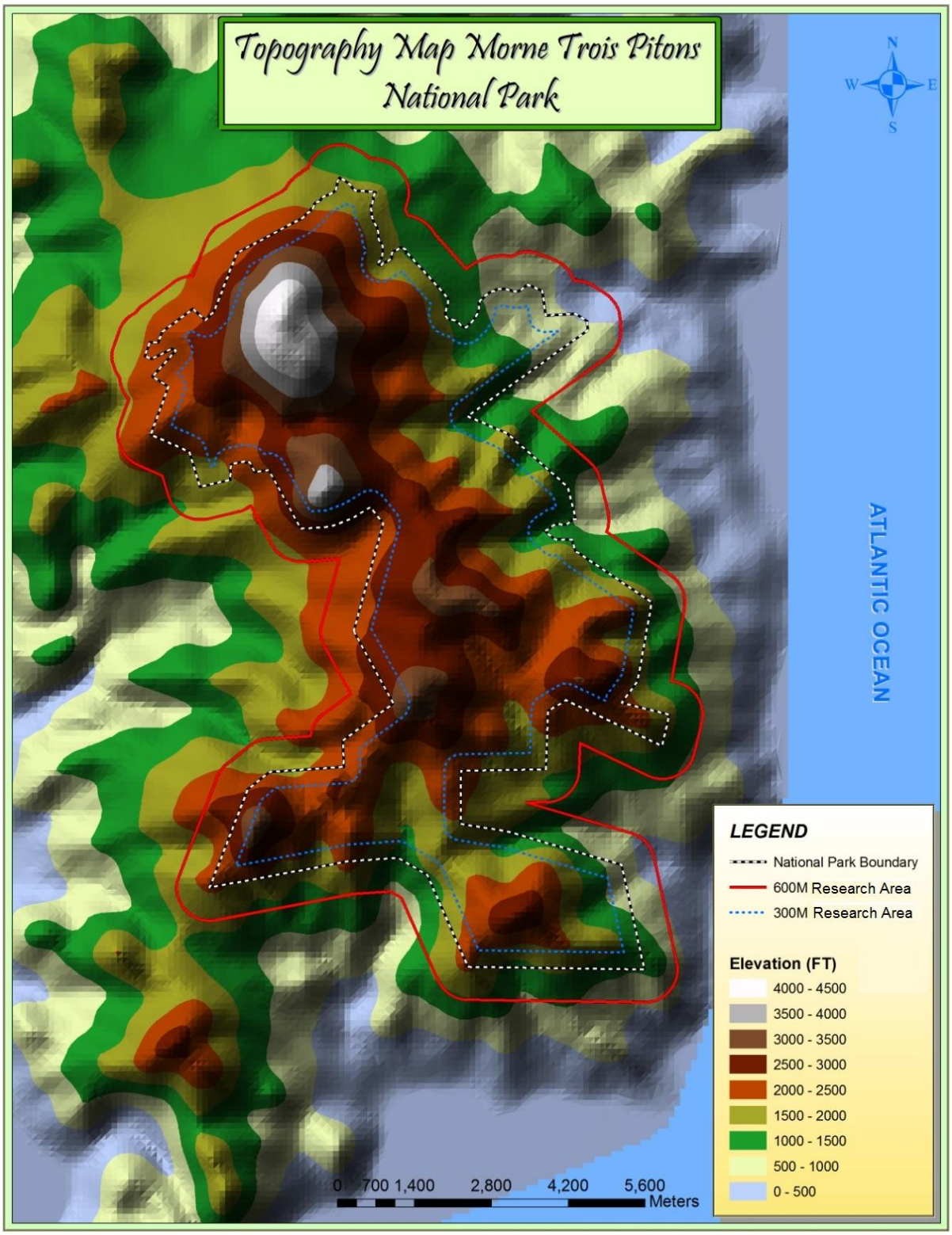
***Map 10:* Attractions and Trails In and Around the Park**

Map 11: Utilities and Commercial Activities

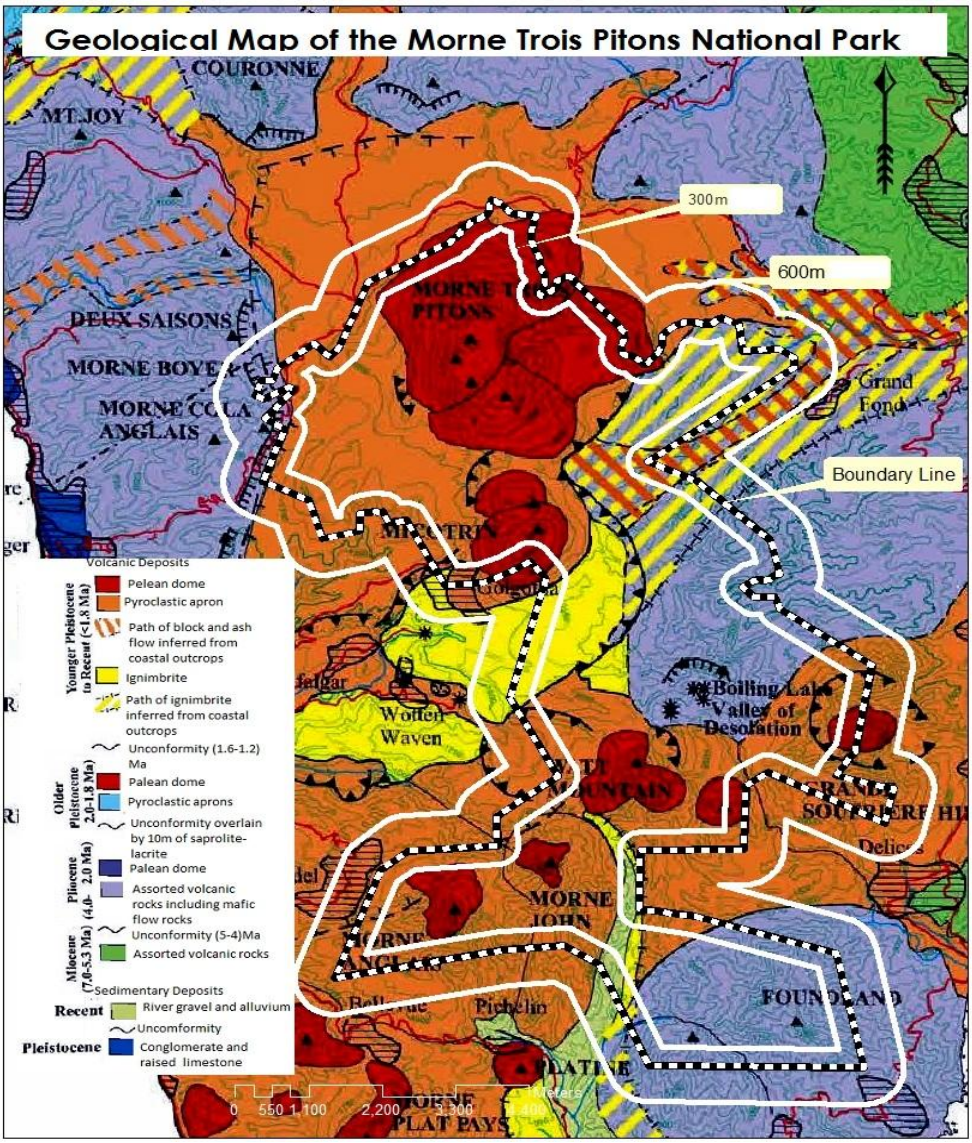
Map 12: Proposed Buffer Zone

Map 13: Park Zones

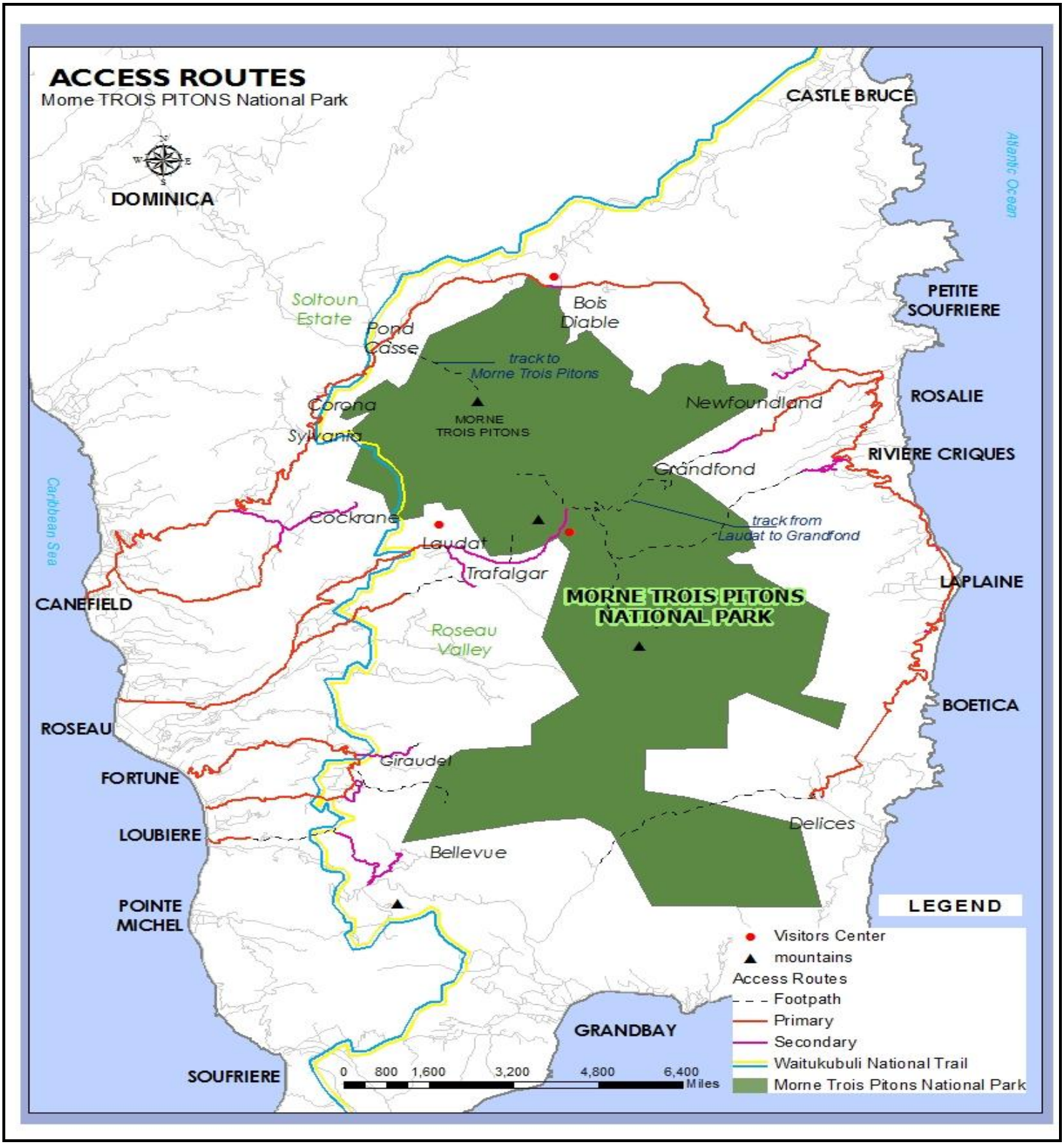
Map 1: Location of Morne Trois Pitons National Park



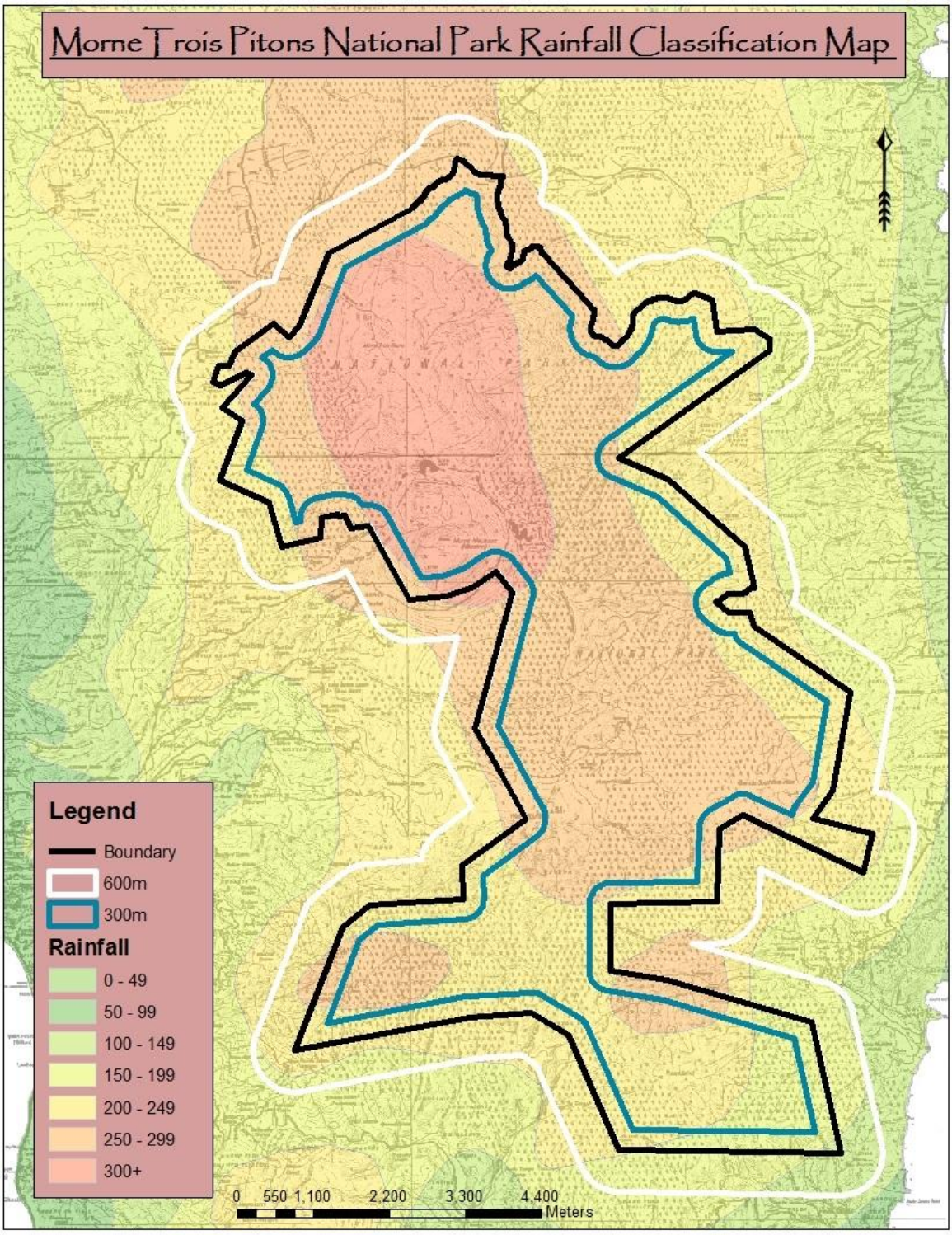
Map 2: Topography of the Morne Trois Piton National Park



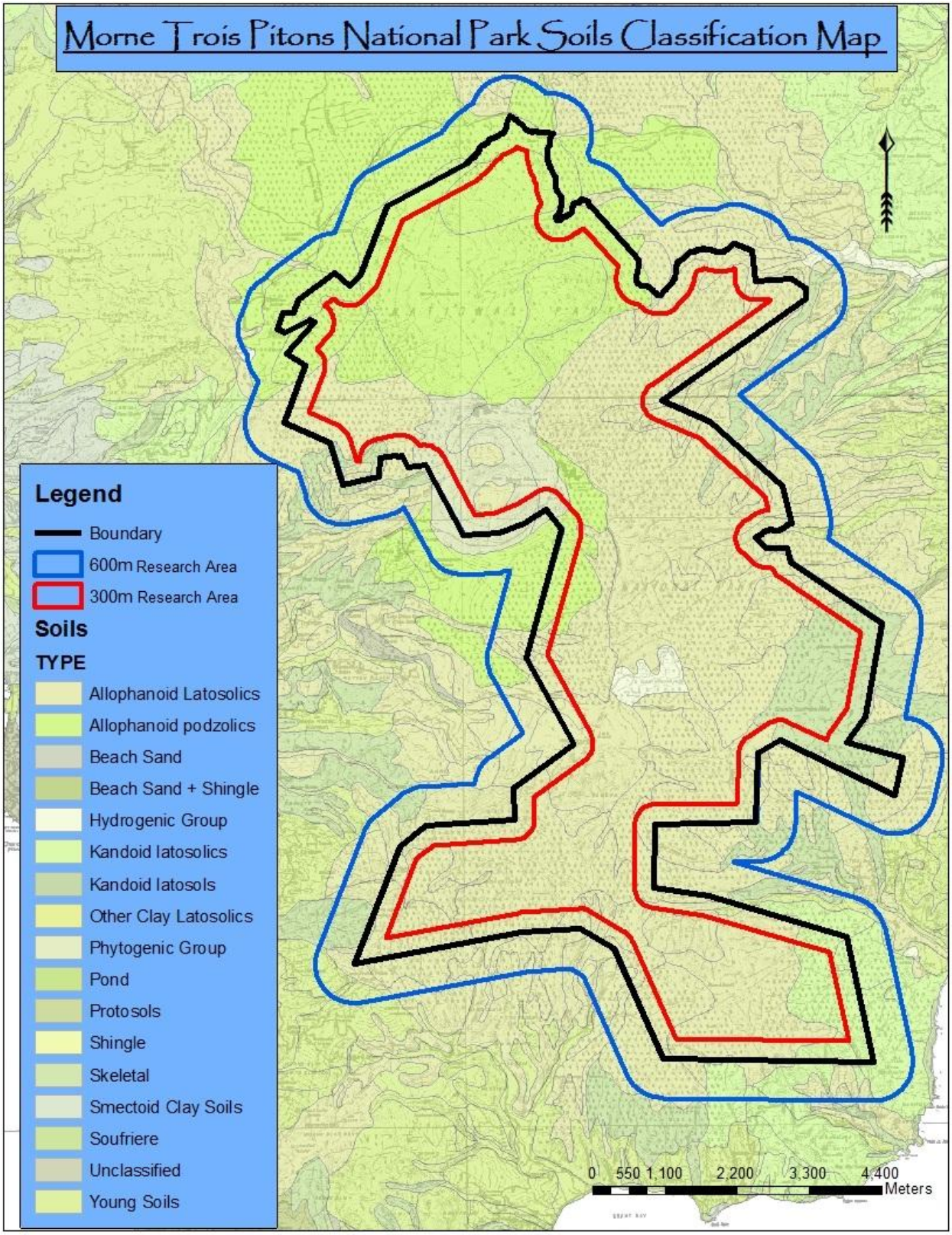
Map 3: Geological Map- Morne Trois Pitons National Park



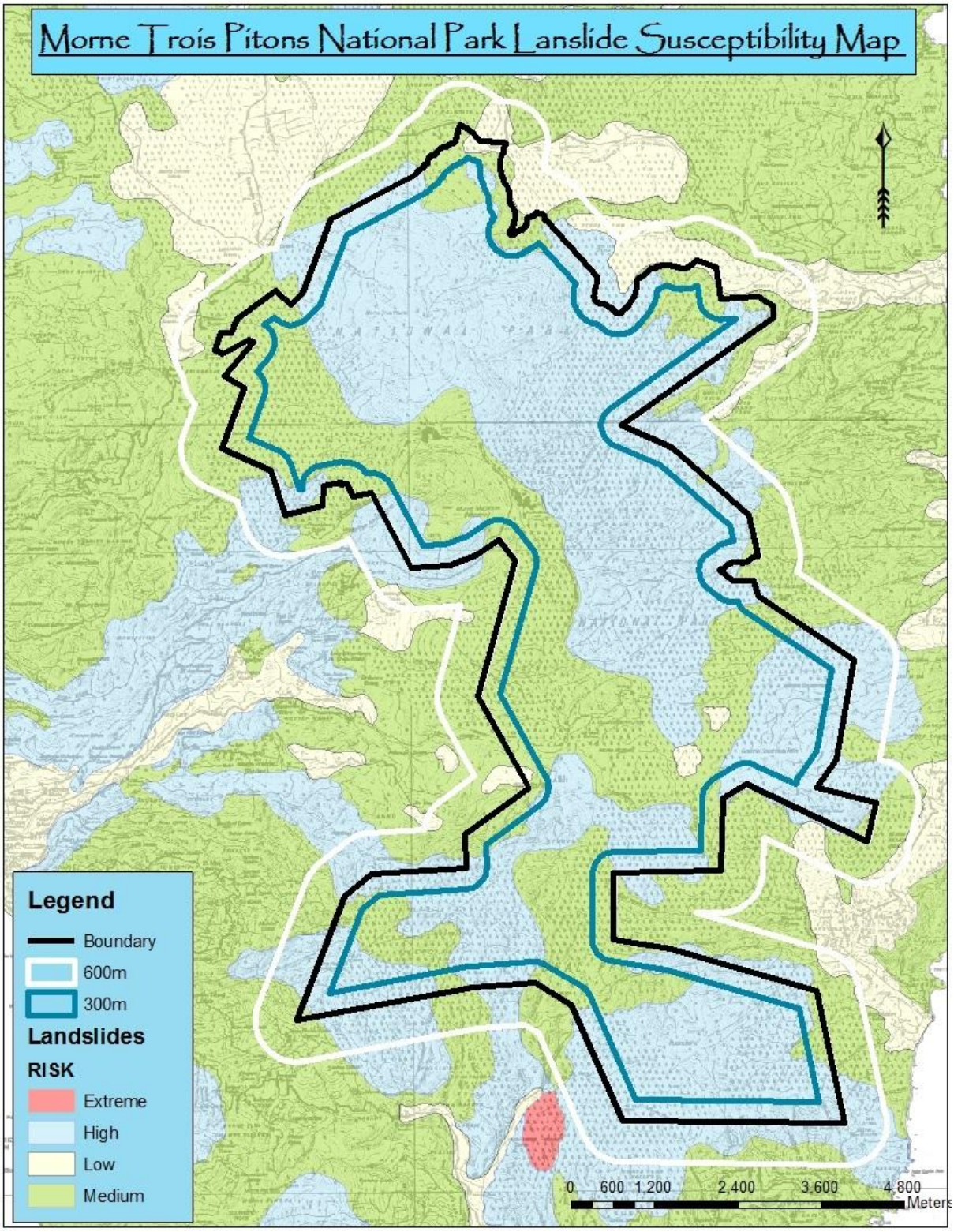
Map 4 – Access Routes-MTNPWHS



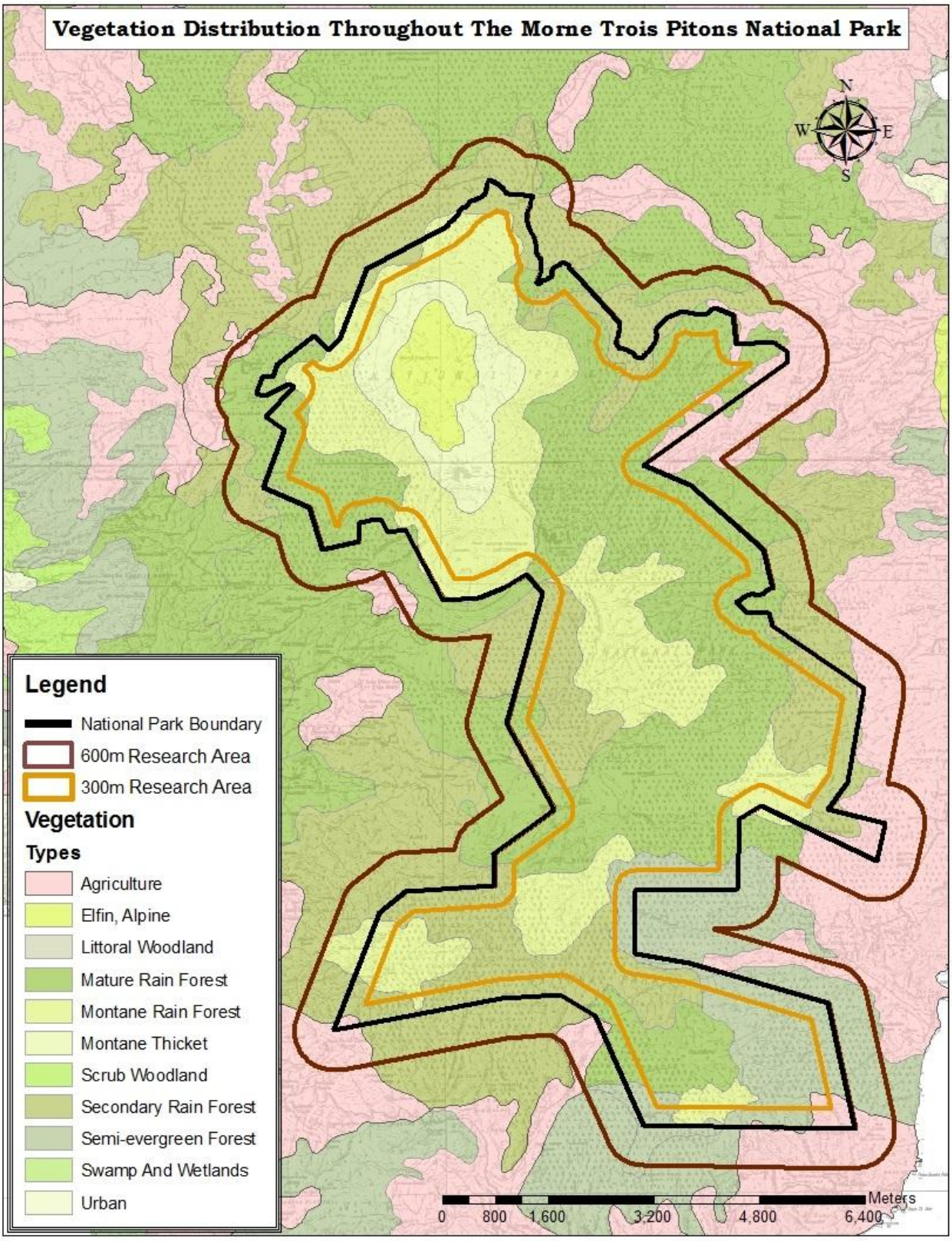
Map 5: Rainfall Classification for the Morne Trois Piton National Park



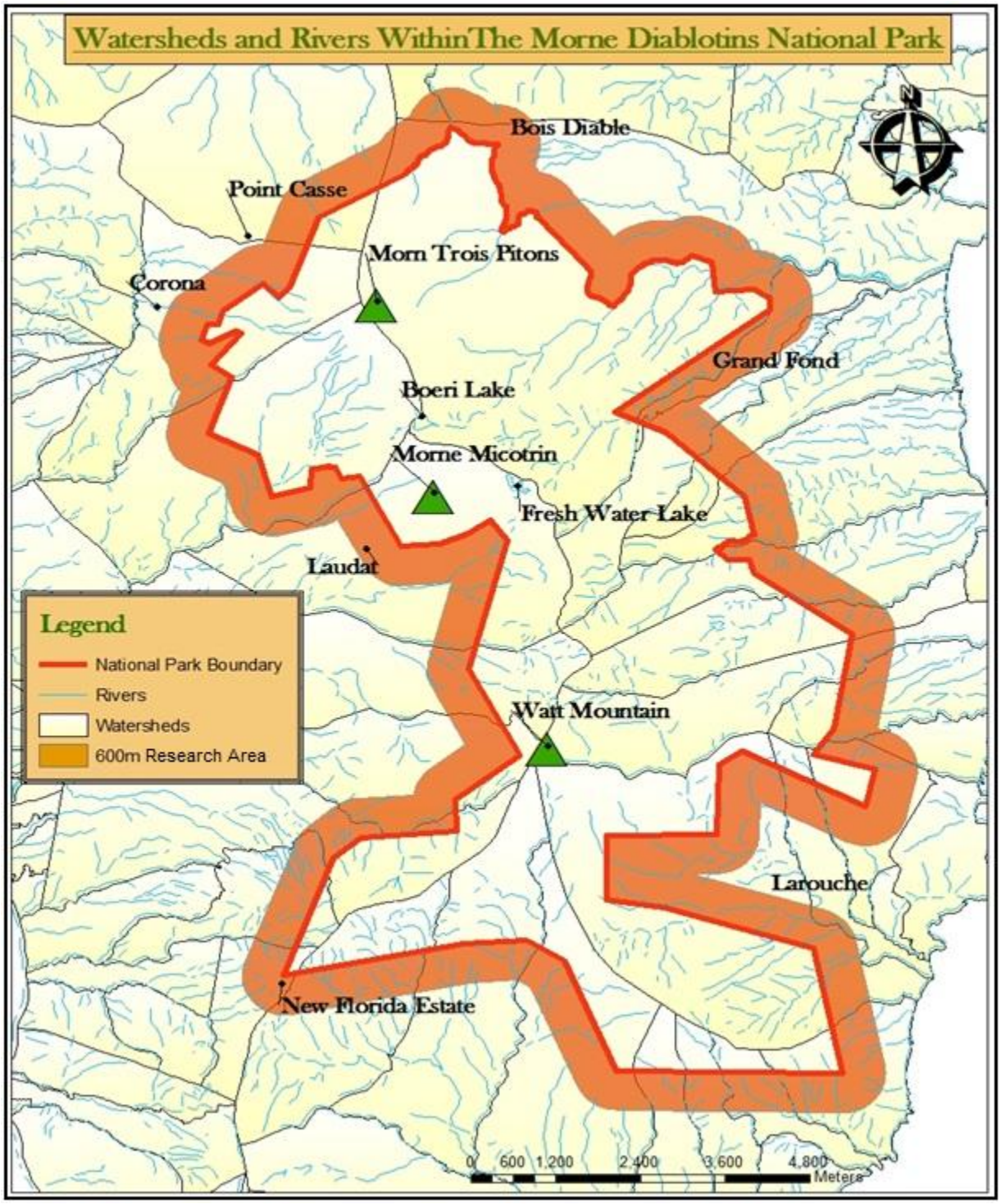
Map 6: Soil Classification within the MTNPWHS



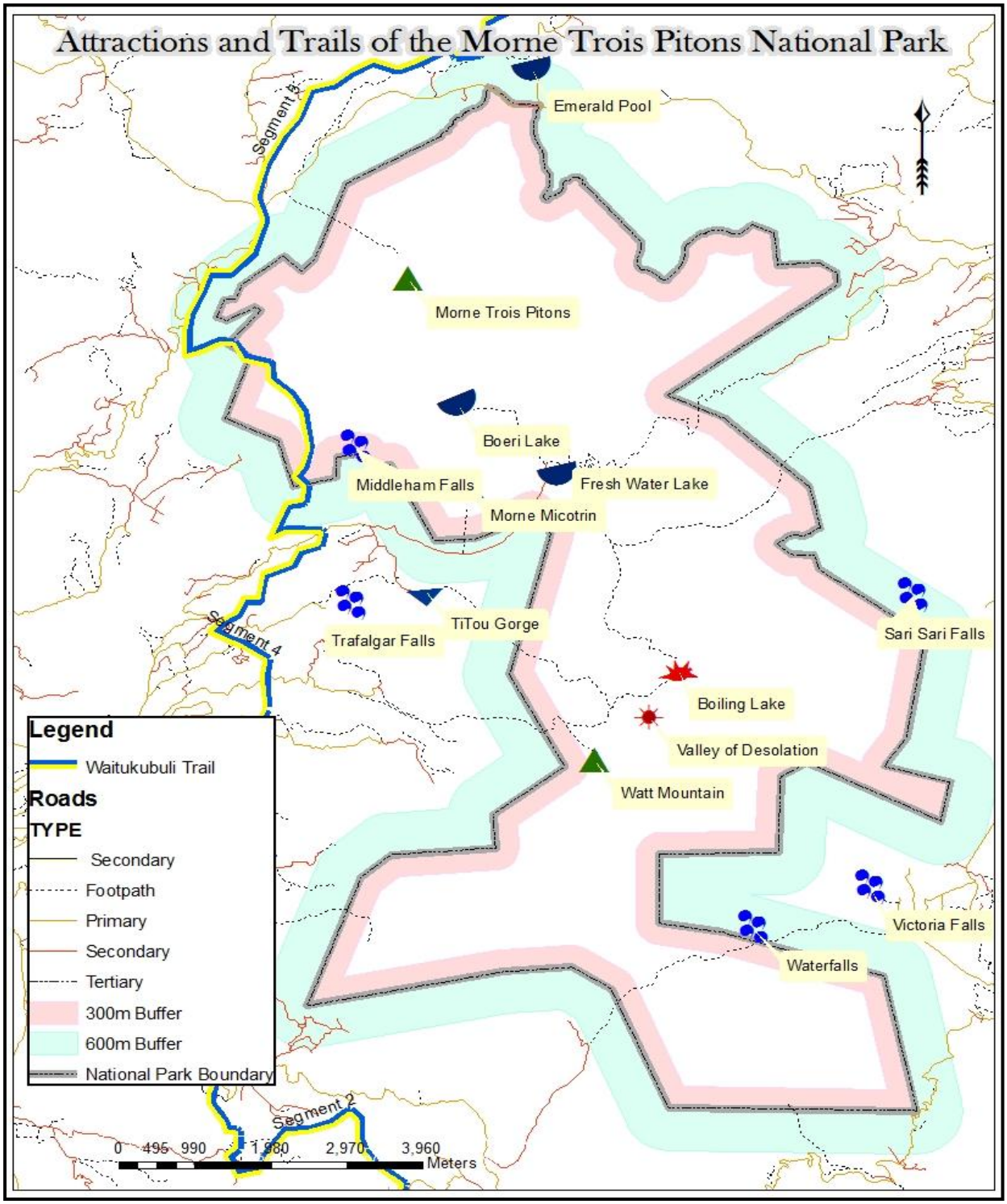
Map 7: Landslide Susceptibility



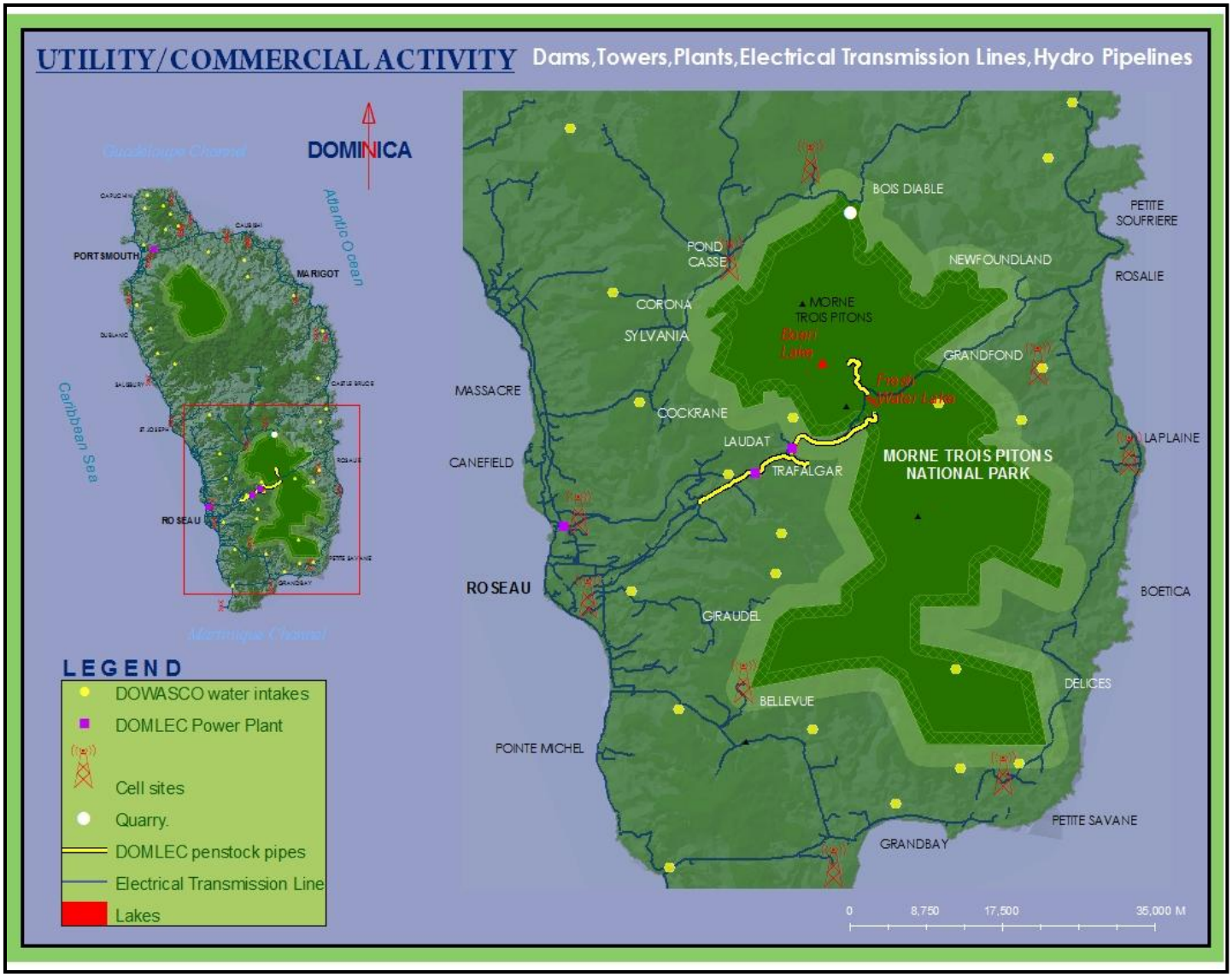
Map 8: Vegetation Distribution Throughout the Morne Trois Piton National Park



Map 9: Watershed and Water Resources

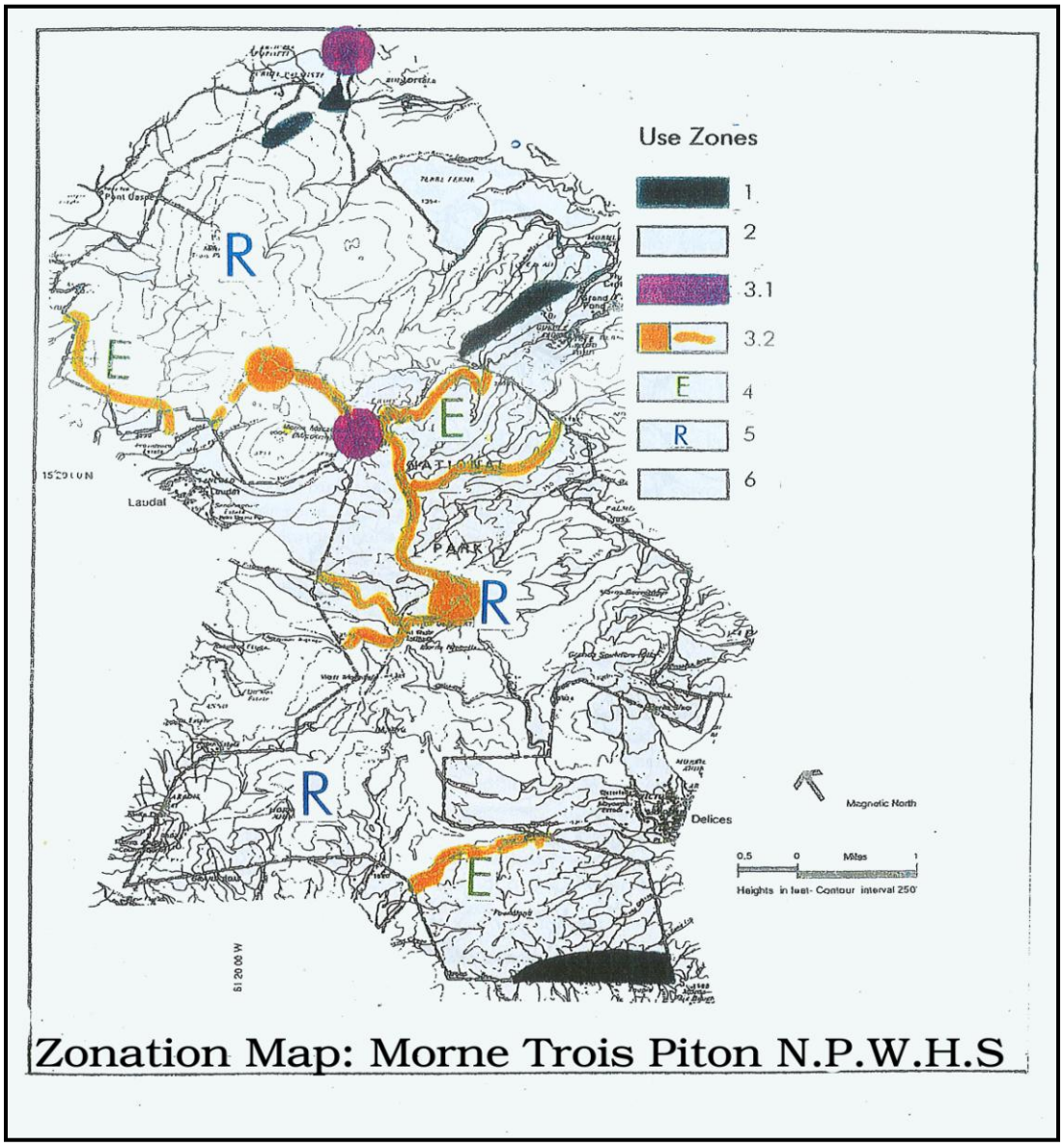


Map 10: Attractions and Trails In and Around the Park



Map 11: Utility and Commercial Activities

Map 12: Proposed Buffer Zone



Map 13: Park Zones

Special Use zone- **Dark Green**

Intensive Use- **Purple coloured**

Extensive Use Zone – **Orange coloured**

Environmental Study Zone - **E**

Research - **R**

Wildland Management- **Area Outside Special Use Zone**

ANNEX B

13.1 BUDGET

MTNPWHS Park Budget						
Boundary Marking						
Boundary Marking Program						
Description	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Sub-Total**
Equipment and Supplies	60,000			-	-	**60,000**
Hire Personnel to cut lines	120,000	80,000	60,000	-	-	**260,000**
Develop and implement boundary maintenance programme		20,000	20,000	20,000	20,000	**80,000**
TOTALS	**180,000**	**100,000**	**80,000**	**20,000**	**20,000**	**400,000**

Boundary Marking and **installation of boundary markers**

It is expected that the Park will use its personnel and the lands & Surveys department for GIS expertise to develop a GIS database. A contractual amount of $260,000 has been estimated for use of local labour for clearing of the Park boundary and installation of boundary markers

Personnel will include park staff which is not considered in this budget/

Project Supplies

It is estimated that boundary markers will be required at a cost of 60,000. An amount of 20,000 is provided for annual maintenance of the boundary lines.

Zoning						
Zonation Marking Program						
Description	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Subtotal**
To undertake a inventory of the resources in the zoned areas	Budgeted under Research & Monitoring					
Survey and demarcation - Personnel (Contracted labour)			90,000	80,000	40,000	**210,000**
Develop a management Plan for the various zones of the Park	Staff time					
Equipment &Project Supplies	60,000	-	-	-	-	**60,000**
Annual Maintenance Program/ Forestry personnel				10, 000	10,000	**20,000**
TOTALS	**60,000**		**90,000**	**90,000**	**50,000**	**290,000**

Park Zonation-Buffer Zone Marking

Activity zone marking

As above, contractual amount of $210,000 has been allocated over 5 years for this activity. This will involve identifying zoning boundaries within the park and will include the development of a database of marker locations.

Personnel & Equipment- As per boundary marking.

Project Supplies

Zoning markers will be required at a cost of 60,000. An amount of 10,000 has been provided for annual repair and maintenance costs. It is expected that the maintenance of the zones and the boundaries will be undertaken simultaneously once the initial work is completed

Public / Visitor Use Programme						
Description	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Sub-Total**
Review and development of visitor services and amenities	Staff time					
Establish visitor safety programmes to include the establishment of forecasting capability and an early warning system and the development of a disaster management Plan*	Office of Disaster Managment	10,000				
Establish visitor monitoring programmes	Staff time					
Establish indicators of Limits of Acceptable Change, LAC, for the Park and monitor indicators	Staff time					
Review and development of visitor services and amenities	Staff time					
Procure communication and safety equipment to upgrade existing stock		**60, 000**				

*Some funding from the development of an early warning system will come from the Office of Disaster Management. Some communication equipment is available. Hence an amount to upgrade the communication equipment.

Infrastructure Design and Implementation						
Description	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**SubTotal**
Upgrading and maintenance of existing trails	20,000	20,000	20,000	20,000	20,000	100,000
Upgrading of picnic shelters, washroom facilities,		10,000 (MF)[3]				10,000
Finalize access points to the Park and construct principal reception centre (Seek funding for construction of reception centre)						
Retrofit all buildings in the park to make them energy and environmentally efficient. Establish "Green Globe" or other relevant programme.	40,000	20, 000	30,000	20,000	10,000	120,000
Close down and rehabilitate the quarry in the Park and relocate shooting range in the Park	Staff time					
Construction of, picnic shelters or washroom where necessary				20,000 Boeri Lake	20,000 Boiling Lake	40,000
Maintenance of existing car parks	50,000	5000	5000	5000	5000	75000
TOTALS	**110,000**	**55,000**	**55,000**	**65,000**	**55,000**	**345,000**

Infrastructure Design and Implementation

This will entail the construction of a rain shelter/picnic shelter at Boeri Lake and Boiling Lake, the upgrading and repairs of the rain shelter at the Middleham Falls.

Budgetary provisions are made for the maintenance and upgrading of the existing trails and the car parks.

Legislation and Regulations- currently being reviewed and developed						
Regulations	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Sub-Total**
Develop a comprehensive policy and regulatory framework to include climate change.						
Review of legislation and existing regulations, develop and finalize						
Print and disseminate to stakeholders		5000.00				
Total		**5000.00**				

[3] Middleham Falls

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Subtotal
Sub-Programme 1C.Scientific Research and Monitoring						
To undertake baseline assessment of the resources	Staff time TA					
Upgrade the current hydrological monitoring programme and instrumentation of the Forestry Division	15,000				15,000	30,000
Purchase equipment/ soft ware for establishment of database	10,000	10,000	10,000	12,000	15,000	57,000
Purchase equipment/ instrumentation for hydro-meterological monitoring	27,423.00					27,423
Install a weather stations in the Park to monitor and assess hydro--meteorological data Install one rain gauge above the forest canopy of the Park to monitor and study the rainfall interception process.	Staff time					
Establish seed/gene bank. Establish physical infrastructure for housing of seed bank Collect and store seeds and plant materials of all endemic and indicator plant species		8, 000 70, 000	6, 000	4,000	2,000	20,000 70,000
Establish a living collection of plants – ex-situ field gene banks.	2000	20000	10000			5000.00 Technical input
Upgrade existing nurseries and establish new ones	8,000	8,000	6,000	4,000	4,000	30, 000
Develop and implement silvicultural techniques to promote forest productivity, maintain genetic diversity and promote ecosystem health						
OUTPUT 4.1 TOTALS	**62, 423**	**116, 000**	**32,000**	**20,000**	**36,000**	**239,423**

Research & Monitoring OUTPUT : Biological, Resource Use, Activity Monitoring						
Description	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Sub-Total**
Research officer						
Technical assistance						
Equipment and transportation	20,000	20, 000	20,000	12,000	15,000	87,000
Maintenance of all the installations and equipment	10,000	10,000	15,000	20,000	26,000	81, 000
OUTPUT TOTALS	**30, 000**	**30,000**	**35,000**	**32,000**	**41,000**	**168,000**

Research & Monitoring
Personnel

It is estimated that this activity will be undertaken by Park personnel- Research Officer and technical assistance from International agencies or collaboration with Institutions of higher learning

Surveillance & Enforcement OUTPUT : Surveillance & Enforcement- Park personnel						
Description	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Sub-Total**
Training of Park wardens	10,000	10,000	10,000	10,000	10,000	**50,000**
OUTPUT TOTALS						

Surveillance & Enforcement
Personnel- This will be undertaken by Park Personnel

Training budgeted for entails short term training and attachments. It is expected that technical assistance for training will also come from regional organizations. Financing will be sought from government and other organizations for long term training.

Project Supplies

This represents estimated cost of transportation and equipment

Staff Training	60, 000	60,000	75,000	75,000	60,000	330,000
OUTPUT TOTALS	60,000	60,000	75,000	75,000	60,000	330,000

This will entail attachment programme to other Parks for new personnel; participation in overseas Seminars and training programmes as well as local training programmes

Education & Public Awareness						
Description	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Sub-Total**
PROGRAMME 2 A. COMMUNICATION, EDUCATION AND PUBLIC AWARENESS	80,000	80,000	80,000	80,000	80,000	
OUTPUT TOTALS	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**400,000**
Programme 2B-Community Outreach and Livelihood Development Programme	40,000	40,000	40,000	40,000	40,000	**200,000**
OUTPUT – TOTALS	120,000	120,000	120,000	120,000	120,000	**600,000**

Education & Public Awareness
Personnel

It is estimated that this activity will require an Education and Outreach Coordinator who will be hired as part of the NP staff under the revised institutional structure

Collaboration, training and technical assistance will be given to adjacent communities in identifying sustainable livelihood projects that are compatible to the goals and objectives of the Park. Collaborative monitoring with the communities will be desirable with respect to the impact of climate change on the biodiversity of the forest.

The objective is to raise Park awareness and to generate a sense of ownership for the resources of the Park so that communities assist in Park management programmes and can benefit from the conservation of the resources through alternative uses of their land.

BUDGET SUMMARY

Summary by budget category						
Budget Category	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Sub-Total**
Personnel						
Staff Training	60,000	60,000	75,000	75,000	60,000	330,000
Boundary Marking Program	180,000	100,000	80,000	20,000	20,000	400,000
Zoning Program	60,000		90,000	90,000	50,000	290,000
Visitor Use Programme		70,000				70,000
Infrastructure Design and Implementation	110,000	55,000	55,000	65,000	55,000	345,000
Legislation and Regulations		5, 000				5,000
Scientific Research and Monitoring	62,423	116,000	32,000	20,000	36,000	239,423
Monitoring	30,000	30,000	35,000	32,000	41,000	168,000
Surveillance and Enforcement	10,000	10,000	10,000	10,000	10,000	50,000
COMMUNICATION, EDUCATION AND PUBLIC AWARENESS	80,000	80,000	80,000	80,000	80,000	400,000
-Community Outreach and Livelihood	40,000	40,000	40,000	40,000	40,000	200,000

Development Programme						
Other Operating Expenses	18,000	18,900	19,800	20,800	21,800	99,300
BUDGET CATEGORY TOTALS	**550,423**	**584.9,900**	**516,800**	**542,800**	**413,800**	**2,594,723**

Managing the Impacts of Climate Change[4]						
Description	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Sub-Total**
Develop public awareness and education programmes targeted at policy makers, the general population, communities and stakeholders on the issues of climate change (to be incorporated under *COMMUNICATION, EDUCATION AND PUBLIC AWARENESS)*						Budgeted under public awareness
Upgrade the current hydrological monitoring programme and instrumentation of the Forestry Division	*******					10, 000
Install a weather stations in the Park to monitor and assess hydro--meteorological data Install one rain gauge above the forest canopy of the Park to monitor and study the rainfall interception process.	*******					27,473.00
Establish seed/gene bank. Establish physical infrastructure for housing of seed bank Collect and store seeds and plant materials of all endemic and indicator plant species						20,000 70,000
Establish a living collection of plants – ex-situ field gene banks.						5000.00 Technical input
Upgrade existing nurseries and establish new ones						30, 000
Reforest and restore degraded areas of the Park and buffer zones						Forest technical input
Develop and implement silvicultural techniques to promote forest productivity maintain genetic diversity and promote ecosystem health						
Retrofit all building in the park to make them energy and environmentally efficient. Establish "Green Globe" or other relevant programme for all attractions in the Park						20,000 120,000

[4] All costs have been integrated into the relevant programmes

Establish forecasting capability, early warning systems						In collaboration with Disaster Management Unit
Close down and rehabilitate the quarry and the police shooting range in the Park						
Provide incentives to land owners with land adjacent to the Parks to reduce impact on the Park						
Establish Social Forestry Programmes						20, 000
TOTALS	**70,000**	**35,000**	**25,000**	**45,000**	**45,000**	**322,473,000**

ANNEX C – Communication, Education and Public Awareness and Visitor Use

To meet the recreational and educational needs of the visitors and potential users with respect to the importance of the World Heritage Site as an world patrimony to be protected and managed on a sustainable basis for economic, social and scientific purposes.

Objectives

- To promote and enhance the Park for public education, public use and enjoyment.
- To sensitize users of the Park of its importance to natural resource conservation and bio-diversity
- To promote the park as a contributor to economic development through sustainable use.
- To sensitize the public and other resource users on the resources and status of the park to encourage them to be custodians of the Park and to evoke responsible behaviour and support.

This will be achieved through interpretation, environmental education, displays and the use of the multimedia facilities.

Design of Educational Programmes

Environmental educational programmes should be developed for different user groups as follows:

- Schools
- Public
- Universities / Research groups
- Government bodies
- NGO's
- Media, local artists etc.

Educational Materials to be developed:

- Billboards and signs
- Brochures, leaflets, booklets, posters
- Audio-visual material
- Exhibitions and displays
- Other interpretive signs

A. Development of Interpretive Centres

Objectives

- To serve as a resource centre and to orient users of the park with respect to the functions and services of the Park
- To inform visitors/users of the park, of the educational and recreational opportunities available in the park.

- To provide visitors with and inform them of the regulations governing the park.

Management Guidelines and Programmes

- All existing brochures, billboards, signs should be upgraded to reflect the status of the Park as a World Heritage Site.
- Development of displays and exhibitions to acquaint park users with the features, regulations and facilities in the Park
- Signs must be erected at the boundaries of the various zones to explain the purpose of each zone.
- Develop the necessary human resource in the park to enhance their ability to educate Park users.

B. Forest Trails Interpretation

This entails upgrading of trails, development of interpretive signs and materials.

Objectives

- To highlight the features of the park
- To improve educational experience and opportunities
- To enhance recreational experience
- To reveal the meaning and relationship of natural features and processes occurring along the trail.
- To develop educational material to highlight the biological resources and functions of the specific zones.

Management Guidelines and Programmes

To interpret the biological diversity of the Park within the intensive and extensive use areas. This to be achieved through the development and use of various educational methods.

Produce brochures for the various trails in order to interpret the unique features of the trail –natural, historical, cultural features.

C. Environmental and Conservation Education

This component will foster an understanding of the Park and its values as a world patrimony, and the need to conserve the biological diversity.
It will provide knowledge of environmental values and an understanding of environmental problems as well as methods of preventing and mitigating environmental problems.

Objectives

- To educate park users on the environmental and socio-economic values of the Park.
- To educate the public and private sector and policy makers on conservation and environmental issues

relevant to Dominica and the World Heritage Site.

- To inform park users of the regulations, policies and management programmes of the Park so as to mitigate negative activities and to enlist them as custodians of the Park
- To inform and recruit communities adjacent to the Park, in the process of education and conservation.

Management Guidelines and Programmes

To highlight the importance of the bio-diversity of the World Heritage Site

- Objectives of the World Heritage Site
- Its history, habitat, fauna and flora
- The structure of the forest
- The role of the Park in the conservation of soil, water and wildlife
- The economic, historical and cultural values of the park
- The impact of human activities on the park including tourism
- Geological / geomorphic Structures

Target Groups

- Schools-primary secondary and tertiary
- Communities adjacent to the Park
- Community based groups and NGO's
- Tour guides, tour operators, and other park users

Tools/ Materials

- Schools programme
- Media programme-radio, TV, Newspaper
- Production and sale of environmental education materials
- Training of staff at interpretive centres and Tourist Information offices

D. Tourism, Ecotourism and Recreation

Dominica has been promoted as "The Nature Island of the Caribbean". Five sites within the WHS are major areas of attractions for a very large percentage of all visitors to Dominica. Although data on actual use patterns and volume have yet to be collected at all sites, the Emerald Pool and Freshwater Lake sites are the most popular. Middleham Falls and Boeri Lake rank second and Boiling Lake third.

As might be expected, sites close to parking areas are visited most often. Sites requiring longer hikes, such as the seven-hour round trip to the Boiling Lake, are much less
frequented.

Branding of the Park

- Branding: Develop a “brand” and tagline for positioning of MTNPWHS
- Development of a logo
- Key messages: Develop and deliver key messages to target audiences using the most cost-effective vehicles;

E. Legislation, Regulation, Planning and Policy formulation are important to the sustainable use of Park for tourism development.

These should address the following:

- It is important that indicators of limits of acceptable change, LAC, be established in areas of attraction so as to determine the maximum number of visitors to the site and the development of facilities and amenities to ensure that the resources of the area are maintained
- Protection of fauna, flora, from incompatible uses
- Control of access to wildlife Management zones and other zones not accessible to public use
- Strict regulations guideline and integrated management plans must be instituted
- Involvement of communities and all stakeholders.
- Visitor safety

Management Guidelines and Programmes

- Development of regulations and guideline for the control of tourism activities in the MTNPWHS
- Development of policy guidelines on architectural design and construction taking into account the need to utilize indigenous technology and materials and the need to blend with the environment.
- Manage the volume of visitors based on LAC or the carrying capacity
- Limit access to sensitive areas
- Protection of fauna and flora
- Integrated management programme
- Policies and action for visitor safety
- Ongoing monitoring of environmental quality

Appendix D- CONSERVATION TRUST FUND CONCEPT-Recommended By Allen Putney, MDNP Plan 2008 and Supported for the MTNPWHS Plan

INTRODUCTION

The revision of this plan is supported by the GEF/World Bank under the under the Special Programme for Adaptation to Climate Change (SPACC) project. The previous plan 2002- 2012 was prepared in 2001 and was funded by the UNESCO. The plan has not been ratified by the Government of Dominica and as such no substantial component of the plan has been implemented.

Additionally, the institutional arrangements for management of the Parks are shifting. A National Park Service is being established that will have responsibility for managing the 3 national parks of Dominica (Morne Trois Pitons National Park and World Heritage Site, Morne Diablotin National Park, and Cabrits National Park) as well as the Ecotourism Sites scattered around the island. In essence, the Park Service will be responsible for the major natural assets of Dominica that are managed for biodiversity and watershed conservation, and tourism.

One important aspect of the revised management plan for the MTNPWHS is financial sustainability, because implementation of the plan depends to a great degree on the availability of funding. Since MTNPWHS is a part of a wider system of protected areas, questions of finance must be considered in the wider context. As such the recommendations for the establishment of a Conservation Trust Fund put forward by Allen Putney for funding of the MDNP is being adopted as follows"

CONSERVATION TRUST FUNDS

"One financing mechanism that has received attention during the past 15 years is the Conservation Trust Fund (CTF). CTFs are legally independent institutions that raise, administer, and disburse funding. They do not implement projects but rather work through other existing implementing organizations. They usually make grants to government protected area agencies, NGOs, and/or local community groups for activities that protect biodiversity and promote community-based sustainable development near protected areas. The last 15 years of experience with CTFs in more than 50 countries demonstrates that they not only complement the funding provided by national governments and international donor agencies, but can also serve to mobilize substantial additional funding from national governments, international donor agencies, and the private sector.

Although CTFs do not implement conservation activities or projects themselves, they can influence the priorities and the operating procedures of government agencies and NGOs by providing them with otherwise hard-to-obtain additional financial resources. In many cases (Mexico, Peru, Ecuador, South Africa and Bhutan), CTFs serve not only as funding mechanisms, but also as catalysts for institutional reform of government protected area agencies. In other countries such as Brazil, CTFs have served as catalysts for the creation of

new partnerships with the private sector. In still other cases (as in the 23 CTFs whose financing comes from the proceeds of bilateral debt reductions by the US Government), CTFs have served as mechanisms for strengthening NGOs.

OPERATION OF A CONSERVATION TRUST FUND

Governance

CTFs are set up as independent institutions, usually as a foundation or not-for-profit corporation, depending on the particular legislation of a country. For example, in Dominica, a similar type of organization, the Social Investment Fund, was set up under the Companies Act. One important lesson learned from experience is that the most critical factor for good governance of a CTF is to have a large non-government majority on its Board of Directors, and to limit the number of government representatives to 20% or less. CTFs whose governing boards have a non-government majority, and are not chaired by a government Minister or housed inside of a government Ministry, are more transparent and accountable in how they spend funds. In some cases, donor representatives are included on the Board, but this has turned out to be limiting in some cases where the presence of a specific donor representative gives the perception that the CTF is the client of only one donor institution, thereby driving away other potential donors.

In some CTFs, a Founder's Committee or similar body is set up to play an oversight function with respect to the Board. The Founder's Committee is made up of the representatives of the institutions that established the CTF in the first place. This Committee has the power of veto over any decision made by the Board of Directors which contravenes the original intent of the legal instruments that established the Fund.

In some cases, CTFs play a lead role in strategic planning and priority setting for a country's national park system, either at the direct request of the government, or by default (i.e., because neither the government nor anyone else is doing this). Recent studies show that CTFs have served as the mechanism for financing up to 75% (in Peru) or even 90% (in Bolivia) of the annual operating costs of a country's protected area system, which can give them a significant indirect (or direct) influence on how those protected area systems are managed. This is true even in cases like Ecuador, where a CTF provides only 20% of such operating costs, or Mexico where a CTF provides only 14% of the total operating costs for 22 protected areas.

Staffing

CTFs seek to maintain low staff levels so that they can maximize the amount available for grant-making. The larger the CTF, the more efficient operations can be as a percentage of total revenues. At start-up, CTFs usually have to spend up to 40% of their funding on administrative overheads, but as they grow in experience and resources, even small funds can usually get their administrative overheads down to about 25% of total

revenues. Starting funds usually need only a Director and a Secretary. As the CTF develops, an Administrative Officer and one or more Project Officers can be brought on board to administer funds, organize and implement the requests for proposals, advise the Board of Directors on project selection, supervise and monitor project implementation, and report to donors. These functions can also be outsourced if preferred.

Sources of Funding

A 2002 study of CTFs in Latin America and the Caribbean found the following distribution of funding sources:

Debt for nature swaps		*48%*
Global Environment Facility (GEF)		*27%*
Bilateral Grants		*9%*
Governments		*7%*
Loans through bi-lateral or multi-lateral institutions	*5%*	
Earned income (fines, entrance fees, concessions, etc.)	*2%*	
Private foundations		*1%*
Donations from multilateral organizations	*<1%*	

These figures show clearly the importance of international funding which adds up to 91% of all current sources. Since this study was carried out, some CTFs have made breakthroughs in tapping into private sources of funding, mostly through the corporate sector.

Grant Making

The basic function of a CTF is to make grants that further biodiversity conservation and other relevant objectives. The guidelines for grant-making are normally outlined in a "Grant-Making Manual", or in a broader "Operations Manual" that has a section on grant-making. Grant priorities can either follow established government policy, such as a biodiversity strategy or protected area action program, or can be developed by the CTF's Board of Directors. The entities eligible for grants are usually defined by the Board of Directors as well and can include government agencies, NGOs, local community groups and/or the private sector. In many instances, the guidelines for grant-making at any particular time are defined in a "call for proposals" that clearly sets out priorities (thematic and/or geographical), deadlines for application, eligibility criteria, monitoring and evaluation requirements, amounts to be granted, and other operational details.

Monitoring and Evaluation

Most CTFs monitor and evaluate "project completion" indicators. There are no reported cases of CTF funds being stolen, misappropriated, or diverted for unauthorized uses. The general record of CTFs seems to be

better than the general record of accountability of individual projects financed by international donor agencies or national governments.

However, many CTFs have not collected detailed baseline data that would permit monitoring of biodiversity impacts of their grants, because collecting such data is often expensive, time-consuming, highly skilled work, for which the best methodologies are sometimes still a subject of debate even among scientific experts. Instead, many CTFs collect and analyze "proxy indicators" for biodiversity conservation, such as the number of (1) additional park guards that have been hired, (2) vehicles and radios purchased to equip park guards, (3) training courses given to park managers, (4) public environmental awareness campaigns that have conducted, and/or (5) environmentally sustainable livelihood projects for local communities in park buffer zones.

Fund Administration

Most CTFs administer their funds through different account types. In general these accounts include trust funds (where the capital is maintained and only the interest is available for grant-making), sinking funds (where an initial seed capital is spent over time, such as with project funding), or revolving funds (where regular income, such as concession fees, entrance fees, or fines build up in an account until spent). Each of these account types may also be divided into sub-accounts so that the funding from different sources is tracked independently. This is a must for most donors.

Investment Performance

The financial performance of CTFs ---i.e., the annual rates of return on the investment of their endowments, sinking funds, and revolving funds---has generally been similar to that of many developed country non-profit institutions such as universities and foundations, averaging between 6% and 9%, depending on which years are used as a reference, and on how much of the CTFs' portfolios are invested in stocks as opposed to bonds.

THE WAY FORWARD

There appear to be opportunities for furthering the development of a CTF in Dominica, both related to the development of national parks. The first is the on-going GEF- World Bank Project. There may be an opportunity for Dominica to request support for the establishment of a CTF as a pilot effort in the region. The other immediate opportunity is the Caribbean Development Bank Project related to the development of a National Park Service in Dominica. It would be entirely fitting to link the establishment of this new entity with the simultaneous establishment of a CTF that might be entitled a "National Parks Fund". There may be other opportunities as well through the U.S. AID financed Caribbean Open Trade Support Program, the European Union, the FFEM (French Global Environment Facility), or other related program initiatives.

ANNEX E- PROPOSED RESEARCH, MONITORING AND TRAINING PROGRAMMES

Research programmes are identified as follows:

- The Valley of Desolation with its geological, volcanic and geothermal characteristics
- The parrot habitat areas,
- Geology and geomorphology especially detailed geology of the formation of the domes within an older crater exemplified between the Freshwater Lake and the Emerald Pool
- The ecosystems on the summits of Micotrin and Trois Pitons
- Climate and hydrology
- Flora and fauna
- Volcanism especially the areas of the Valley of Desolation and the seismic activity in the southwest of the Park
- The impact of climate change on the biodiversity of the Park- Plant and animal species especially endemic plants and animals, phenology.
- Develop and implement silvicultural techniques to promote forest productivity maintain genetic diversity and promote ecosystem health via restoration

It should be noted that some baseline studies have been conducted in the Park. However, additional studies are needed to adequately characterize the present status of the Park. As such, the entire Park should be considered a “zone for research”

Monitoring Programmes

- Status of endemic plants and animals
- Trail erosion;
- Declining water quality and water level of major rivers in the Park
- Agricultural encroachment
- Visitor Impact
- Trail conditions; and,
- Condition of the Visitor Centre interpretive exhibits.
- Indications of hunting within the Park.
- Hydro-meteorological data
- Monitoring the impact of climate change on the Park through establishment of indicators
- Introduction of invasive species
- Physical and biological resources of the Park.
- Rainfall trigger values and soil moisture content required for the initiation of landslides so as to manage fresh water resources both within and exterior to the confines of the Park.

Proposed training programme

- Train staff responsible for monitoring and collating climate data
- Train staff and communities in silvicultural techniques to promote forest productivity
- and maintain genetic diversity
- Data management
    - Instrumentation and processing large quantities of data
    - Data storage and retrieval
    - General maintenance and troubleshooting

APPENDIX F- BIRDS FOUND IN THE MORNE TROIS PITONS NATIONAL PARK

SPECIES	*SCIENTIFIC NAME*	*REMARKS*
Blue-headed Hummingbird	*Cyanophaia bicolor*	*2-island endemic*
Purple-throated Hummingbird	*Eulampis jugularis*	
Antillean crested Hummingbird	*Orthorhyncus cristatus*	*Regional Endemic*
Green-throated Hummingbird	*Sericotes holosericeus*	
Osprey	*Pandion haliaetus*	*Migrant*
Broad-winged Hawk	*Buteo platypterus*	
Yellow Warbler	*Dendroica petechia*	
Plumbeous Warbler	*Dendroica plumbea*	*2-island Endemic*
Blackpoll Warbler	*Dendroica striata*	*Migrant*
Green Heron	*Butorides striatus*	
Cattle Egret	*Bubulcus ibis*	
Little Blue Heron	*Egretta caerulea*	
Great Egret	*Egretta albus*	*Migrant*
Yellow-crowned Night Heron	*Nycticorax violaceus*	
Bananaquit	*Coereba flaveola*	
Grey Kingbird	*Tyrannus dominicensis*	
Mangrove Cuckoo	*Coccyzus minor*	
House Wren	*Troglodytes aedon*	
Blue-winged Teal	*Anas discors*	*Migrant*
Ruddy Quail-Dove	*Geotrygon montana*	
Red-necked Pigeon	*Columba squamosa*	
Common Ground Dove	*Columbina passerina*	
Zenaida Dove	*Zenaida aurita*	
Red-necked Parrot	*Amazona arausiaca*	*Endemic to Dominica*
(Imperial Parrot)	*(Amazona imperialis)*	**(Endemic; present in MTPNP)*
Blue-hooded Euphonia	*Euphonia musica*	
Ruddy Turnstone	*Arenaria interpres*	*Migrant*
Spotted Sandpiper	*Actitis macularia*	*Migrant*
Ringed Kingfisher	*Ceryle torquata*	
Caribbean Elaenia	*Elaenia martinica*	
Lesser Antillean Pewee	*Contopus latirostris*	*Regional Endemic*
Lesser Antillean Flycatcher	*Myiarchus oberi*	*Regional Endemic*
Lesser Antillean Swift	*Chaetura martinica*	*Regional Endemic*
Black Swift	*Cypseloides niger*	
Barn Swallow	*Hirundo rustica*	*Migrant*

Bank Swallow	*Riparia riparia*	*Migrant*
Scaly-breasted Thrasher	*Margarops fuscus*	
Pearly-eyed Thrasher	*Margarops fuscatus*	
Trembler	*Cinclocerthia ruficauda*	
Forest Thrush	*Cichlherminia lherminieri*	
Rufus-throated Solitaire	*Myadestes genibarbis*	
Black-whiskered Vireo	*Vireo altiloquus*	
Black-faced Grassquit	*Tiaris bicolor*	
Lesser Antillean Bullfinch	*Loxigilla noctis*	*Regional Endemic*
Streaked Saltator	*Saltator albicollis*	
Common Moorehen	*Gallinula chloropus*	
Sora Rail	*Porzana carolina*	*Migrant*
American Coot	*Fulica americana*	*Migrant*

APPENDIX G - LIST OF PERSONS INTERVIEWED

David Williams, the National Parks Superintendent, Forestry and Wildlife Division

Ronald Charles, Head, Forest Protection Unit

Cyril John, Forester 1 -Forestry

Bertrand Jno. Baptiste,

Stephen Durand

Esther Thomas, Permanent Secretary of Tourism

Lloyd Pascal, Head of the Environmental Coordinating Unit

D. Lestrade, Director- Department of Lands and Surveys

Wallace James, Focal Point SPAAC Project Dominica

Annie Edwards, Senior Physical Planning Officer

Arlington James, Head Research-Forest Officer

Errol Harris, Consultant, Past Manager, /Compact Project,

Dominica Land Owners, Syndicate

Philbert Samuel - Dominica Fire & Ambulance Services

APPENDIX H - LIST OF PARTICIPANTS/ NATIONAL CONSULTATION

Registration

FULL NAME	ORGANISATION/ADDRESS	CONTACT #	EMAIL
Marshall Alexander	Dominica meteorological service	449-1190	metoffice@cwdom.dm
Betty Perry Fingal	P.O. Box 1915	449-0859	bfingal@cwdom.dm
Julietta Richards	Cockrane Village Council	245-5461	julietterichards@hotmail.com
Raphael Carbon	Bellevue Organic Group/MOA extension	265-7476	
Mareus Thomas	Bagatelle Village Council	225-7744	
Collin Guiste	E C U	448-4577	collincg@gmail.com
Gwennie Dickson	DOWASCO	255-2911	g.dickson@dowasco.dm
Jacqueline Andre	Forestry Wildlife & Parks	266-5857	asstforestofficer@cwdom.dm
Ashton Lugay	Forestry Wildlife & Parks	266-5857	asstforestofficer3@cwdom.dm
Hilroy George	Grandbay Tourism Development Committee, G T E C Grand bay	295-4267	
Lauretta Smith	Boetica village	225-9158	nadinelaurettasmith@gmail.com
Cyrille John	Forestry	265-4146	Johncab3@hotmail.com
Eric Hypolite	W N T – Ministry of Agriculture	276-4252	forestry@cwdom.dm
Errol Harris	DOMSETCO	448-4091	errolmar@cwdom.dm
Marcella Harris	DOMSETCO P.O.Box 939	235-4091	errolmar@cwdom.dm
Marshall Alexander	Met. Office	225-6995	marshallalexander@hotmail.com
Evelyn Vidal	Salisbury	276-6309	

Appendix I - Hydro-meteorological Monitoring - List of Instruments and Hardware

No.	Instruments / hardware	Global Water
		Unit cost
1	Weather Station	3,235.00
1	Mounting Tripod	292.00
1	Solar Radiation Sensor	807.00
1	Soil Moisture Sensor	291.00
1	Barometric Pressure Sensor	426.00
2	Recording Rain Gauge	918.00
1	Satellite Telemetry System	2,047.00
1	Ultrasonic Water Level Recorder	856.00
1	Boost Regulator+Water Level Logger+Enclosure	600.00
2	Solar Panels	734.00
		$ 10,206.00 = 27,722.56

(Reference Shawn Boyce- Assessment of Hydro- meteorological Sensors to Support Dominica's National Park Management- Final report-)