Barbados National Action Programme to Combat Desertification and Land Degradation, and to Mitigate Against the Effects of Desertification, Land Degradation and Drought

United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/ or Desertification, Particularly in Africa

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FOREWORD

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GLOSSARY

Aquifer. A rock that will hold water. Bore holes can be drilled into the rock to access the water.

Biodiversity. The totality of genes, species and ecosystems in a region.

Buffer Zones. Vegetated strips of land that are intended to screen ecosystems from impacts.

Community. A geographical place where people live and work.

Conservation. The management of human use of the biosphere so that it may yield the greatest sustainable benefit to current generations while maintaining its potential to meet the needs and aspirations of future generations.

Desertification. The degradation of land in arid, semi-arid and dry sub-humid zones. Desertification is due to the combined effects of climatic variations and human activities.

Drought. A long, continuous period of dry weather. **In Barbados a drought year is defined as a year in which the annual rainfall recorded is less than 42 inches (1100 mm).**

Ecology. The scientific study of the interactions of living things and their environment.

Ecosystem. A dynamic complex of plant, animal, fungal, and micro-organism communities and their associated non-living environment interacting as an ecological unit.

Ecotourism. Travel undertaken to witness sites or regions of unique natural or ecological quality or the provision of services to facilitate such travel.

Environmental Impact Assessment. Process by which the potential benefits and negative impacts of proposed projects are evaluated as an integral part of planning the project, alternatives are analysed, mitigation measures identified and the general public is given opportunity to comment.

Fauna. All of the animals found in a given area.

Flora. All of the plants found in a given area.

Geographic Information Systems (GIS). This is a database, which relates spatial data (maps) with its attribute data (characteristics). A GIS can be computerized and the database queried using two variables and the required information can be extrapolated.

Gully. An incised water-worn channel. Particularly common in sub-humid and semi-arid

regions.

Habitat. The environment in which an organism lives. Habitat can also refer to organisms and physical environment in a particular place.

Indigenous/ Native Species. Plants, animals, fungi, and micro-organisms that occur naturally in a given area.

Intellectual Property Rights (IPR). A right enabling an inventor to exclude imitators from the market for a limited time.

Land Degradation. The wearing down of the land surface and an attendant loss of productivity as a result of natural or anthropogenic factors.

Non-governmental Organisation (NGO). A non-profit group or association organised outside of institutionalised political structures to realise particular social objectives (such as environmental protection) or serve particular constituencies (such as indigenous people). NGO activities range from research, information distribution, training, local organisation and community service to legal advocacy, lobbying for legislative change, and civil disobedience. NGO's range in size from small groups within a particular community to huge membership groups with a national or international scope.

Protected Area. A legally established area under public or private ownership that is regulated and managed to achieve specific conservation objectives.

Saline Intrusion. The flow of salt or brackish water into areas previously occupied by freshwater. Generally as a result of over-abstraction of freshwater.

Sustainable Development. Development that meets the needs and aspirations of the current generation without compromising the ability of future generations to meet their own needs and aspirations.

ACRONYMS

ADP	Agriculture Area Development Plan
BADMC	Barbados Agricultural Development Marketing Corporation
BAMC	Barbados Agricultural Management Company
BAS	Barbados Agricultural Society
BWA	Barbados Water Authority
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Community
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CITES	Convention on International Trade in Endangered Species
CPACC	Caribbean Planning for Adaptation to global Climate Change
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ESA	Environmentally Sensitive Areas
EU	Environmental Unit
EWS	Early Warning System
FAO	Food and Agricultural Organisation
GEF	Global Environment Facility
GIS	Geographical Information System
GM/UNCCD	Global Mechanism/United Nations Convention to Combat Degradation
GTZ	Gesellschaft fur Technische Zusammenarbeit
IAF	Inter-American Foundation
IFAD	International Fund for Agricultural Development
IICA	Inter-American Institute for Cooperation on Agriculture
IPCC	Intergovernmental Panel on Climate Change
IRDP	Integrated Rural Development Programme
KAP	Knowledge Attitudes and Perception
LDAC	Land Degradation Advisory Council
LDCU	Land Degradation Coordination Unit
LIS	Land Information System
MA	Ministry of Agriculture
MEA	Multilateral Environmental Agreement
MEWD	Ministry of Environment, Water Resources & Drainage
NAP	National Action Programme
NBSAP	National Biodiversity Strategy and Action Plan
NCC	National Conservation Commission
NCSD	National Commission on Sustainable Development
NFP	National Focal Point
NGO	Non-Governmental Organisation
NSP	National Strategic Plan
PDP	Physical Development Plan
PISLM	Partnership Initiative on Sustainable Land Management
RDC	Rural Development Commission

RIOD	Reseau Internationale de ONGs pour la Desertification
SCU	Scotland Conservation Unit
SIDS	Small Island Developing States
TCDPO	Town and Country Development Planning Office
TCP	Technical Cooperation Programme
TDP	Tourism Development Programme
UNCED	United Nations Conference on Environment and Development
UNEP	United Nation Environment Programme
UNEP/ROLAC	United Nations Environment Programme/Regional Office for Latin America and the Caribbean
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
UWI	University of the West Indies

1.0 Introduction

The global impacts of desertification and land degradation prompted the United Nations Organization to adopt the United Nations Convention to Combat Desertification and Drought (UNCCD) in 1994. Barbados ratified the UNCCD on May 14th, 1997. Under the UNCCD all parties to the Convention are expected to prepare and implement a National Action Programme (NAP).

Barbados is a small country with a high population density and a long history of combating land degradation. The natural vegetative cover of Barbados consisted primarily of tropical forests, with grassland areas in the northern and south-eastern regions of the island. The island was settled by Europeans in 1627 and by 1657 it was estimated that as much as 80% of the traditional vegetative cover was removed to facilitate large scale commercial agriculture.

Land degradation in Barbados has been accelerated by a number of natural and anthropogenic factors including geology, climate, agricultural practices and settlement patterns. Barbados has been tackling land degradation since the 1680's, with some success. The island is now taking a more holistic approach, founded upon the principles of sustainable development as Barbados has adopted sustainable development as the concept governing natural resource use. The NAP is being developed out of this multi-sectoral approach.

The NAP spells out the critical activities to comprehensively and holistically address land degradation in the Barbadian context. To facilitate a greater understanding of the situation the NAP presents a definition of key terms; a discussion on the importance of land to national development; an understanding of the Barbadian environment and land degradation and drought; the role of the UNCCD; a description of relevant measures taken to date; an examination of some successes; an analysis of some of the challenges ahead; and proposed imperatives for action.

1.1 Implementing the UNCCD in Barbados – a rationale

On May 14th, 1997 Barbados signed the United Nations Convention to Combat Desertification and Drought. The Convention came into force for Barbados on August 14th, 1997. Some of the main reasons for Barbados becoming a party to the UNCCD include:

i. To support other countries, especially those in Africa experiencing the effects of severe drought and desertification.
ii. To adopt measures designed to reduce and/prevent the impacts of land degradation and drought at the national level
iii. To participate in the development of technologies to address land degradation and mitigate against the impacts of land degradation and drought. It is anticipated that Barbados would share experiences and technological

advancements with other affected countries for the benefit of all.

iv. To increase global awareness of the threat which desertification poses to Small Island Developing States (SIDS).

v. To access funding to assist with efforts at the national, local and community level to address desertification, land degradation and drought.

vi. To increase local awareness of the problems of desertification, land degradation and drought.

As a result of a long history of combatting land degradation as a nation, Barbados has a clear understanding of the need for the UNCCD and remains committed to the process at the national, regional and international level.

Barbados' participation in the UNCCD demonstrates Government's commitment to taking action at the local level in order to address international environmental issues. In this regard, the government has become a party to the other multilateral environmental agreements that have been formulated to remedy those environmental concerns which affect the global commons and future generations. It is Government's intention to implement the UNCCD together with these MEAs in a cost effective manner that results in the creation of synergies and enhances complementarities.

Table 1.1 Commitments to Related Multilateral Environmental Agreements (MEAs)

Convention	Date Signed	Responsible Ministry & Executing Agency
United Nations Convention on Biological Diversity (CBD)	Adopted 5th June 1992, Rio de Janeiro Entered into force 29th December 1993 Barbados became a party 10 December 1993	Ministry of Environment, Water Resources and Drainage (MEWD)
The Convention on International Trade in Endangered Species of Flora and Fauna (CITES)	Adopted 3rd March 1973, Washington Entered into force on 1st July 1975 Barbados became a party 9th December 1992	MFYSE
United Nations Framework Convention on Climate Change (UNFCCC)	Adopted 9th May 1992, New York Barbados became a party 23rd March 1994	MFYSE
The Vienna Convention for the Protection of the Ozone Layer	Barbados acceded on 20th July 1994	MFYSE
Food and Agriculture Organization (FAO) Compliance Agreement	Barbados became a party on October 26, 2000	Ministry of Agriculture

At the National level policies and programmes continue to be put in place to address desertification, land degradation and drought issues. The activities go well beyond what is required by the Convention. It is important to have these pressing concerns addressed to assist Barbados with its national pursuit of sustainable development.

1.2 The Context

The Government of Barbados has adopted certain measures at the national level aimed at mainstreaming land degradation and drought into the national development agenda. The **National Strategic Plan of Barbados 2005-2025** outlines government's overarching vision for national development over a twenty year time horizon. It contains the following relevant national objectives and strategies:

GOAL ONE

Objective 1.4 To ensure Social Justice

Strategies:
1.7 Determine the appropriate uses of land in light of the new global economy and the traditional sensitivities of Barbadians to ownership of and access to land.

GOAL THREE

Objective 1.8 To Eradicate Poverty

Strategies:
1.11 Promote and enhance rural development

GOAL FOUR

Objective 1.1 To Promote and facilitate the environmentally sustainable use of our natural resources

Strategies:
1.11 Promote sustainable land management practices

Objective 1.6 To maintain an Efficient Land-Use Policy

Strategies:
1.1 to safeguard arable agricultural land by discouraging the conversion of arable land to non-agricultural production; guiding non-agricultural uses to the Urban Corridor and minimising adverse impacts on agricultural operations;
1.4 …directing the majority of new growth to clearly defined urban corridors, rural settlements with growth potential and national park villages;
1.5 Promote and facilitate opportunities for small farm creation and increase ownership accessibility to arable lands.

GOAL FIVE

Objective 1.4 To safeguard Food and Nutrition Security

Strategies:
1.6 Define an agricultural green belt for the maintenance of a minimum critical area to facilitate food production;
1.8 Promote and institute good agricultural practices

The Barbados Sustainable Development Policy (2004) is government's attempt at incorporating the principles of sustainable development outlined in various international and regional action plans such as Agenda 21, the Barbados Programme of Action (BPOA), the outcomes of the World Summit on Sustainable Development (WSSD), the Mauritius Strategy for the Further Implementation of the BPOA, the outcomes of the Bolivian Summit on Sustainable Development and the decisions of the Forum of Ministers of Environment for Latin America and the Caribbean.

In Barbados Sustainable Development Policy contains the following relevant recommendations:

- To carry out critical assessments of existing land use policies and legislation with amendments where necessary to ensure the sustainability of the agricultural sector;
- Supporting farm and crop diversification as well as general production enhancement, through infrastructural developments and support such as sustainable irrigation where necessary; market facilities; transport services for products; and education programmes on sustainable cultivation practices;
- Supporting and encouraging farmer training programmes which build awareness of sustainable cultivation practices;
- Establishment of an effective and comprehensive data collection system and information dissemination service for the agricultural sector;
- Harness the traditional knowledge within the industry with specific attention paid to sustainable technologies and practices;
- Preserve a minimum area of vegetative cover to prevent disruption of climatic patterns as well as reduce the potential economic and environmental impacts associated with soil erosion and change in rainfall patterns arising from drastic changes in natural areas and landscapes;
- Use of GIS land use database to facilitate the coordination, collection, storage and sharing of land use information with governmental agencies and other interest groups;

1.3 Land and National Development

1.3.1 Introduction

The Property Act Cap 236 of the Laws of Barbados defines land to mean the surface of the earth, the space above it and the things below it. This legislation gives a very wide meaning to the term land which includes houses and structures; mines and minerals; land covered by water; and legal estates and interests in land. The term land resources is often used in a more restricted and narrow sense to include natural resources such as soils, minerals and a wide range of ecosystems[1]. For example the UNCCD defines land to mean the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system.

[1] Barbados State of the Environment Report (2000 : 27)

Land performs a number of inter-related roles in terms of national development that is influenced by a combination of social, economic, environmental, cultural and spiritual (amenity) values. Land is one of the critical factors of production and the lack of an abundance of land space can be an inhibiting factor to national development.

Land in Barbados is traditionally a very sensitive issue. Aided by a relatively high population density the scarcity of this natural resource has facilitated immense competition among the various development sectors in the island. This has resulted in three main national development issues:

1. Land Tenure
2. Land Suitability
3. Land Use Conflicts

1.3.2 Land Tenure

Barbados is a private-property owning democracy. Chapter 3 of the Constitution of Barbados makes provision for the protection of certain fundamental rights and freedoms. The fundamental right for the protection from deprivation of property is enshrined under Section 15 of the Constitution. Under this section the Constitution prohibits the compulsory taking of property except in certain specified circumstance.

One of the important national development issues in Barbados relates to limited access to land by a significant majority of the population. There is a strong cultural and historical desire amongst the population for property ownership. This real demand however is not easily converted into effective demand for several reasons:

Historical and Cultural Factors: The current land tenure pattern in Barbados is a direct result of its historical development. After the island was settled by Europeans in 1627 a plantation economy emerged with the large tracts of fertile areas being occupied by plantations for the production of important export crops such as sugar cane and cotton. The rocky and less fertile soils called **rab lands** were occupied by the slaves and their descendents. These rab lands have traditionally been used for residential purposes and subsistence agriculture by the descendents of Africans.

The early plantation economy has shaped the present land tenure pattern and has produced two landless classes: the landless farmers; and the plantation and urban tenantries. A significant amount of land in Barbados is occupied and used by these two groups. The landless farmers usually occupy the lands with less formal contractual arrangements and tend to practise livestock production.

The plantation and urban tenantries are usually occupied through more formal agreements and licences. This form of land tenure has restricted the tenants from building permanent structures on the land. It has given rise to a special type of house, the chattel house which is well suited to the local environment, culture and socio-economic situation. With the exception of a few urban pockets, squatting is not a major issue in Barbados.

Weak land tenure relationships may affect national development in a number of ways, for example:

- Absolute interest in land is the most secure and preferred form of land ownership which may be more easily converted into investment opportunities and development;
- Leases and Licences are a less secure form of property ownership and the financial sector may be more averse to providing credit and financial assistance in these situations;
- Leasees, Tenants and Licences are more reluctant to expend large sums of investment in property that they cannot pass on to their beneficiaries.
- Weak land tenure relationships may inhibit investment which may be necessary to maintain and sustain the quality of the resources

Cost: During the last 15 years the cost of land in Barbados has been rising at an astronomical rate for example bare land with planning permission for residential development which was worth US $0.75/sq. ft. is currently worth US$ 1.25/sq.ft. that represents a 100% increase since 1993[2]. Average building plots are currently being sold between US$ 4.0/sq. ft. and US$ 7.5/sq. ft. This cost has increased from US$ 3.0/sq. ft. in 1993. Depending on the location the average costs for beach front lands exceed US $ 50/sq. ft.

In terms of the agricultural land market there is a strong demand for this type of resource in Barbados. The cost varies depending on the size, for example, for lots less than 2 acres prices range from US$ 24,700 to US$ 61,750 per hectare (US$ 10,000 to US$ 25,000 per acre for lands close to the main city Bridgetown. In 1994/1995 it has been estimated[3] that a similar property would have cost between US$ 18,500 to US$ 30,850 per hectare (US $ 7,500 to US$ 12,500 per acre). Bare agricultural lands over 2 acres range between US $6,150 and US$ 8,650 per hectare that is, (US$ 2,500 to US$ 3,500 per acre) where no subdivision is possible. Where a residential subdivision is possible these agricultural lands sell at US $24,700 to US$ 61,750 per hectare that is, (US$ 10,000 to US$25,000 per acre).

In terms of leased land, the Barbados Agricultural Development Marketing Corporation (BADMC) has let some 24 farms/small holdings averaging 6.76/hectares (16.70/acres) where 13 of the tenants have 30 year leases and the others have no leases. The holdings 4 hectares or larger are leased at the annual rate of US$ 159/hectares (US$ 64.50/acre).

There is a strong belief that the driving force behind the steep rise in land prices in Barbados is influenced by factors including:

- strong demand by wealthy non-nationals who perceive Barbados as a tourism paradise and investment opportunity

[2] Area Development Plan (Task 8): Agricultural Land Subdivision and Land Use Planning (1999:28)
[3] Area Development Plan (Task 8): Agricultural Land Subdivision and Land Use Planning (1999:29)

- nationals residing abroad with high income levels compared with locals
- non-nationals working in high paying jobs in Barbados
- market distortions resulting from large amounts of land being held by few persons
- land speculation

1.3.3 Land Suitability

Barbados is a Small Island Developing State (SIDS) with a limited land area of 166 square miles. This represents a total land area of 43,176 hectares which must be divided among the several competing development sectors such as agriculture, settlement and allied uses, and recreational and open space. Between 1966 and 1998 some 5764 hectares (15%) of agricultural lands was lost to urban development. Approximately 51% (22,000 hectares) of the available land area in Barbados is being used for agricultural purposes[4].

In 1999 an Area Development Plan (ADP) was prepared to among other things:

- identify and classify all agricultural lands;
- assess the viability of plantations and determine a land classification;
- examine the agricultural small holdings sub-sector in terms of their contribution to agriculture, their long-term viability and the type of classification that should be applied to the small holder concentrations;
- develop a critical method for controlling the subdivision of good agricultural land, and develop agricultural subdivision policy within the context of the ADP.

In an attempt to halt the loss of arable agricultural land and to ensure the more sustainable management of lands in Barbados all the lands have been classified into five main categories in terms of their suitability for agricultural purposes.

Table 1.2. Land Class Distribution[5]

Land Class	***Area (ha)***	***Suitability***
I	3,586	Arable (Super Prime)
II (a)	6,830	Arable (Prime a)
II(b)	8,868	Arable (Prime b)
III	7,182	Arable (Sub-Prime)
IV	383	Trees of Pasture
V	5,218	Timber or Bush
Total	32,067	
Other Uses (Non-soil classes)	11,109	Urban and allied uses
Total Land Area	43,176	

Under the land suitability classification the total agricultural land resources now extend to

[4] Area Development Plan : Review of Existing Agricultural Policy Mix (1999: 6)
[5] Adapted from Area Development Plan (1999:12) – This table shows the availability of each Land Class in terms of the area in hectares.

approximately 32, 000 hectares. Of these some 19, 200 comprise Class I and II lands which are available for arable agriculture. The Class III lands (7,182 hectares) have been designated for small scale mechanised arable production or hand cultivation. The Class IV and V (5,600) have been designated for tree or pasture based production with an emphasis being place on conservation and protection.

In Barbados there is now a presumption against development of Class I, II and III agricultural lands. The ADP must be applied in harmony with the Physical Development Plan (PDP) in making physical planning decisions. There is a national agricultural subdivision policy in place to stymie attempts to allow lands to remain idle to expedite their conversion to non-agricultural purposes. These strategies will ensure the availability of a minimum area of land for agricultural purposes as part of the national development strategy and the national food security strategy.

1.3.4 Land use conflicts

One of the preferred ways of avoiding or reducing land use conflicts is through a comprehensive land use policy. Since 1970 there has been a comprehensive land use policy, the Physical Development Plan (PDP), in Barbados. The first PDP was developed in 1970 with a ten year plan period that lasted until 1985 because the PDP became operational in 1976. Barbados is currently into its third revision of the national Physical Development Plan with the most recent document having been amended in 2003[6].

The legal basis for the preparation of the PDP is the Town and Country Planning Act, Cap 240 which requires the preparation of Development Plans for the entire island or parts of the island.

The PDP is a useful planning tool that seeks to create a direct link between national development and land resources by ensuring the allocation of adequate land to support economic development, social development and environmental conservation. This is achieved by allocating land space for all economic activities including agricultural, industrial, residential, commercial and recreational land uses.

The PDP is used to ensure the orderly, progressive and proper development of land in Barbados by reducing or preventing adverse conflicts between and among competing land uses. The PDP is used to achieve positive social, economic and environment outcomes. The PDP amended 2003, has adopted the notion of sustainable development and embraces the following basic planning principles:

- emphasis on the protection of the natural environment and cultural heritage resources;
- establishment of criteria and procedures for Environmental Impact Assessments (EIA);
- a national development strategy which aims to minimize scattered urban

[6] The second PDP was prepared in 1983 and adopted in 1998.

development, by concentrating new growth into a defined urban corridor;
- protection of agricultural lands from incompatible urban development;
- promotion of a strong diversified economy through land use policies which encourage a wide variety of locations throughout the Island;

The PDP amended 2003, contains a number of social development goals aimed at addressing the following issues:

- Growth Management and Agricultural Preservation;
- Housing
- Social and Community Facilities
- Cultural Heritage

The PDP amended 2003, contains two main economic development goals:

- to promote further diversification and expansion of the national economy, while at the same time promoting the efficient use of land and the protection and conservation of significant natural and heritage features;
- to assist in the achievement of national economic development goals by ensuring that sufficient land is available to meet the needs of the various economic sectors.

The PDP amended 2003, contains three main environmental goals:

- to conserve and manage natural resources for valued ecological functions and to provide an improved quality of life for the residents and future generations of Barbados;
- to advance public awareness and appreciation of the essential linkages between the environment, quality of life and sustainable development;
- to limit the unnecessary and inefficient use of fossil fuels, by promoting environmentally friendly sustainable modes of transportation.

The PDP as a planning instrument is not governed by rigid zoning policies. The PDP is operated as a flexible guideline with a few exceptions where it is necessary in the interest of public health and safety to enforce strict guidelines[7]. In a perfect world scenario economic efficiency would expect that a scarce resource would be diverted to uses which result in maximum net benefits to the society. In Barbados the land use model may best be described as a hybrid where both market-driven and plan-led approaches co-exist.

The land space of Barbados has been divided into three main physical planning units:

1. The Urban Corridor where there is a presumption in favour of urban settlement development;
2. The Agricultural green belt where there is a presumption in favour of agricultural development interspersed with rural villages and hamlets;

[7] For example, there are strict planning zones to protect the ground water resources; and in controlling the use of lands surrounding the airport.

3. The National Park area where the presumption is in favour of resource conservation, amenity and open space development.

The PDP amended 2003, contains specific strategies consistent with the overall objectives of the three broad planning units, *viz*:

1. New settlement growth is confined to the Urban Corridor. This will ensure the preservation of a predominantly urban landscape;
2. The Agricultural green belt is protected from incompatible urban development. In addition, a minimum amount of agricultural lands have been designated for protection from conversion to non-agricultural use. This will ensure the preservation of a predominantly rural landscape ;
3. The designation and implementation of a National Park and Open Space system, including gullies. This will ensure the preservation of a predominantly open space and recreation area.

1.3.5 Land and Poverty

It has been recognised that there is a nexus between poverty and environmental degradation. Subsistence agricultural practices focus more on land resources being used as a means of survival. In that case sustainable land practices are not a priority and the agricultural practices that are used may lead to land degradation. When access to arable land is restricted it may eventually lead to the exploitation of marginal lands, illegal land use development and squatting.

In Barbados, although poverty is not a major issue Government acknowledges its eradication as an ethical, social, political, economic and environmental imperative for humankind. While the incidence of poverty is not significant in Barbados its intensity in some geographical areas is quite severe. Some 8.7% of households in Barbados are considered to be affected by poverty[8]. This translates into 7000 households living below US $ 2,752 p.a. This figure converts into approximately 35, 000 persons or 13.9% of the population. Some 62% of the poor live in non-urban areas in Barbados.

The causes of poverty are complex and multidimensional. In Barbados key variables that are used to explain poverty include lack of education, unemployment and gender. The Government has taken a strategic approach to the eradication of poverty. The National Strategic Plan 2005-2025 contains the following specific strategies:

Objective 1.4 To ensure Social Justice

Strategy 1.4

Eradicate material poverty and the marginalisation and stigmatisation of the poor through an expanded range of new social and economic opportunities.

Strategy 1.7

Determine the appropriate uses of land in light of the rules of the new global economy and the traditional sensitivities of Barbadians to ownership of, and access to, land.

[8] The Inter-American Bank (IDB) Report on Poverty and Income Distribution in 1996/1997 outlines the poverty profile for Barbados.

The Government has created a Ministry of Social Care which is mandated to, among other things, formulate and execute a poverty alleviation programme. A national poverty alleviation programme is being implemented through the Poverty Alleviation Unit of the Ministry of Social Transformation. Government has also formulated programmes to improve the livelihood of the rural poor.

A land for the landless programme has been instituted by the Ministry of Agriculture through the Barbados Agricultural Development and Marketing Corporation (BADMC). The programme provides land, mostly in the Scotland District, for lease at very low rates to landless farmers. In many ways this programme represents a challenge as it brings new persons into the Scotland District who now have to be educated on the special nature of the area and on acceptable farming and animal husbandry practices in the area.

Under Government's Land for the Landless Programme, arable land is made accessible to groups who normally lack access to lands. The beneficiaries tend to be *bona fide* farmers who are provided with access to both private and public lands through formal contractual arrangements including leases and licences. The programme tends to support enterprises that result in maximum social and economic benefits, especially within the rural areas.

One of the main objectives of the programme is to empower groups of citizens, especially those in rural areas, to meet their family needs. The programme is also intended to promote agrarian reform in the rural areas by increasing productivity through value added agricultural products.

A good example is the Spring Hall Lease Project which is a land settlement scheme designed to allow small farmers who would not normally have the opportunity, the chance to operate a farm and thereby provide income for their families. This scheme involves one Government-owned plantation with 427 acres. There are 27 farmers occupying the land where allotments range in sizes between 5-27 acres. The BADMC provides extension services to farmers involved in the rural development programme and the Spring Hall Lease Project.

The Government has created a statutory entity, the Rural Development Commission (RDC), to provide for the improvement of social amenities, assist small farmers and establish and develop cottage industries in rural areas. One of its functions is to allocate government lands to persons desirous of farming. Small farmers benefit from the programmes of the RDC through agricultural training, the provision of funding for engineering and machinery. Assistance is also given with production and marketing of produce.

The Irrigation Unit of the BADMC assists small farmers with access to water through the provision of wells and related infrastructure such as pipelines. The BADMC evolved from an Integrated Rural Development Project (IRDP) into a more sustainable programme. It manages some 11 irrigation districts throughout the island where water is sourced from 20 wells. There are approximately 7,605 service connections by 495

farmers.

1.4 The Environment

1.4.1 Location and Land Area

Barbados is the most easterly of the islands of the Caribbean, located at 13 ^{0} North, 59 ^{0} West, approximately 100 miles from the nearest landmass, against prevailing winds and currents.

The island is 34 km long and 23 km wide with a total land area of approximately 432km^{2} and an Exclusive Economic Zone (EEZ) of 167, 000 km^{2}.

1.4.2 Climate

The climate is classified as dry sub-humid with temperatures between 20 and 30^{0}C. There is a distinct dry season from December to May and a wet season from June to November. The average annual rainfall is about 50 inches (1254 mm) in the lower elevations and about 66 inches (1650 mm) in higher elevations. Most locations recieve between 56 and 60 inches of rainfall annually. The island lies on the edge of the Atlantic storm zone and apart from occasional coastal damage from storm systems, it has not been affected by a major hurricane system since Hurricane Allen in 1980, and has not been struck directly since Hurricane Janet struck the island in 1955.

1.4.3 Geologic Structure and Topography

The island is divided into distinct geologic regions. Eighty six percent of the surface area is composed of young limestone ranging in age from present day coastal reefs to the more inland limestone depsosits which have an age of between 400,000 and 800,000 years. The remaining land area is composed of older clastic sedimentary rocks, sandstones, siltstones and clays which are exposed in an inlier to the north east of the island where limestone only occurs as erratic blocks or as small irregularly scattered patch reefs.

The limestone was deposited as a series of coastal reefs which were individually uplifted as the island slowly gained elevation over the last 800,000 years. From the central section of the island, down to the west and south coasts, the limestone generally exhibits a cliff and terrace type topography, with there being two major cliffs, the first and second high cliffs, illustrated in **Figure 1**.

Generally these limestone lands do not show much relief and are gently rolling. They are however broken by a set of radially trending dry gullies which start in the central section of the island and run radially to the coast.

The older clastic sediments range in age from Lower Middle Eocene (approximately 55 million years old) to Upper Miocene (about 5 Million years old). These sediments are

less resistant than the limestone and are very susceptible to subaerial erosion. They have therefore been cut into a series of ridges and valleys to give a dissected, badland type topography in many areas of the Scotland District region in Barbados[9].

The older rocks are highly folded and faulted, and are ovelain by the younger limestone, which is essentially structureless.

Inspite of the above, the island is relatively flat, with the highest point being Mount Hillaby at 336m (1, 104 ft). There is little surface water on the island, with small surface streams found primarily in the Scotland District. The island is therefore almost completely dependent on groundwater abstracted from the aquifer underlying the island.

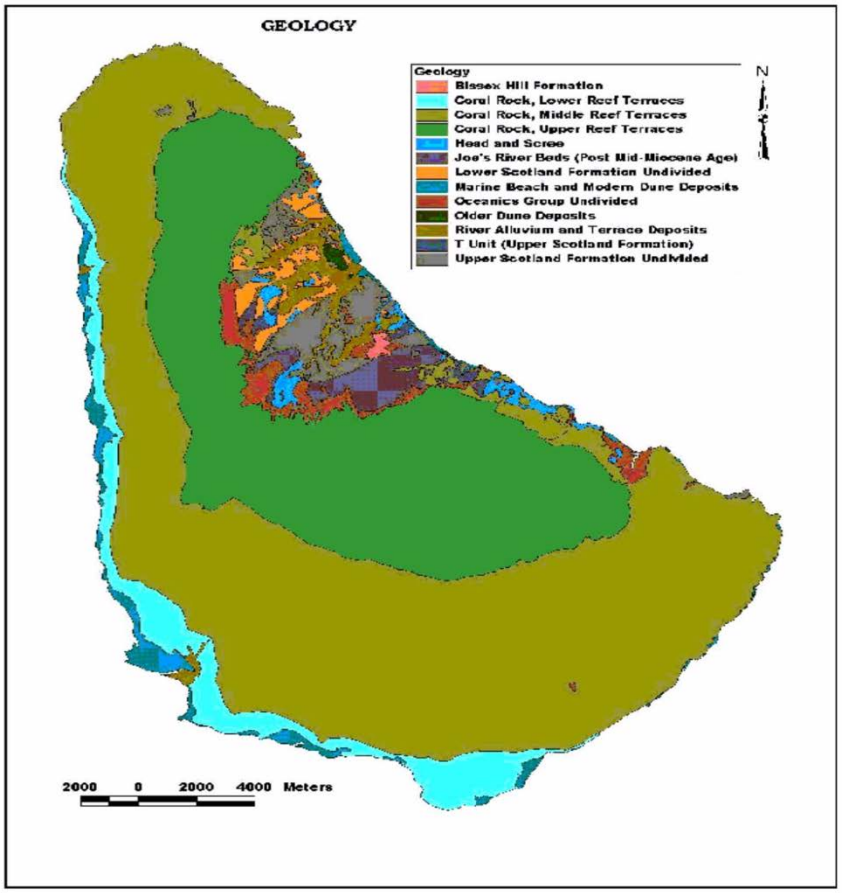


Figure 1. The Geology of Barbados

1.4.4 Water

[9] The Scotland District region represents an inlier – that is a geological feature where older rocks are surrounded by younger rock.

Barbados' freshwater supply is primarily a function of the climate and the physical geological conditions. Groundwater accounts for the largest proportion of the island's water resources which supply approximately 79% of the public water supply. The groundwater resources contribute 98.6% of the island's potable water supply.

Fresh water occurs in Barbados in a coastal, phreatic (water table type) acquifer. The coral limestone is the water bearing rock (the acquifer) and this overlies a thick clay formation, called the Oceanics Formation, which provides the aquiclude. Precipitation percolates through the limestone and ponds at its base on top of the Oceanics. The encroaching sea water also helps to keep the freshwater ponded at the coastline.

Fresh water therefore occupies the coastal belt (where the Limestone Formation occurs) as a thin lens between 15 to 30 metres thick. This fresh water lens grades into brackish water and eventually the underlying sea water. There is a delicate balance between the out-flowing freshwater and the encroaching sea water, which if disturbed by anthropogenic activity, can be the most serious threat to the island's water supply.

The main anthropogenic threat is overpumping of the fresh water lens which may lead to saline intrusion. One natural threat is a rise in sea level such as would be triggered by climate change or eustatic adjustments.

In recent years however Government has been utilising brackish water and sea water in desalination plants to augment both the potable and irrigation water supply. This will require careful management if it is to be expanded.

Barbados has consistently been ranked among the ten most water scarce countries in the world. An analysis of 47 years of data has indicated that the annual renewable freshwater resources of Barbados stand at 225, 410 m^3 or 49.59 mgd (million gallons per day). These figures fall well below the 1, 000 m^3 per capita set internationally as the limit below which a country is classified as "water scarce". A 1978 study estimated that, under an average annual rainfall conditions of 60 inches, a total of 54.79 mgd is available and 34.37 mgd in a drought year with a recurrence interval of 1 in 15.

Table 1.3. Water Scarce Countries

Country	Renewable Water Resource	Country	Renewable Water Resource
Djibouti	**23 m^3 / capita/ year**	**Isreal**	**461 m^3 / capita/ year**
Kuwait	**75 m^3 / capita/ year**	**Tunisia**	**540 m^3 / capita/ year**
Barbados	**300 m^3 / capita/ year**	**Kenya**	**636 m^3 / capita/ year**
Saudi Arabia	**306 m^3 / capita/ year**	**Algeria**	**689 m3 / capita/ year**
Jordan	**327 m^3 / capita/ year**	**Somalia**	**980 m3 / capita/ year**

1.5 The Socio-Economic Factors

Barbados boasts one of the highest levels of education in the world with an estimated literacy rate of 95%. Primary and secondary education is mandatory and free. Tertiary education is not mandatory, but is free.

Barbados also boasts an excellent health care system based on the principal of universal access to health care by free delivery of services to all sectors of the population, covering medical, dental and opthalmic care.

Barbados has an open economy with a very narrow range of exports, and a heavy dependence on imported goods. Even after the decline of the slave trade and the abolition of slavery agricultural production continued to dominate the economy of Barbados until well into the twentieth century. The importance of agriculture to the economy has however declined since the 1960's, but remains important. There is also a viable textile sector and the offshore sector continues to expand. The expansion of the tourism sector has however been the primary engine of economic growth in Barbados over the last few decades. This trend is expected to continue over the forseeable future.

The recent worldwide growth in eco-tourism and the movement toward the establishment of a Barbados National Park System would both seem to support a shift to a more sustainable paradigm with respect to further development of the tourism infrastructure on the island, but would also indicate greater use of the more fragile ecosystems represented by the Scotland District and the gullies of Barbados.

1.5.1 Human Settlement

Barbados has been settled by Amerindian peoples and subsequently by Europeans, who displaced the Amerindians and established a plantation agricultural system. The system was based on a slave labour system and peoples were brought from the African continent to work as slaves on the plantations of Barbados. Descendents of the former slaves continue to represent the predominant population of the country.

In 1998 the population stood at approximately 266, 800 persons, comprising 48.1% males and 51.9% females. Life expectancy at birth for males and females in Barbados is 72.9 and 77.4 years, respectively. The average rate for population growth was 0.3% between 1980 and 1999.

Of significance, the population density in the Scotland District has always been lower than in other parts of the country, and the population of the Scotland District has continued to decline steadily over the last decade. This trend is expected to continue over the forseable future.

Table 1.4. Parish Population and Population Projections

	Population (by year)				Change
Parish	**1990**	**1997**	**2005**	**2010**	**1997-2010**
St. Michael	**97, 516**	**95, 600**	**92, 300**	**87, 900**	**- 7, 700**
Christ Church	**47, 050**	**51, 300**	**55, 900**	**60, 000**	**8, 700**
St. George	**17, 905**	**18, 100**	**18, 100**	**17, 800**	**- 300**
St. Philip	**20, 540**	**21, 700**	**22, 800**	**23, 600**	**1, 900**
*** St. John**	**10, 206**	**9, 900**	**9, 400**	**8, 800**	**- 1, 100**
St. James	**21, 000**	**24, 200**	**28, 100**	**32, 100**	**7, 900**
St. Thomas	**11, 590**	**11, 800**	**11, 900**	**11, 800**	**0**
*** St. Joseph**	**7, 619**	**7, 400**	**7, 100**	**6, 700**	**- 700**
*** St. Andrew**	**6, 346**	**6, 000**	**5, 600**	**5, 100**	**- 900**
St. Peter	**11, 263**	**11, 300**	**11, 200**	**10, 900**	**- 400**
St. Lucy	**9, 455**	**9, 600**	**9, 600**	**9, 500**	**- 100**
Barbados	**260, 491**	**266, 900**	**272, 000**	**274, 200**	**7, 300**

* Parish with a large portion of land area comprised of the Scotland Series

2.0 The Status of Land Degradation and Drought

2.1. The NAP Preparation Process

The Ministry of Environment, water Resources and Drainage is the national focal point for the United Nations Convention to Combat Desertification and Drought (UNCCD). Shortly after the Government of Barbados became a party to the UNCCD the Ministry responsible for Environment took certain key actions to facilitate the implementation of the Convention including:

- The designation of an officer with responsibility for overseeing the implementation of the UNCCD;
- The formulation of a National Work Programme for the implementation of the UNCCD; and
- The establishment of a Cabinet-appointed multi-disciplinary advisory committee with responsibility for advising government on matters related to the implementation of the UNCCD.

The Land Degradation Steering Committee was established in 1997 and comprised representatives of the following agencies:

- Environmental Unit, Ministry of Physical Development and Environment (MPE)[10]
- National Conservation Commission, MPE
- Coastal Zone Management Unit, MPE
- Ministry of Agriculture (MAR)
- Soil Conservation Unit, MAR
- Ministry of Foreign Affairs
- The Meteorological Department
- The Barbados Water Authority; And
- The Barbados Agricultural Society

In May – June 1999, the Government of Barbados in association with the UNCCD Secretariat convened a National Consultation on Land Degradation, Desertification and Drought. The Consultation provided a forum for all interested stakeholders to meet to develop a Strategy and to elaborate on Action Plans to address land degradation in Barbados.

The meeting identified three priority areas for further development of thematic action plans, namely agriculture, settlement and resource use and conservation. The thematic actions were incorporated into a draft comprehensive Strategy and Action Plan. The plenary session of the consultation reviewed each sector plan and the meeting decided that due to the interconnectivity of the issues full coverage would be provided for all matters.

[10] The designation of the Ministry has been changed to the Ministry of Energy and Environment in February 2006 now Ministry of Environment, Water Resources and Drainage in 2008.

Smaller work groups were established to develop a strategy and action plan using the following agreed format:

1 The Vision, Aims and Objectives
2 Identification of Key Actions
3 Identification of Key Agencies, Stakeholders and Individuals; and
4 A Proposed Timeframe for Implementation

In addition relevant background information was distilled from a preliminary presentation session that presented current information and resource materials on the following topics:

- Macro-Environmental Policy for the Scotland District;
- Historical and Current Assessment of Land Degradation in the Scotland District;
- Current Land Use – Specific Focus on Agriculture;
- Water Resources Issues, Climatic Variations and Drought, Community Involvement in Habitat Rehabilitation Activities.

The main outcome document of the consultation was a draft National Action Programme (NAP) for Barbados which was prepared in 2002. The national focal point spent the next several years trying to source necessary funding to finalise the draft National Action Programme. After leveraging necessary financial resources in late 2005 processes were put in place to have the draft NAP finalised.

In this regard, a National Consultation was convened on September 8, 2005 with the main objective to review the draft NAP and make recommendations for it to be updated and finalised. Participants were drawn from all the relevant stakeholders including government, civil society and all the major groups.

Three presentations were made to give an overview of the NAP process and status report on the draft NAP. The meeting was then divided into three multi-disciplinary focus groups to identify:

1. the factors contributing to land degradation and drought;
2. practical measures necessary to combat land degradation; and
3. practical measures necessary to mitigate the effects of drought.

Each focus group was also responsible for conceptualising possible projects to assist with the implementation of the UNCCD. The output information from the consultation has been used to complete the National Action Programme.

The legislative mandate for the preparation of national action programmes is derived from the United Nations Convention to Combat Desertification and Drought (UNCCD) in particular Articles 9 and 10. Article 10 of the UNCCD outlines the purpose of the NAP; the Content of the NAP (mandatory and discretionary); and specified priority fields. These guidelines were generally adhered to during the preparation of the Barbados NAP.

The United Nations Convention to Combat Desertification sets out a number of clear procedures for elaborating commitments, both by countries experiencing serious drought

and/ or desertification, in the form of national, regional and/ or sub-regional action programmes. The basic strategy for the action programmes flow from the objectives of the Convention.

The methodology for National Preparatory Activities calls for a phased approach as outlined as follows.

Phase 1	**Collection of basic information at the local level**
Phase 2	**Consultations and Strategy Identification**
Phase 3	**Preliminary Action Programme/ National Roundtable**
Phase 4	**Preparation of final action programme and report to the INCD**

The NAP preparation process benefited from the availability of a wealth of local knowledge and information that existed among the various stakeholders and resource users. This information has been collected and analysed by a variety of groups and individuals including government agencies, quasi-government agencies, private sector organisations, NGOs and CBOs, research/ educational institutions, regional and international organisations.

2.1.1 Definitions

Article 1 of the UNCCD defines the following critical terms:

- Land means the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system.
- Land Degradation means reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a combination of processes, including processes arising from human activities and habitation patterns such as:
    a. Soil erosion caused by wind and/or water;
    b. Deterioration of the physical, chemical and biological or economic properties of soil; and
    c. Long-term loss of natural vegetation.
- Drought means the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems.

2.2 Land Degradation and Drought in Barbados

2.2.1 The State of Land Degradation

Land degradation in Barbados has been recorded since the 1600's and is contributed to by the natural and anthropogenic factors referred to. These include:-

1) Natural

a) Geology
   i. Soils
   ii. Slopes
   iii. Strata Orientation

b) Climate
   iv. Rainfall

2) Anthropogenic

a) Mining
b) Culture
c) National Economy
d) Settlement
e) Deforestation
f) Agriculture
g) Grazing/ Animal husbandry
h) Fire

Geology has been a major factor in causing land degradation in Barbados, in particular in the Scotland District region. With the uplift of the island and the subsequent removal of the coral limestone cap in its north-eastern section, the softer underlying clastic sediments (shales, sandstones, clays) have been exposed to subaerial processes, erosion, weathering and mass movement.

The Joes River mudstones, a diapiric intrusion which is exposed at the surface, occupies the central section of the Scotland District area. This formation is soft, oily, structureless mudstone and sandstone, which is very susceptible to erosion.

Additionally, the oceanic clays directly underly the limestone cap rock and these tend to be exposed in the apex of the island at Mount Hillaby and Chimborazo both around 335 metres (1100 ft).

The Scotland District region includes the highest part of the island and therefore the steepest slopes. In addition it receives the highest rainfall with totals of 1524 to 2286 mm (60 to 90 inches) per annum.

The major factors which therefore contribute to and accelerate subaerial erosion (steep slopes, high rainfall and non-resistant rocks) are all present in the higher sections of the Scotland District. This has resulted in the Scotland District now charaterised by a "badland" type topography.

In addition to the geological charateristics, man-made activites such as inappropriate agricultural practices which include as over-grazing and cross-contour ploughing have had a significant impact. There has also been almost complete deforestation over the last three centuries leaving much of the steep slopes exposed. Illegal settlement and

construction has also contributed to destabilising the slopes in the Scotland District, through the increased weight of the structures and the introduction of water (waste disposal).

Table 2.1. Soil Erosion in The Scotland District (tons/ ha/ year) (24 m^3 plots)

Bare Plots				
Year	**Clays**	**Loams**	**Muds**	**Sands**
1985-1986	436.1	89.56	26.86	9.51
1986-1987	760.07	359.65	94.01	97.20
1987-1988	223.13	175.24	39.24	22.28
1988-1989	158.6	158.2	130.51	46.12
1989-1990	20.05	101.46	3.3	2.43
Grassed Plots				
1985-1986	67.19	33.63	0.06	0.01
1986-1987	7.45	2.2	0.58	2.35
1987-1988	10.18	0.84	0.05	0.53
1988-1989	42.63	1.63	0.67	1.56
1989-1990	3.19	0.18	0.26	1.05

2.2.2 Land Degradation in the Limestone Region

Over the last 350 years efforts to combat land degradation have centred on the Scotland District, however in recent years more focus has been brought to bear on the issue of soil loss and land degradation in the limestone areas of the country as well. Changing land use practices and the application of inappropriate agricultural techniques have also resulted in significant and visible loss of soils in the limestone areas of the country.

Some of the factors affecting land degradation in the limestone areas are:

- The reduction in acreage allocated to sugar cane cultivation;
- The removal of khus khus grass hedges;
- The frequent brush and cane fires leaving exposed soils

2.3 Scope of the National Action Programme

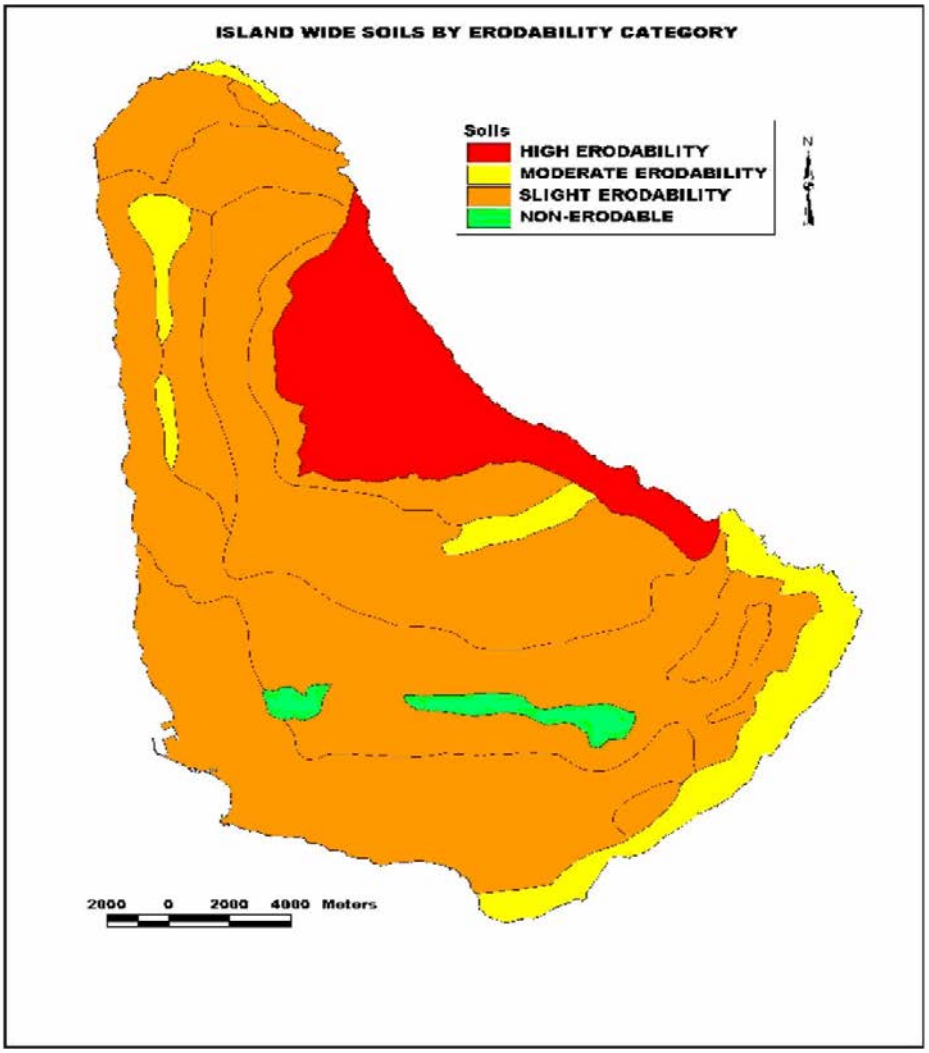
Although the Limestone region of Barbados represents the significant majority (86%) of the land surface, the National Action Programme will initially focus on addressing land degradation in the Scotland District (14% of surface area) for the following reasons:

- The scale and nature of land degradation is by far more significant in the Scotland District; and
- The social, economic and environmental impacts of land degradation are not as pressing in the limestone region.

The UNCCD requires that the National Action Programme should also seek to prevent

the impacts of land degradation and drought from spreading to areas that are not currently affected by these conditions. In this regard the Barbados National Action Programme will eventually cover the entire island however it will be undertaken using a phased approach. Intially consideration will focus more on mitigative and remedial strategies for the Scotland District. At a later stage a detailed assessment will be undertaken of the limestone area with a view to preventing scotland district type land degradation from spreading to a national scale.

Figure 2. Soil Erodability in Barbados



2.4 The Status of Drought in Barbados

As mentioned previously, Barbados is among one of the ten most water scarce countires in the world, and as a result has a long history of dealing with drought conditions. The frequency of drought in Barbados is about 3 in 10 years and has been related to El Nino occurences. In recent years drought has been recorded in 1982, 1986, 1993, 1994 and 1997.

In Barbados domestic fresh water, which is pumped from underground aquifers, is dependent on rainfall recharge to those aquifers. Rainfall from one rainy season becomes available for abstraction the following year. Drought and prolonged over-abstraction reduces the amount available for the next year and increases the chances of saline intrusion.

Table 2.2. Available Water Resources

Source	***1978 Study***[11]				***1996 Study***	
	Average Rainfall Conditions (60")		**1 in 15 Design Drought Year**		**Average Rainfall Conditions (56")**	
	m3 / day	**(Mgd)**	**m3 / day**	**(Mgd)**	**m3 / day**	**(Mgd)**
Groundwater	**205, 773**	**45.27**	**137, 183**	**30.18**	**202, 591**	**44.57**
Surfacewater	**32, 682**	**7.19**	**13, 136**	**2.89**	**15, 909**	**3.50**
Springwater	**8, 182**	**1.80**	**5, 909**	**1.30**	**5, 455**	**1.20**
Wastewater*					**30, 018**	**6.60**
Runoff	**2, 409**	**0.53**	**0.00**	**0.00**	**1, 455**	**0.32**
Total	**249, 046**	**54.79**	**156, 227**	**34.37**	**225, 410**	**49.59**

Mgd = Imperial million gallons per day
*** = From Sewerage Systems. Not considered in the 1978 Study**
Domestic Users (including unaccounted-for-water) account for more than 60% of the total water abstracted. Drought therefore impacts on these users first.

Table 2.3. Water Usage (1996) and Projected Water Demand for 2016

Use by Category	***Consumption 1996***			***Demand 2016***	
	M^3 / day	(Mgd)	%	m^3 / day	(Mgd)
Domestic (metered & unmetered)	48, 681	10.71	22.00	51, 337	11.29
Industrial and Commercial	16, 955	3.73	7.66	17, 460	3.84
Hotels and Ships	5, 200	1.14	2.34	10, 821	2.38
Agriculture	52, 091	11.46	23.54	63, 545	13.98
Golf Course Irrigation	2, 458	0.54	1.11	14, 182	3.12
Unaccounted-for-water	95, 973	21.11	43.35	30, 282	6.66
Total Consumption	**221, 358**	**48.69**	**100.00**	**187, 627**	**41.27**

[11] Stanley Associates Engineering Ltd. of Canada

2.5 The Existing Governance Structure

There is no single agency with sole responsibility for implementing all of the obligations of the UNCCD. In 1997 the Cabinet of Barbados approved the establishment of a multi-disciplinary committee to oversee the implementation of the convention in the island. The members of the Committee are listed in Table 2.4. .

The Environmental Unit in the Ministry of Environment, water Resources and Drainage, as national focal point for the UNCCD, has the lead role to play in coordinating the committee. The Environmental Unit also functions as the secretariat for the Committee. As UNCCD focal point the Environmental Unit also performs an important technical role which involves liaising with the regional and international organisations and community. The other members of the Committee represent technical agencies which provide specialised technical and scientific support in respect of their area of legal and other mandates.

Table 2.4 Members and Function of the Land Degradation Committee

Agency	*Type*	*Mandate*	*Focal Area*	*Legislation*	*Policies*	*Programmes or Projects*
Environmental Unit, Ministry of Environment, Water Resources and Drainage (MEWD)	Gov't	Environmental Policy, education and public awareness.	National Focal Point for several MEAs	Draft Environmental Management Act	Draft Environmental Management Plan	National Land Degradation Work Programme
Coastal Zone Management Unit, (MFYSE)	Gov't	Protection and management of the coastal zone area.	Technical and scientific information on the coastal zone	Coastal Zone Management Act	Coastal Zone Management Plan	
National Conservation Commission, (MFYSE)	Gov't	The maintenance of parks, beaches and open spaces.	Protected Areas Management	NCC Act		
Ministry of Agriculture and Rural Development (MARD)	Gov't	Management of the Agricultural Sector – maintaining food security and efficient use of natural resources	Agriculture	- Plant Pest & Disease Act - Pesticides Control Act - Pesticides (Import Control) Control Labeling of Pesticides Regulations		

Agency	*Type*	*Mandate*	*Focal Area*	*Legislation*	*Policies*	*Programmes or Projects*
				- Plant Pest & Disease (Eradication) Act - Pesticides Control Regulations		
Soil Conservation Unit, (MARD)	Gov't	Addressing the special problems of the Scotland District region of Barbados	- Reduction in landslides - control of surface drainage - rehabilitation of degraded and unproductive lands -reduction of infrastructure damage	Soil Conservation Act		Forestry: - reforestation & afforestation - stabilisation of eroded land - propagation of agro-forestry and forestry related species
Ministry of Foreign Affairs	Gov't	Foreign Policy, relations and negotiations	Functions as the political focal point for all MEAs.	None		
Meteorological Services Department, (MARD)	Gov't	Provide meteorological and hydrological services	Weather and Climate	None		
The Barbados Water Authority, (BWA)	Gov't	Protection, management and distribution of water	Water Resources	Barbados Water Authority Act		
Barbados Agricultural Society (BAS)	Non-Gov't	To coordinate Agricultural Producer Groups	It functions as secretariat for seven agricultural commodity groups.	Agricultural Society Act 1890		

Additionally, there are a plethora of entities which have responsibility for different aspects of sustainable land management in the island as shown in Table 2.5 below. It shows a fragmented institutional framework with each agency focusing on a specific technical issue. This approach tends to inhibit coordination and integration of decision-making.

Table 2.5. Institutional Framework

Agency	***Responsibility***	***Scope***
Ministry of Agriculture & Rural Development	Overall management of the agricultural sector	National
Soil Conservation Unit	Addressing special problems of the Scotland District	Scotland District region
Forestry Department	To stabilise, improve physical structures and conserve soils within the Scotland District	Scotland District region
Meteorological Services	Meteorological and hydrological services	National
Barbados Agricultural Development Marketing Corporation (BADMC)	Develop agriculture; participate in agricultural projects; manage agricultural lands vested in the corporation consistent with Government's Agricultural Policy	National
Land For the Landless Programme (BADMC)	Making land available to bona fide farmers without access to land	National
Irrigation Unit	To satisfy the irrigation water requirements of the farming districts	Eleven Irrigation Units scattered throughout the island
Extension Department of BADMC	Provision of extension services to farmers involved in rural development	Rural areas
Spring Hall Lease Project	To improve livelihood of farmers who lack opportunity to operate a farm	Friendship Plantation, St. Lucy
Rural Development Commission	Improve the quality of life for rural communities	National
Barbados Agricultural Management Company (BAMC)	Management of arable lands of heavily indebted sugar plantations, the sugar factories and the sugar terminal	National
Town and Country Development Planning Office (TCDPO)	Orderly and progressive development of the island including allocation of lands for agricultural purposes and	National

Agency	*Responsibility*	*Scope*
	subdivision of agricultural lands	
National Council on Science and Technology (NSCT)	Science and Technology	National
Barbados Community College	Training and Capacity Building	National
Samuel Jackman Prescod Polytechnic	Training and Capacity Building	National
West Indian Sugar Breeders	Sugar Research	Caribbean Region
Caribbean Agricultural Research and Development Institute	Research	Caribbean Region
University of the West Indies	Research, training, capacity building	Caribbean Region
National Commission on Sustainable Development (NCSD)	Cabinet appointed since 1997 with a mandate to development and implement a national policy on sustainable development	National
There are a number of ad hoc national steering committee responsible for certain MEAs, e.g. National Working Group on Biodiversity, CITES Working Group, Biosafety Working Group, Climate Change Working Group and the Ozone Depletion Working Group.	Providing technical and scientific advice relating to the implementation of various MEAs	National
Scotland District Commission (Proposed)		Scotland District Region

2.6 The Role of Non-Governmental Organisations

In many respects civil society is at the frontline of the implementation of the UNCCD on a day-to-day basis, in the form of farmers, women, resource owners and rural resource users. The UNCCD anticipates that the civil society will be key partners in the UNCCD process at all levels. In Barbados the civil society movement and major groups are critical partners in overall national development. There is no national civil society focal point for the UNCCD. In its absence the Barbados Agricultural Society (BAS) functions as a *de facto* umbrella body for Non-Governmental Organisations (NGO) and Community Based Organisations (CBOs). Table 2.6 lists some of the key NGOs that are involved with land and water resources management in Barbados.

Table 2.6 NGOs Relevant to the UNCCD Process

NGOs	*Focal Area*
Barbados Agricultural Society	Agricultural marketing
Organic Growers Consumers Association	Organic Farming
Barbados Sheep Farmers Association[12]	Farming (sheep rearing)
CARDI	Research
West Indies Central Sugarcane Breeding Station	Research
University of the West Indies	Research, Training, Capacity Building
Bawdens Environmental Group	Community activities

The BAS has been in existence for over 100 years (1845). It was established by an Act of Parliament and its main focus is to represent the interest of the agricultural sector in all relevant forums. The BAS serves as the secretariat for seven commodity groups comprising of more than 500 farmers with women comprising approximately 30% of the group. The seven commodity groups are:

1. Barbados Pig Farmers Cooperative Society
2. Barbados Egg and poultry Producers' Association
3. Barbados Fruit and Vegetable Growers' Association
4. Barbados Floral Producers and Exporters' Association
5. Barbados Dairy and Beef Producers' Association
6. Barbados Sheep Farmers Inc.
7. Barbados Cotton Growers' Association

The BAS lacks the necessary administrative, technical and scientific competence to function as the national coordinating civil society focal point for the UNCCD.

[12] The Barbados Sheep Farmers Association has evolved into a not-for-profit company called the Barbados Sheep Farmers Inc.

3.0 Existing Programmes, Policies and Projects

3.1 Major Policies and Plans

The Government of Barbados has developed several programmes, policies and projects which were not necessarily designed as a direct response to the national obligations of the UNCCD. Nevertheless, several of these national measures give general support to the objectives of the UNCCD. Table 3.1 lists some of these existing measures.

Table 3.1. A Snapshot of the main policies related to land and water resources management

Existing Measures	***Focal Areas***	***Relevance to Land Degradation or Drought***	***Importance***
National Strategic Plan 2005-2025	National Development Agenda	Provides government's strategic vision for all sectors including land and water resource management	Very High
Physical Development Plan amended 2003 (PDP)	It allocates land resources among all competing sectors	Provides a comprehensive land use policy including agricultural development, mining and quarrying, conservation and natural parks development, and water resources protection and conservation	Very High
Coastal Zone Management Plan	Coastal Zone Management	It provides an integrated coastal zone policy	High
Environmental Management and Natural Resources Management Plan	Environmental Protection and Conservation	It provides comprehensive policy for managing environmental degradation and pollution	High
National Biodiversity Strategy and Action Plan (NBSAP)	Biodiversity	It provides a National strategy for the protection and sustainable use of the island's biodiversity	High
Gully Ecosystem Management Study	Gully Ecosystems Management	It provides a strategy for protecting and managing natural resources located within gully ecosystems in the island	Medium
The Barbados Sustainable Development Policy 2004	Sustainable Development	Provides a national definition and framework for sustainable development	Medium
Barbados Sustainable	Tourism	Provides a strategy for the sustainable development of the	Low

Existing Measures	*Focal Areas*	*Relevance to Land Degradation or Drought*	*Importance*
Tourism Policy		Tourism sector	
State of the Environment Report 2000	Environmental Management	It provides environmental data that captures the state of the national environment	Medium
Water Resources Development and Management Policy	Water Resources	Provides a comprehensive strategy for the management of water resources until 2016	Very High
Agricultural Area Development Plan (ADP)	Agricultural Lands	It provides an assessment of the agricultural and non-agricultural land classes and provides a policy for the use of all agricultural lands, taking into account the impact of future land use policies on agricultural lands	Very High

1. **National Strategic Plan**

The use of national strategic planning is based on the need to respond to rapid changes in a more dynamic way. This approach reduces overlap and duplication of effort across government departments and because the National Strategic Plan (NSP) is developed from sectoral strategic plans this results in coordination and greater support for the overall sustainable development process. It therefore results in the incorporation of social, economic and environmental issues into national development planning.

2. **The Coastal Zone Management Plan**

Provides for the more effective management and regulation of the coastal resources of Barbados and for the conservation and enhancement of those resources. Addresses the linking of ecologically sensitive coastal and marine areas and the governing of activities in these areas.

3. **The Environmental Management and Natural Resources Management Plan**

Provides the framework and policy for the protection, regulation of use and the monitoring of the health of Barbados' environment and natural resources. Includes a National Park plan to guide the development of a National Park System, including the National Park Area (Scotland District and other significant natural heritage features) and the development of additional Natural Heritage Conservation Areas and related buffer zones.

4. **The Barbados Sustainable Development Policy**

In keeping with the recommendations of the United Nations Conference on Environment and Development (UNCED) Barbados established a Cabinet-appointed National Commission on Sustainable Development (NCSD). The Commission is broad based with representatives from government agencies and all major groups including Non-Governmental Organisations (NGOs), Community-Based Organisations (CBOs), Trade Unions, Women Organisations, the Academic Community and Private Sector entities.

The NCSD advises government, facilitates coordination on sustainable development issues at the national level, promotes greater understanding on the principles and opportunities with respect to sustainable development and reviews and advises on actions in pursuit of sustainable development.

One of the main outputs of the National Commission on Sustainable Developoment is the Barbados Sustainable Development Policy. This document provides a national definition for sustainable development which means:

"Development which optimises the quality of life of every person without over-exploiting natural and environmental assets and services, or jeopardizing social and economic develoment".

The Barbados Sustainable Development Policy attempts to translate the agreed national, regional and international goals into action at the local level. It provides key sustainable development principles which should be adopted by decision-makers at all levels of national development.

5. The Physical Development Plan

The Physical Development Plan (PDP) amended 2003 encapsulates the principles of sustainable development to guide land resource management. The PDP provides policies to guide land use and it prescribes criteria, controls and standards for regulating all types of development activities. It is national in scope and provides island wide coverage with specific policies for selected centres. The PDP is perhaps the single-most important policy instrument governing land management in Barbados.

The first PDP was published in 1970 and it is currently into its third revision. The PDP has been a catalyst for national development over the past 36 years. The PDP has been designed and applied with sufficient flexibility to remedy past problems while at the same time with specific measures in anticipation of new problems and emerging trends.

The main aims of the PDP amended 2003 are to:

- Foster the economic, environmental, physical and social well-being of the residents of Barbados;
- Establish a vision to guide the future form of development with respect to land use and environmental management;
- Guide the future form of development on the island and inform the public, business and government sectors as to the nature, scope and location of

development; and

- provide a guideline for other private and public works and actions which impact the social, economic and environmental health of the nation.

The PDP outlines the following relevant principles which will be used to guide development:

- the efficient use of land, resources and finances of the nation;
- the conservation, protection and enhancement of environmental and man-made resources; and the management of growth so that it occurs in an orderly fashion ensuring the protection of environmental features and agricultural lands.

6. The Soil Conservation Programmes

Since its establishment in 1957 the Soil Conservation Unit has undertaken extensive slope rehabilitation works in the Scotland District. The Unit also reviews all development proposals involving permanent structures in the Scotland District, with the view to preventing activities in areas prone to erosion and land slippage, and the prevention of activities that might cause or exaccerbate land degradation.

7. The Sustainable Tourism Policy

The Sustainable Tourism Policy recognises that tourism cannot succeed without a healthy physical and social environment. The policy represents the first attempt for Barbados in the development of a tourism policy in a participatory manner. It stresses the importance of sustainable development and has a special focus on community tourism, cultural heritage and nature based tourism.

8. The Water Resources Development & Management Policy

Provides for the comprehensive management of water resources until 2016 through a series of strategies in the areas of demand management, supply management and augmentation, institutional capacity building, and legislation.

9. Area Development Plan

Provides a comprehensive policy for the classification and use of all agricultural lands. It is designed to operate in harmony with the national Physical Development Plan.

3.2 Other Relevant Programmes, Projects and Activities

1. **Agro-Eco-Tourism Project** was a joint initiative of the Inter American Institure for Cooperation on Agriculture and the Ministries of Agriculture, Environment, Water Resources & Drainage, Social Care and Tourism to promote the development of sustainable projects at the community level in the Scotland

District. The project offered training, prizes and incentives and sought funding for the projects submitted under the programme. The capacity building component included workshops on the development of project proposals.

2. **Community Redevelopment Projects** represented an offshoot of the Coastal Conservation Programme under the Coastal Zone Management Plan. The projects were community driven, with technical and financial support from varoius government agencies and the private sector, and saw the development of a Dune Rehabilitation Programme and a Coastal Revegetation Project at Walkers, St. Andrew.

3. **Agricultural Sector Plan** was prepared to ensure that practices within the agricultural sector serve to maximise productivity and ensure optimal use of land available for agriculture, promote the adoption of farming systems that are environmentally friendly, and ensure preservation of adequate areas of arable land for future generations.

4. **Tourism Development Programme Sub-program C** suggests various ways to diversify the tourism product and has a special focus on community tourism, cultural heritage and nature based tourism. The TDP C forms a critical component of the Tourism Plan for Barbados.

5. **Bawdens Demonstration Project** is a working display established by the Bawdens Environmental Group, a local NGO, to show persons in a practical way the benefits of utilizing renewable energy, organic farming and living lightly on the land. The work of the group is all the more important as the group represents one of very few examples in Barbados of a functional NGO that combines grass roots environmentalist, farmers and academics.

6. **Barbados National Report to Habitat II** provides an assessment of percentage land for residential and business development relative to agriculture islandwide. Provides good baseline data for analysis purposes.

7. **National Biodiversity Strategy and Action Plan** provides for the integration of the conservation and sustainable use of biological resources into the relevant sectoral and cross-sectoral plans, programmes and national policies.

8. **Caribbean Planning for Adaptation to Climate Change (CPACC).** Barbados housed the CPACC project office and was the site of the pilot study on Coastal Vulnerability & Risk Assessment. A subject that is seen as critical to Barbados since, due to its small size the entire island is seen as a coastal zone.

9. **Representation on the Intergovernmental Panel on Climate Change (IPCC).** At the international level, Barbados has ratified the United Nations Framework Convention on Climate Change, and is an active member of the Intergovernmental Panel on Climate Change, thus ensuring that the issues of

Small Island Developing States are fully discussed in such fora and that the necessary links are made between combating climate change and sea level rise, biodiversity resource protection and the fight against desertification.

10. **Conserving Biodiversity and Preventing Land Degradation in Small Island Ecosystems of the Caribbean.** The Government of Barbados signed on in support of the proposed project for the Caribbean sub-region. The project is intended to develop programmes, strategies and mechanisms on sustainable land management for the protection of the biodiversity of the Caribbean Region. The project will take the form of demonstration projects to be set up in each of the territories of the Caribbean sub-region.

11. **Disaster Recovery and Proactive Actions** have included the relocation of (160) households from the White Hill community of St. Andrew by the Ministry of Housing and Lands. The households had to be relocated as they were in danger due to severe land slippage in the area. The persons were relocated at no cost to themselves. Another (43) households have been identified for relocation.

12. **Engineering Works.** In addition to the activities outlined above, the Government of Barbados continues to spend millions of dollars every year in the Scotland District for road and bridge construction and stabalisation and on preventative and mitigative engineering works to address land degradation through the works of the Soil Conservation Unit, Ministry of Agriculture and the Ministry of Transport and Works.

3.3 The Legal Framework

Barbados has no current legislation designed to specifically address commitments under the Convention to Combat Desertification, however there are a number of pieces of legislation which contain some applicable provisions. The most significant pieces of legislation providing statutory protection and provision for mitigating activities to combat land degradation are described in the following section.

1. **The Constitution** provides for the protection from deprivation of private property. The imposition of planning restrictions that deprive land of its value could result in claims for compensation. However, **Section 16** of the Constitution allows for the confiscation of property in circumstances where the environment is threatened.

2. **The Land Acquisition Act (cap. 228)** makes provision for the acquisition of land for public purposes, such as the development of parks and caves.

3. **The Prevention of Floods Act (cap. 235)** provides for flood prevention works and the designation of special flood areas.

4. **The Town and Country Planning Act (cap. 240)** makes provision for the orderly and progressive development of land. The Act provides for the preparation of a Physical Development Plan which allows for the allocation of land for parks and open spaces; the preservation of places of archaeological, architecture, artistic and/ or historical interest; preservation and/ or protection of forests, woods, trees, shrubs, plants and flowers; regulation and control of the deposition of materials on the land or into the sea. The Act also has provisions that influence land use relative to agriculture and forestry.

5. **The Barbados Agricultural Development and Marketing Corporation Act (cap. 254)** establishes the BADMC with responsibility for the stimulation and development of agriculture on lands vested in the Corporation. A large proportion of the lands vested in the BADMC lie in the Scotland District.

6. **The Petroleum Winning Operations Act (cap. 281)** regulates the exploration and exploitation of oil resources.

7. **The Mines Regulation Act (cap. 350**) regulates the operation of mines.

8. **The Quarries Act (cap. 353**) regulates the operation of quarries.

9. **The Irrigation Act (cap. 263)** provides for the development of irrigation systems on land and related purposes.

10. **The Cultivation of Trees Act (cap. 390)** promotes the cultivation of specific species of trees through the financial incentive of receiving a tax contribution payment equivalent to the amount of taxes payable in respect of the land so cultivated, the payment of a fruit tree subsidy or subsidy payment.

11. **The National Conservation Commission Act (cap. 393)** establishes the National Conservation Commission and provides for the maintenance of parks, beaches and open spaces.

12. **The Soil Conservation (Scotland District) Act (cap. 396)** restricts the use to which land can be put in the Scotland District.

13. **The Preservation of Trees Act (cap. 397)** makes the killing of any tree one metre or more in circumference an offence unless a permit has been obtained from the Chief Town Planner. The Act also allows the Chief Town Planner to require the owner of vacant land or land adjoining or near a public road to plant or replant trees and to clear land of weeds or overgrown grass.

14. **The Coastal Zone Management Act (cap. Not yet assigned)** provides for the more effective management of the coastal resources of Barbados and for the conservation and enhancement of those resources, and matters related thereto.

In addition the proposed **Environmental Management Act** will provide for the wise and sustainable use of the natural environment and resources of Barbados by making provision for the management and protection of the water resources, the natural heritage and the development of the Barbados National Park System.

There is still however a clear need for a review and rationalisation of all relevant legislation to ensure complete and complementary coverage of land degradation issues.

4.0 National Action Programme

The Barbados National Action Programme (NAP) represents Government's response to the twin spectres of land degradation and drought in accordance with Article 9 of the UNCCD. The NAP, as previously mentioned, is intended to eventually cover the entire island however at this stage it will concentrate on the Scotland District region where the most severe forms of land degradation occurs. Although the NAP will be implemented as a national strategy document it will focus in large part on the Scotland District region.

Vision: The fields and hills are owned, developed and conserved by and for current and future Barbadians in harmony with the bio-physical limits to growth.

Goals: To promote the sustainable management of land and water resources in the interest of our society, economy and environment through achieving the following within the shortest practical timeframe:

- An effective and efficient land and water resources governance system based on a well coordinated, integrated and transparent decision-making process of related policies, programmes and projects;
- Strengthening and fostering effective and efficient partnerships among government, civil society, resource owners and users, the donor community and the research and scientific community;
- The eradication of poverty and the enhancement of livelihoods; and
- Increased access to land through more secure land tenure.

Objectives :

1. to identify the factors contributing to land degradation and drought
2. to identify practical measures to combat land degradation
3. to identify practical measures to mitigate the effects of drought

Principles: The Principles of the UNCCD as outlined in Article 1 of the Convention are hereby adopted and incorporated. In addition, in order to ensure the proper implementation of the objectives of this programme all decision-makers should be guided by the following sustainable development principles[13]:

1. Quality of Life: decision-makers should ensure that decisions on the design and implementation of programmes, policies and projects to combat land degradation and mitigate the effects of drought recognise quality of life as the overarching goal.
2. Conservation of Resources: decision-makers should recognise the bio-physical limits to growth and ensure that this factor guides the utilisation of land and water resources and related environmental services.
3. Economic Efficiency: decision-makers should apply appropriate incentives and science and technology to ensure that land and water resources are used in an efficient and optimal manner.

[13] Adopted from Section 5 of the Barbados Sustainable Development Policy (2004)

4. Equity: decision-makers should ensure equal access to land and water resources, for current and future generations.
5. Participation: decision-makers, in a spirit of partnership and cooperation among all relevant stakeholders should ensure that all stakeholders, government, non-governmental organisations, resource owners, resource users and major groups are involved in the decision-making process at all levels, national, regional and international.

Priority Action Areas

The following four priority action areas have been identified:

1. Agriculture
2. Settlement
3. Resource Use and Conservation
4. Drought

The following cross-cutting issues have also been identified:

1. Institutional Arrangements
2. Legal Framework
3. Information
4. Funding
5. Stakeholder Participation

4.1 Agriculture

Vision Agriculture remains a vital part of the development of the Scotland District, thus contributing to the reduction in loss of top soil and the prevention of land degradation

Aim To promote economic activity through agriculture, to benefit the people of the area.

Proposed initiative: The creation of **agro-zones** (agriculture under zones). The existing farming groups are the most appropriate means of undertaking agriculture in the Scotland District area. The suggested produce is as follows:

1 Crops – Fruit trees, Cash crops, Grasses
2 Livestock – Sheep farming

It is envisaged that the existing eco-tourism activities would continue in the area as well and therefore there will be the need for strict management to prevent degradation of the area.

Stakeholders: Plantation Owners, the Government, the BADMC, Small Land Holders Cooperatives, NGOs, Communities

Key Actions

1. The development of an inventory of resources inclusive of;
   i. Soil type & Location
   ii. Availability and quantity of water resources
   iii. Available technical resources
   iv. Geological mapping

It was recognised that the necessary information already existed and what was needed was the compilation and augmentation of the information into one comprehensive database.

2. Development of Programmes to meet the needs of the farmers:
   i. Education

4.1 Agriculture
ii. Cultivation services iii. Access to water iv. Access to roads 3. Terracing programmes 4. The development of programmes to promote the use of grassed buffer zones around field edges and along roadsides, and cross-hill as opposed to downhill ploughing.
Recommendations i. Establishment of a performance criteria for land owners to reduce the burden of management on the Government ii. The strengthening of the Soil Conservation Unit (Ministry of Agriculture) as a regulatory agency not only for the Scotland District but also for the limestone area of the island. The Soil Conservation Department of the Ministry of Agriculture is the lead government entity in the Scotland District. Its mandate includes reducing the incidence of landslides; control of surface erosion; rehabilitation of degraded and unproductive land; and reduce infrastructural damage. It works in close conjunction with the Town and Country Development Planning Office. It provides the TCDPO with technical and scientific advice on all development applications in the Scotland District. The SCU is well positioned to play a led role in terms of the execution of the NAP however its technical capacity is very weak. There is therefore a need to undertake an institutional review of the Soil Conservation Unit with a view to improving its efficiency and effectiveness especially in respect of land degradation. iii. Further augmentation of water resources iv. Re-education of farmers utilizing farming organisations already active in the areas; and v. Development of high value/ exotic agriculture where possible through farm cooperatives (Value Added Products). A good example is the development of tree crops to provide fruits for processing through partnerships with the private sector. vi. Development of environmentally sensitive areas (ESAs) consistent with national policies and action plans such as the Agriculture Area Development Plan (ADP), the Physical Development Plan (PDP), the Sustainable Tourism Policy, the Coastal Zone Management Plan and the proposed Environmental Management Plan. vii. Development of a tree crop planting and reforestation programme.

4.2 Settlement

Aim To effect the management of settlements and associated activities, both present and future, as they relate to land degradation within the Scotland District

Specific Objectives

1. Improved management of existing settlements – lowland, highland and roads.
2. Combating degradation associated with settlements
3. Rationalising and planning for present and future settlements
4. To guide settlement and land use patterns

Key Actions Three scenarios were presented

Scenario 1:	**Scenario 2:**	**Scenario 3:**
Removal of all settlements (socio-politically not feasible).	Development of a comprehensive and integrated land use management plan for the Scotland District. This should be reviewed to include the policy recommendations of the Environmental Management for Land Use Planning Project, the Agriculture Area Development Plan, and the revised Physical Development Plan 2003, which has at its base three (3) designated areas for future settlement development. It should also include: i. A legal and institutional framework enacted to ensure the proper management of the settlement plan; and ii. As a component of the institutional framework, the establishment of a planning committee or suitable administrative body with appropriate stakeholder representation.	The establishment of demonstration project(s). While striving to put in place systems to effect Scenario 2, to conduct one or two pilot projects which demonstrate objectives on a small scale. The project outputs would be used as a basis for decision making with respect to the larger and more capital intensive Scenario

Components of the Management Plan:

1. Screening of the designated areas with regards to carrying capacity and settlement density in relation to available infrastructure.
2. The development of a database of information on existing settlements in the Scotland District.
3. Cost–benefit analysis of the availability of resources and the provision of infrastructure in the Scotland District and the determination of the level of economic activity which should be sustained in the area.
4. Development of a zoning policy for designation of areas of non-use, restricted use and conditional use.
5. The following should be reviewed:

4.2	**Settlement**
	• Where existing settlement remains what mitigative measures need to be put in place; • Where there is removal of settlement with continued economic activity (agriculture) permitted; • Where there is removal of settlement with no activities being permitted; • Issues of property rights, land tenure and ownership especially as they relate to settlement relocation; • Use of the Physical Development Plan to identify areas which can support economic activity for persons who have been displaced; 6. Rehabilitation and stabilization of unstable/ degraded lands after settlement removal
Stakeholders: Existing land owners, Utility companies, Transportation agencies, Waste disposal operators, Community groups, Scotland District Association, St Andrew Independence Committee, Ministry of Education, Soil Conservation Unit ,Scotland Beef Project, Ministry of Agriculture, Water Resources Unit, Town and Country Development Planning Office, Coastal Zone Management Unit, Transport & Works, Mining/ quarrying companies, Construction Companies, Drainage Unit, Environmental Unit	
Timeframe: Pilot Project – Five (5) years Full Implementation (Scenario 2) – Ten (10) years	

4.3 Resource Use & Conservation

Vision: The conservation and sustainable management of the resources including water, arable land, sand, clay, shales, limestone, oil and gas, flora, fauna and people.

Aim: To utilize an integrated approach based on the available body of knowledge in conjunction with consultation with stakeholders, for use in an integrated management system to:

i. Preserve and enhance existing flora and fauna
ii. Sustainably utilize mineral resources; and
iii. Preserve and foster the socio-economic and cultural activity of the area, to the benefit of Barbados as a whole.

Stakeholder Groups: Residents/ Landowners, Businesses, Horticultural site operators, Historical site operators, Tour companies, Guest house owners/ Hoteliers, Fishermen, Recreation Providers , Government agencies, key research institutions

Key Representatives within Stakeholder Groups

Residents/ Landowners

i. Broad, community based committee/ association (needs to be formed)
ii. Scotland District Association
iii. St. Andrew Independence Committee
iv. Small Farmers Cooperative of St. Andrew
v. Bawdens Environmental Group
vi. The Codrington Trust
vii. The Churchical Order of the Nayabinghi

Businesses

i. Claytone (clay based tile producer)
ii. Sand-Ben (sand mining operation)
iii. Walkers Sand Quarry
iv. Springfield Mining
v. Barclays' Park Restaurant, and other restaurateurs
vi. Caribbean Riding Institute
vii. Richard Hoad Farms
viii. Highland Outdoor Tours
ix. Safari Tours
x. Operators of the National Landfill and Greenland
xi. Shell Gas Station
xii. Richard Goddard Farms
xiii. Scotland Beef Project
xiv. Arawak Cement Plant
xv. Barbados National Trust
xvi, Other business owners and commercial farmers

Horticultural/ Historical Sites and Visitor Attractions

i. Barbados National Trust
ii. National Conservation Commission
iii. The Flower Forest
iv. The Barbados Wildlife Reserve
v. St. Nicholas Abbey
Churches
vii. Other land owners with attractions on their lands

4.3 Resource Use & Conservation

Hoteliers	**Fishermen**	**Recreation Providers**	**Research Institutions**
i. Edgewater ii. Atlantis hotel iii. Roundhouse iv. Sand Dunes v. Bonito vi. Guest house owners	i. Consett Bay ii. Tent Bay iii. Sea Egg Fishers Association iv. Sea Moss Growers v. Martin's Bay	i. Mountain Bikers ii. 4 x 4 Tour Operators iii. Hikers and trailers iv. Trail Friends Inc. v. Barbados National Trust vi. Bawdens Environmental Group vii. St. Andrew Independence Committee viii. Surfers	i. University of the West Indies ii. Bellairs Research Institute

Government Agencies

i. Ministry of Environment, Water Resources and Drainage
ii. Ministry of Agriculture
iii. Ministry of Health
iv. Ministry of Tourism
v. Ministry of Transport and Works
vi. National Petroleum Corporation
vii. Ministry of Finance, Investment, Telecommunications and Energy
viii. Ministry of Education, and Human Resource Development
ix. Ministry of Social Care, Constituency Empowerment, Urban and Rural Development
x. Barbados National Oil Company

Key Actions

1. There will be overall sensitisation and education of all key groups in the Scotland District through consultation and information exchange between the various groups. Such consultations will identify activities within the district, provide historical information, list problems encountered and provide an overall vision through the combined visions of the interest groups.

2. The information from the consultations along with that amassed from studies by the Government and private agencies over the years will be used to guide the development of a Scotland District Environmental Standards Certification Programme for all activities within the area. There would be special emphasis placed on the need for Environmental Impact Assessment with a primary focus on the impact of activities on the

4.3 Resource Use & Conservation
availability, quality and distribution of water, and on drainage as well as on recommendations to minimise impacts that could result in land degradation. 3. All agencies/ organisations with operations in the Scotland District will be encouraged to develop corporate environmental policies to pursue economic and development activities under a sustainable development ethos. 4. The visitor attraction sites will be developed as models for the proposed environmental standards programme and will play a key role in the dissemination of information. 5. Government agencies active in the Scotland District will be responsible for: i. Coordination of the public awareness and education program and organisation and facilitation of consultations as necessary. ii. Development and enforcement of legislation to promote sustainable activity and prevent and mitigate against land degradation in the Scotland District. iii. Development of the Scotland District Environmental Standards Certification Programme. iv. Development and facilitation of projects to address the priorities identified. v. Provision of funding and assistance in sourcing funds to assist in the fight to combat desertification, land degradation and drought. It should be noted that NGOs, CBOs and private sector entities should also try to identify and provide funding for such activities. vi. Expansion of the programme to combat desertification, land degradation and drought to provide full national coverage, and to push the issue as an important one in the regional and international fora. vii. Development of an early warning system for extreme climatic events such as storms and drought.

4.4 The Response to Drought

Barbados is a water scarce country. There is a need for a comprehensive definition of the term drought for Barbados. Currently the term drought has a number of different meanings for various professionals in Barbados. The term drought from a meteorological perspective relates to reduced rainfall below a certain average, while from the perspective of the Barbados Water Authority the term drought relates to water levels which are below the amount to effectively supply the country with potable water supplies. Those involved in agriculture may also have a different interpretation of the word drought. One overarching simple definition of the word drought is thus required in the context of Barbados. The new definition of the term drought in Barbados should examine drought in the context of frequency of occurrence, magnitude and duration

In addition to redefining the term drought in the Barbadian context , there needs to be a comprehensive analysis of droughts which have occurred in Barbados, with an evaluation of the impacts of drought, and the development of comprehensive response measures..

The Barbados Water Authority has developed a Sustainable Water Management Strategy and Action Plan which could be used as the basis for comprehensive action as it relates to drought. The plan has a number of conservation and mitigation techniques to respond to drought.

The main elements of the strategy include:

1 Demand Reduction
2 Supply Augmentation
3 Water Quality Protection
4 Public Education
5 Capacity Building and Networking

4.4.1 Demand Reduction

The Barbados Water Authority (BWA) is responsible for the abstraction of groundwater for public supply. Currently the BWA abstracts in excess of 35.0 million gallons per day. In addition, there has historically been private abstraction, controlled by a system of licences. There are currently an estimated one hundred and eleven (111) private wells in use, abstracting approximately 11.8 million gallons per day.

In order to address demand reduction a number of policies have been implemented. These include:

a) Metering: Historically all commercial, hotel and industrial customers are metered. A programme has been instituted for the metering of domestic customers. To date over (70) percent of the distribution is metered.
b) Water Saving Devices: The Barbados Water Authority (BWA) has to date distributed over 30, 000 low flow shower heads and 30, 000 tap aerators and has promoted the wider use of water-saving Water Closets.
c) Agricultural Practices: The Government of Barbados has put an incentive scheme in place which provides a rebate of eighteen (18) percent of the cost of new irrigation equipment for non-sugar agriculture utilizing drip irrigation.
d) Roof Catchments: The Town and Country Development Planning Office now requires that dwellings with 3 000 sq.ft. or more of roof area must have rainwater storage corresponding to at least 2.0 gallons per square foot of floor area. For the commercial sector the requirement is that they must provide at least (4) gallons per square foot of floor area once the building has a roof area of 1, 000 sq,ft, or more. As a result of sometimes questionable water quality, the water collected is recommended for non-potable uses only.
e) Reduction in Unaccounted-for-water: The BWA has put in place a programme to more effectively identify and address leaks.

f) Tarif Structure: The Government is currently looking at the possibility of amending the tarif structure of charging for water. This would also result in a review of the licencing system for the operators of private wells.

4.4.2 Supply Augmentation

Several supply augmentation alternatives are available to Barbados. These include surface water impoundment in the Scotland District, reuse of wastewater, desalination, construction of check dams through the gully system and even importation.

To date only the option of desalination has been advanced. The construction of a desalination plant has served to increase the potable water supply by 10%. The water produced through the desalination process is mixed with the abstracted groundwater to ensure that there is no real discernable change in taste of the water supplied to customers.

A number of golf courses have been given permission for development on the basis that they have to use desalinated water for their irrigation. To date at least one golf course, Sandy Layne, has installed a desalination plant which has been commissioned and is currently in use.

The Government of Barbados continues to examine the issue of wastewater reuse, especially for golf course application. In addition, the issue of the development and re-development of a check dam system is being studied to address both flood mitigation and groundwater recharge.

4.4.3 Water Quality Protection

Given the scarcity of water in Barbados the issue of water quality protection is critical. Since 1963 a groundwater protection zoning system has been in place. The zoning system gives considerable protection from biological pollution sources but gives little protection against chemical pollution.

It is against this background that a long term strategy is being developed for protecting the water resources of Barbados. The study calls for:

1 Amended Zoning Regulations
2 Containment Data Base
3 Import Controls of Contaminants
4 Long-term Water Quality Monitoring

Discussions are currently underway amongst the relevant agencies for the implementation of the components of the strategy outlined.

The long term water quality monitoring programme will be particularly important with the proliferation of desalination plants. This will be necessary to check salt-fresh water interface movements and to regulate brine disposal.

4.4.4 Public Education

In recognition of a need for widespread public support the BWA has sought to implement a multi-media and multi-sectoral public awareness and education programme. The programme components implemented to date have included:

1 Facility Tours
2 Visits to Schools and Social Clubs
3 Radio and Television Programmes

With the advent of National Strategic Planning (NSP) related sectors will assist the BWA in public awareness and education. In addition it is proposed that water resources management issues be included in a comprehensive education programme addressing desertification, land degradation and drought to be addressed through the National Action Programme (NAP).

4.4.5 Capacity Building and Networking

This is an ongoing concern that is being addressed partially through the implementation of the recommendations of the 1997 Water Resources Management and Water Loss Study and partially through the National Strategic Planning process. It is anticipated that the United Nations Convention to Combat Desertification can provide considerable assistance in the area of Capacity Building and Networking.

It is being further suggested that there needs to be a coordinated approach to capacity building with respect to dealing with drought management. The relevant agencies will be the Barbados Water Authority, the Ministry of Agriculture, The Barbados Meteorological Services and the Caribbean Institute of Meteorology and Hydrology. A number of actions that should be taken include:

- The analysis of rainfall records (long term)
- The definition of drought by end use
- The need for monitoring network development
- The development and application of models
- The development of drought plans for the various end use sectors
- The coordination of the country networks with the Caribbean Institute of Meteorology and Hydrology
- The evealuation of drought impacts
- The development of mitigation measures such as conservation and augmentation.

4.4.6 Emergency Drought Management Plan

In addition to the development of a Sustainable Water Management Strategy the Barbados Water Authority has also pursued the development and the implementation (as necessary) of an Emergency Drought Management Plan. The plan includes Short, Medium and Long Term Activities. These are summarised below:

Table 4.1 Short Term Activities under the Drought Management Plan (0 to 6 months)

1.Establishment of a Multi-Agency Task Force	*The task force will facilitate liasing between agencies and will have an advisory and policy coordinating role.*
2. Call to Order of the BWA Task Force	This task force will be responsible for the execution and administration of the plan.
3. Use of Drought Indicators to Inform Action	The drought indicators to be used are: 1 Rainfall 2 Reservoir levels 3 Well measurements • Output from sources • Groundwater table levels • Salanity (sheetwater wells)
4. Response Stages	The water shortage response plan has 3 stages: Stage 1: Voluntary Conservation Measures Stage 2: Mandatory Water Use Restrictions Stage 3: More Stringent Manditory Restrictions
5.Financial/ Administrative Activities for the Plan	These include water and human resources and addressing financial, legal and technical constraints.
6. Technical Activities for the Plan	These include: 1. Management • Distribution management system • -Tanker management plan • -Shut-off/ rationing plan 2. Water Resources/ Supply • BWA Wells • Private Wells • Desalination 3. Distribution System Activities

Medium Term (6 to 12 months)

The medium term strategy address administrative and technical components and can be summarised as follows:

1. Administrative
    - Encourage existing residences to install tanks to harvest rainfall for non-potable uses.
    - Review and modify BWA Act as necessitated.
    - Institute legislation to ensure that developments are approved with

minimum dead-end lines.

2. Technical
    - Reorganise superintendent distribution regions.
    - Investigate the possibility of importation of water from other Caribbean islands.

Long Term (over one year)

These components of the plan reflect the long term goals of the BWA and include:

1. Reduction in unaccounted-for-water in the distribution system to 30% or less.
2. Implementation of a broader desalination plan.
3. Implementation of a Supervisory Control and Data Acquisition System.
4. Use of the Hydraulic Network Model in other distribution systems.
5. Incorporation of the use of dual reticulation systems into the building code.
6. Encouragement of the reuse of wastewater for appropriate non-potable purposes.
7. Encouragement of blending for agricultural purposes.
8. Fast track ban on the importation of all non low flow water use fixtures.

4.4.7 Role of Science and Technology

The role of science and technology is critical in addressing issues related to the NAP. There is a need for additional automated weather stations to address issues to provide accurate meterological data which can be used to assist with the management of droughts, and providing accurrate meterological information. There is a need for research as it relates to micro climates in Barbados. This information will aid in drought management. Technologies will also need to be provided to aid in preventing soil erosion, with the application of the latest soil erosion prevention techniques.

Drought prevention will be aided by the implementation of a supervisory control and data acquisition systems and the application of a Hydraulic Network model and geographic information system to aid in the management of water resources.

5.0 Implementation Strategy

It is proposed that the Barbados National Action Programme should be implemented in the short to medium term according to the following priority criteria:

- Priority I: An implementation timeframe of less than one year
- Priority II: An implementation timeframe of three years
- Priority III: An implementation timeframe of more than three years

The Land Degradation Coordinating Unit (LDCU) will be responsible for the annual review of the implementation of National Action Programme. The National Action Programme should be reviewed and revised every three years.

Strategic Approach: The implementation of the National Action Programme will involve the following strategic actions:

1. Governance Structure
2. Science and Technology
3. Information Sharing
4. Legal Framework
5. Funding Mechanisms
6. Monitoring and Evaluation
7. Project Concepts

5.1 Governance Structure (Priority I)

One of the main challenges restricting the implementation of the UNCCD in Barbados is a fragmented institutional framework. It is proposed that this obstacle will be addressed through the creation of a coordinated and integrated institutional framework involving the following actors:

a. Governmental Agencies
b. The Affected Communities (resources owners and users)
c. Civil Society (including all major groups women, youth, academics, farmers, etc.)
d. Private Sector
e. Donors

a. Governmental Agencies

Government has a key role to play in respect of the achievement of sustainable land management in Barbados. There are specific high level tasks which must be undertaken at the Government level which include:

- participating in regional and international inter-governmental negotiations
- adopting and implementing regional and international Conventions, Treaties, Agreements, and Action Programmes
- Preparing and implementing national policies, plans, programmes and projects
- Mobilising resources (financial, human, technological, information)
- Mainstreaming of sustainable land management issues into the national development agenda

- Specialised technical knowledge and skills

b. Affected Communities

The genuine participation of affected communities at all levels of decision-making augurs well for successful policy formulation and implementation. It is desirable that critical decisions be made at the level where the benefits and costs accrue such as at the community level by land owners and resource users. Affected Communities have an important role to play in respect of sustainable land management through information sharing, cost sharing, in kind contributions (financial and material) and monitoring and evaluation.

c. Civil Society

The civil society has an important role to perform in the implementation of the National Action Programme in terms of policy formulation, research, advocacy, capacity building, monitoring and evaluation and project formulation and implementation. There is a need for the establishment of a national umbrella body to coordinate the work of civil society.

d. Private Sector

The private sector is a critical partner in the implementation of the NAP. The business community tends to be major resource owners and users that focus on the exploitation and development of resources. The private sector can assist with the implementation by providing financial support, participating in policy formulation and implementation.

e. Donors

The successful implementation of the NAP will require the fostering of strong partnerships with all relevant partners at the national, regional and international levels. One of the main obstacles to the sustainable land management in Barbados is resources. The Donor community has a role to play in providing financial, technical, information and capacity building resources.

5.1.2 Proposed Actions

There is an urgent need to rationalise the fragmented institutional framework by undertaking the following activities:

1. The Environmental Unit (EU) in the Ministry of Environment, Water Resources and Drainage should be strengthened to continue to perform its role as the National Focal Point (NFP) for the UNCCD. Since the Environmental Unit already functions as the National Focal Point for a number of other key Multilateral Environmental Agreements (MEAs) consideration should also be given to creating synergies between and among these MEAs at the national level, including the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC). The Environmental Unit is best positioned to facilitate this level of coordination and integration. The EU should continue to liaise with the regional and international stakeholders including donors. The EU should continue to participate in regional and international negotiations. The EU should perform the role of Secretariat for the

Land Degradation Advisory Council.

2. An institutional audit should be undertaken of existing institutional arrangements governing land and water resources management with a view to determine the most suitable arrangements for the establishment of a Land Degradation Advisory Council (LDAC) and a Land Degradation Coordination Unit (LDCU) to strengthen coordination and integration.
3. The LDAC should replace the existing Cabinet-appointed land degradation steering committee. The membership of the LDAC should be widened to include the Town and Country Development Planning Office (TCDPO), resource owners resource users, and the business community. The main function of the LDAC should be to provide advice and guidance to the LDCU in respect of its programmes, policies, projects and plans.
4. Although the Soil Conservation Unit (SCU) has a clear legal mandate in respect of soil degradation in the Scotland District it lacks the technical, scientific, and administrative capabilities to effectively and efficiently achieve sustainable land management for the entire island. The Soil Conservation Unit (SCU) should be reviewed with the objective of strengthening its capacity to oversee and undertake the day to day activities relating to the implementation of the Barbados National Action Programme (NAP). This objective may be achieved through the upgrading and conversion of the SCU into the Land Degradation Coordination Unit (LDCU).
5. The establishment of the LDCU will require the widening of the legal mandate of the SCU to ensure that it has responsibility for land degradation in the entire island, including the limestone areas. The functions of the LDCU should include:
    (i) The implementation of the NAP;
    (ii) The development and implementation of a national framework for sustainable land management including sustainable land management and drought mitigation projects, plans and programmes;
    (iii) Research;
    (iv) Promotion and application of science and technology; public awareness and education and
    (v) The strengthening of partnerships among all relevant stakeholders.

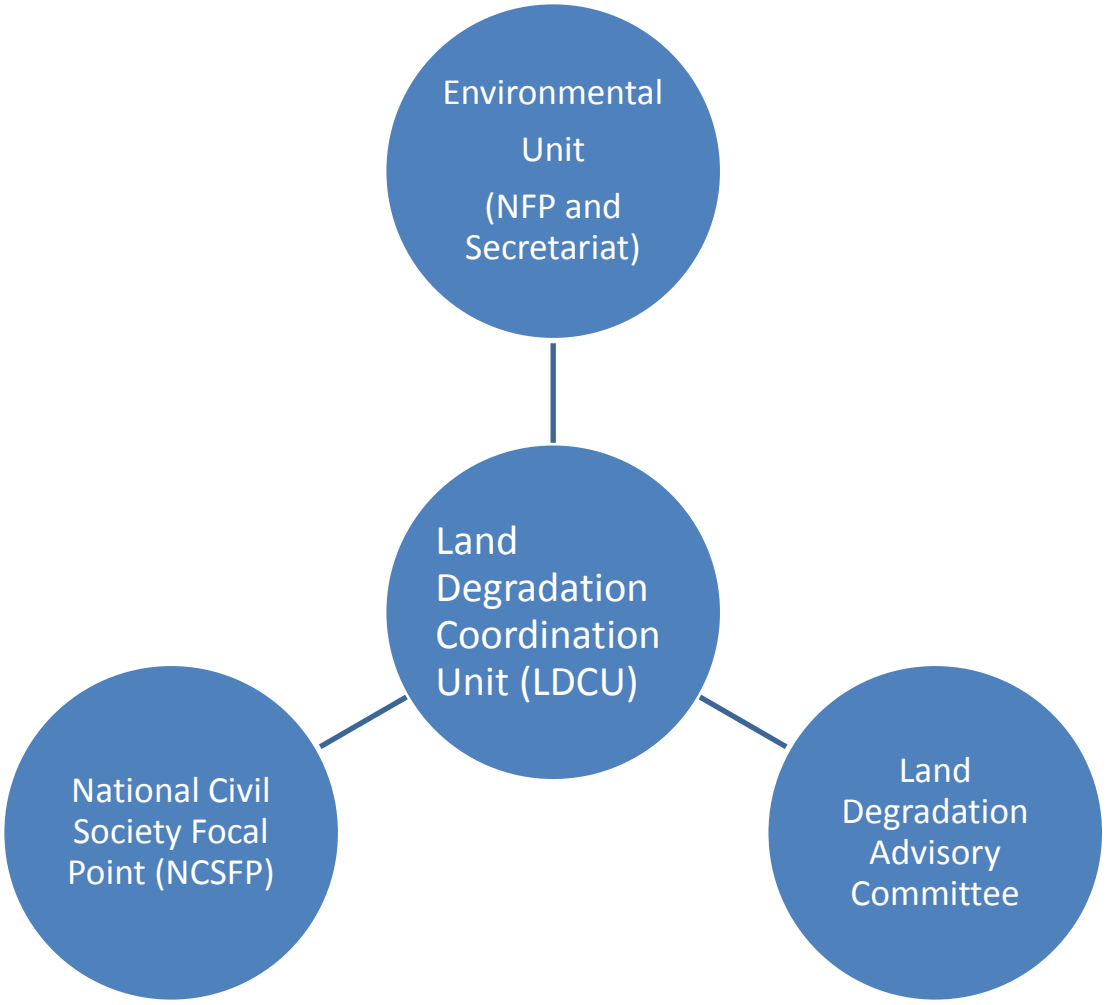
The LDCU if established in accordance with the requirements of the UNCCD should provide for, *inter alia*:

- cooperation and integration
- clarification of responsibilities
- promotion of mutual coexistence

6. Develop a national programme to harmonise public policies and programmes relating to land degradation and drought

The proposed institutional framework for coordination of land degradation activities is shown in the Figure 3.

Figure 3. Proposed Institutional Framework for co-ordination of land degradation activities



5.2 Funding Mechanisms (Priority I)

The existing national Land Degradation Work Programme is funded through annual budgetary allocations from the Ministry of Finance, Investment, Telecommunications and Energy and through *ad hoc* assistance from relevant international inter-governmental organisations, usually in the form of targeted technical assistance.

The lack of financial resources has been identified as one of the main obstacles to achieving sustainable land management in Barbados. It is critical therefore that the requisite financial resources be identified to ensure the effective implementation of the NAP.

5.2.1 Proposed Actions

1. Undertake an assessment, including a gap analysis, to determine the costs and benefits associated with the overall implementation of the NAP;
2. Government will continue to allocate annual financial support to the national Land Degradation work programme;
3. Formulation of a strategy focussing on resource mobilization and fund raising
4. Consideration will be given to use of a suite of economic instruments to ensure the efficient allocation of land and water resources;

Consideration will be given to the establishment of an Environmental Trust Fund to address environmental degradation, including land degradation and drought. Opportunities should be identified and explored to source funding from Government, the private sector, bi-lateral donors and the international donor community. The Environmental Trust Fund will be used to provide financial and technical assistance to NGOs and affected communities.

5.3 Information Sharing (Priority II)

Access to accurate and timely information is an essential requirement for the implementation of the NAP. The existing legal and institutional framework for land and water resources management in Barbados is characterised by a narrow sectoral approach to data collection, storage, manipulation and dissemination. While there may be lots of data sets available it is not readily accessible by all stakeholders. There is a need to develop a comprehensive land information network in Barbados.

5.3.1 Proposed Actions

1. Adoption of Freedom of Information Legislation;
2. Promote and facilitate public participation in the decision-making process by improving access to information, access to process and access to justice
3. Undertake a Review and Assessment of the all institutions providing relevant land and water management information;
4. Formulate the elements for a Comprehensive National Information database
5. Develop a Comprehensive National Land Degradation and Drought Information Plan ;
6. Formulate a Strategy for disseminating Land Degradation and Drought Information.

5.4 Legal Framework (Priority II)

There are a number of existing pieces of legislation in Barbados that affect land and water resources management. One of the most important pieces of legislation is the Town and Country Planning Act, CAP 240. This piece of legislation mandates the preparation of a comprehensive land use plan. This has resulted in the preparation and execution of three Physical Development Plans (PDP) in Barbados since 1970. During

these 36 years the PDP has been influential in shaping the use and development of land resources in Barbados.

Notwithstanding the role of the Town and Country Planning Act the overall legislative framework is fraught with weaknesses caused by gaps and omissions. For example, there is no specific legislation governing land degradation. There is no statutory requirement for Environmental Impact Assessments (EIAs) in Barbados. In practice a liberal interpretation is applied to s.17 of the Town and Country Planning Act, CAP 240 as the authority for requesting the submission of EIAs. EIA requirements are provided for in the Town and Country Planning Applicant's Guidelines (2002). Current planning practice requires the submission of impact studies for proposals involving certain classes of agricultural lands.

Another weakness in the legal framework is the absence of legislation that addresses land degradation in a comprehensive and coordinated manner. The geographical and administrative scope of the existing Scotland District Act is too narrow. It focuses only on land degradation in the Scotland District region of the island. In addition, there is no legislation which specifically addresses drought. It is necessary therefore to review the existing laws with a view to:

- Widening the geographical and geological scope to include the limestone area
- Provide for the mitigation of drought; and
- To establish the appropriate administrative structure to achieve sustainable land management and drought mitigation.

5.4.1 Proposed Actions

There is a need to remedy the inherent weaknesses in the existing legal framework through the following:

1. A comprehensive review and assessment of the existing regulatory framework as it relates to land degradation and drought
2. Preparation of legislation to specifically govern land degradation and drought including the establishment of the appropriate institutional arrangements
3. Enactment of comprehensive legislation to ensure sustainable land management and drought mitigation;
4. Enactment of comprehensive Environmental Management Act, including making provision for Environmental Impact Assessment procedures

5.5 Science and Technology (Priority II)

There is a need to improve the knowledge and understanding of the factors which cause or contribute to land degradation and drought in Barbados in order to identify appropriate interventions to ensure sustainable land and water resources management. It is necessary therefore to develop and strengthen the capability of relevant technical and scientific institutions to undertake research activities that:

- contribute to increased knowledge among all stakeholders of the processes leading to land degradation and drought including the impacts, and causes (both

natural and human);

- respond to clearly defined objectives to meet the specific needs of affected communities;
- identify solutions that improve the quality of life of affected communities;
- protect, integrate, enhance and validate traditional and local knowledge, know-how and practices while ensuring adequate benefit-sharing;
- take into consideration the nexus between poverty and environmental degradation;
- encourage joint research between local, regional and international research organizations.

5.5.1 Proposed Actions

The following research priorities should be implemented:

1. Undertake an audit of research activities with a view to determine their relevance and adequacy for land degradation and drought
2. Review the national policy on science and technology prepared by the National Council on Science and Technology to ensure that it addresses the needs of the NAP
3. Formulate a coordinated research programme for land degradation and drought including the nexus between global climate change and land degradation and drought in Barbados

5.6 Monitoring and Evaluation (Priority II)

Land degradation and drought, like other aspects of environmental change, take a considerable time period before they are detected. The symptoms are not always immediately obvious to local resources owners and users, or government decision-makers. The impacts could have significant social, economic and environmental consequences requiring costly corrective actions. In order to prevent and/or reduce the significant impacts of land degradation and drought it is necessary to formulate and execute a comprehensive monitoring and evaluation framework. In this regard, any effective monitoring and evaluation framework will depend on accurate and timely data and information.

5.6.1 Proposed Actions

1. Development of a comprehensive national environmental information system including Geographical Information Systems (GIS) and Land Information Systems (LIS);
2. Implementation of proposed national indicators and benchmarks for land degradation and drought
3. Development of an Early Warning System (EWS) for land degradation and drought
4. Development of a Code of Good Practice for agriculture

5.7 Indicators

In recognition of the crucial importance of benchmarks and indicators to the achievement of sustainable land management and overall sustainable development at the national level, the Government of Barbados has identified a number of indicators to demonstrate, monitor and evaluate the country's progress towards sustainability and ultimately a 'Green Economy'. Indicators have been identified through a National Indicators Programme to cover the area of environment, economic, development and social welfare. The environmental indicators identified have been categorised into various themes Air, Land Use and Water. Land Degradation has been identified as a sub-theme under the 'Land Use' theme. The specific indicators identified for land degradation are as follows:

1. Annual rates of erosion
2. Property damage, people displaced due to flooding/landslides
3. Activities threatening erosion e.g. monocultures and overgrazing
4. Soil conservation measures implemented
5. Rainfall data (periodicity, duration intensity etc.)

Land area is a critical issue for Barbados and considerable efforts have been made to mitigate the impacts of land degradation and drought. The Government of Barbados is cognizant of the fact that for any indicator initiative to be successful in today's technologically advanced society it must be information technology driven and; in this regard, Government is assiduously working towards putting systems in place to facilitate ongoing data collection, analysis and reporting in real time. The development and full implementation of the use of Land Degradation indicators is therefore a critical component of an integrated approach to tackling this issue in Barbados.

5.8 Project Concepts

The Land Degradation Coordination Unit (LDCU) should seek to develop and implement the following priority actions.

Table 5.1 Priority Actions

Project	*Objectives*	*Activities*	*Timeframe*	*Priority*
Establishment of the Land Degradation Advisory Council (LDAC)	To provide proper advice and guidance in respect of the formulation and development of sustainable land management and drought mitigation programmes, policies, projects and plans	1. Institutional Audit 2. Assessment of relevant existing institutions 3. Evaluation and Recommendations	Within one year	I
Institutional Strengthening of the Soil Conservation Unit (SCU)	1. To rationalise the existing institutional framework for implementing the NAP 2.To Strengthen the SCU to become the main executing agency for the implementation of the NAP 3. To establish the Land Degradation Coordination Unit	1. Review the existing institutional and legal arrangements 2. Evaluation and recommendations (institutional and legal)	Within three years	II
Capacity needs assessment of all relevant stakeholders including NGOs	1.To strengthen the capacity of relevant stakeholders 2.To create a civil society focal point for land degradation and drought	1.Identify all relevant stakeholders 2.Review and evaluate capacity needs 3.Develop action plan for building capabilities of stakeholders 4.Establish a national civil society focal point	Within three years	II
Establish an Environmental Fund	To develop a sustainable funding mechanism to support environmental management in general; and sustainable land management and drought mitigation in particular	1. Gap Analysis 2. Review and evaluate alternative mechanisms 3.Establishment of Fund	Within one year	I
Elaboration of the Elements for a National Framework for Sustainable Land Management	1.To identify agreed priority land degradation issues 2.To guide the implementation of the NAP at the community level 3. To facilitate consensus among the relevant stakeholders	1.Review of all relevant policies, plans, programmes and projects 2.Identification of gaps, overlaps, and omissions 3. Identification and evaluation of agreed priority activities 4. Identification and mobilisation of required	Within one year	I

Project	*Objectives*	*Activities*	*Timeframe*	*Priority*
	4. To create a partnership among key stakeholders 5.To mainstream sustainable land management and drought mitigation into the national development agenda	resources 5. Development and execution of a comprehensive training, public awareness and education plan		
Development of a national land degradation and drought research programme	To build a sound body of scientific data and information to guide policy formulation and practice.	1.Underatake an audit of national research programmes 2.review and evaluate relevant policies, plans, programmes and projects 3. prepare and implement a national strategy for science and technology relating to land degradation and drought e.g. including the development of Scotland District Environmental Standards	Within three years	III
Undertake a comprehensive assessment of land degradation in the limestone areas of Barbados	1 To identify the status of degradation in the limestone areas of the island	1. Identify the factor causing or contributing to land degradation in the limestone area 2. Identify the practical measures for preventing or mitigating land degradation limestone area 3. Review the Carroll and Vernon Soil Classification for Barbados 4. Prepare an updated Soil Classification Map for Barbados 5. Promote the use of grassed buffer zones around field edges and along roadsides and cross-hill 6. Formulate a Code of Good Agricultural Practice	Within one year	I
Develop a Reforestation Project for the Scotland District	1. To mitigate land degradation by increasing the tree cover within the Scotland District	1. Undertake a detail data collection exercise and inventory of all critical parameters and resources 2. Prepare a reforestation plan including identification of appropriate species	Within three years	II
Create employment and income generating	1. To reduce rural poverty 2. To enhance livelihood	1.Create agro-zones, for example, tree crop planting and land reforestation in	After three years	III

Project	*Objectives*	*Activities*	*Timeframe*	*Priority*
opportunities		environmentally sensitive areas (ESA) 2. Develop education and training programmes for targeted communities 3.Develop and improve infrastructure (roads, markets, water, etc.) 4. Improve land tenure security 5. Involvement of NGOs in planting and management 6. Promote tourism and nature-based tourism in appropriate areas 7. Encourage processing/added value employment through fruit crop cultivation and the sustainable use of timber and non-timber forest products		
Promote environmental conservation and sustainable utilisation of resources	1. to ensure the protection and conservation of biodiversity 2 to ensure the sustainable utilisation of resources including mineral resources	1. Ensure the adoption and implementation of relevant strategies, policies and plans including the NBSAP, and PDP 2003, 2. Develop guidelines, including economic measures, for the mining sector	After three years	III
Development of an Early Warning System for Drought	To develop capacity to reduce risk and vulnerability to drought	1. Undertake an assessment of drought hazards including surveys of affected communities 2. develop early warning strategies including at community level	Within three years	II

During the finalization of the National Action Programme document, the Government of Barbados consulted with representatives from various stakeholder agencies and organizations in order to identify project ideas that could be developed into full project proposals for subsequent submission for funding. A number of stakeholders that included representatives from various government agencies, technical experts and civil society was asked to conceptualize projects that could be designed to mitigate or prevent the negative impacts of desertification, land degradation and drought based on their respective mandates. The agencies and organisations consulted in relation to the submission of project concepts were as follows:

- The 4-H Foundation
- The Agricultural Planning Unit, Ministry of Agriculture
- The Barbados Agricultural Society
- Barbados Environmental Society

- Barbados Water Authority
- Coastal Zone Management Unit
- Community Development Department
- The Drainage Unit
- Environmental Protection Department
- The Meteorological Department
- Ministry of Housing and Lands
- National Botanical Gardens
- National Conservation Commission
- Soil Conservation Unit
- Town and Country Development Planning Office
- Natural Heritage Department
- Inter-American Institute for Cooperation on Agriculture
- Centre for Resource Management and Environmental Studies, UWI

Representatives from the aforementioned agencies, departments and organisations were first invited to a workshop where they were asked to contribute any ideas they had in relation to future potential fundable projects specific to the area of combating land degradation in Barbados. Subsequently the representatives were then given additional time to develop their ideas in a little more detail, the final result at this stage being a project concept that could later be developed into full project proposals that could be submitted for funding.

Table 5.2 Project Concepts

Project Title	*Objectives*	*Activities*	*Timing*	*Responsible Agency*	*Performance Indicators*	*Means of Verification*	*Risk Assumption*	*Cost $BB*
Reforestation in the Scotland District Area	To reduce land degradation in the eroded areas of the Scotland District. Particularly in the area between Barclays Park and Chalky Mount.	Select, propagate and plant varieties of floral species (grasses, shrubs, trees etc.) that can survive in the harsh conditions in the area. Establish *Chrysopogon zizanioides* (Vetiver Species) locally known as Cuss cuss on the contour to prevent run-off.	During the wet season of 2011	Barbados National Trust	- Survival and growth of the trees. -Cessation of erosion of the soil. -Beautification of the area	Change in the landscape from desert conditions to a forested area	Adverse weather ie Heavy rain, landslides pest damage and Praedial Larceny will slow the pace of the project	120,000.00
Measuring and Monitoring the Meteorological Conditions in the Scotland District	To set up an automatic weather station and develop a sampling programme to take accurate measurements in relation to weather conditions and ground water availability in the Scotland District.	- To observe and record rainfall, ambient and extreme temperatures, humidity, solar radiation, evaporation and wind data. -To Measure Reservoir levels - To take Well measurements e.g. Output from sources, Groundwater table levels & Salanity (sheetwater wells)	During 2011	Barbados Meteorological Service in conjunction with the Barbados Water Authority	Improved data collection and record keeping for the area Improved planning for the area which results in faster real time responses in the event that there is an emergency	Improvement in the record keeping for the area Using the data in crop and climate predictor models	Vandalism or theft of instruments may slow the progress of the project	50,000.00
Stabilisation Works in the Scotland District	To construct the most appropriate engineering solutions for stabilization works in 18 project areas within the Scotland	- To provide drainage infrastructure to improve the stability of the area - To engineer water courses & slopes to	Commence During 2008 Option A - Five (5) year implementation	Soil Conservation Unit	Effective control of surface and subsurface flows Reduced slippage/erosion	Presence of healthy plant growth in degraded areas Increased plant coverage in degraded	There may be an occurrence of strong weather systems that could impede the work for extended periods of time	35,900,000.00

	District	control surface & subsurface water - To undertake a detailed data collection exercise and inventory of all critical parameters and resources - To Prepare a reforestation plan including identification of appropriate species - Reforestation of degraded areas	period Option B- Ten (10) year implementation period		Maintenance of access for residents, agriculture, tourists and commerce Reduction of infrastructural damage	areas Reduction in the number of degraded areas Reduction in infrastructural damage from land slippage		26,500,000.00
Capacity Building in Youth for Sustainable Land Management	-To develop clear plans and guidelines for a reforestation project (this would be done in conjunction with the Soil Conservation Unit) - To Restore degraded land areas through education and active involvement of youth in sustainable land management.	- 50 000 trees to be planted - 50 Youth group members trained in information technology and use of GPS equipment. - Construction 3 shade houses at selected schools.	June 2008 to April 2009	National Conservation Commission	Sustainable reforestation projects implemented by youth organizations	Reports submitted to technical committee for sustainable land management Preparation of Monitoring reports.	Adverse weather conditions may affect the competion of the project on time Pests and Disease outbreak could destroy the trees and therefore extend the competion date for the project	$204,000.00
Measurement of Annual Rates of Erosion in the Scotland District	To collect, record & store accurate erosion rates for the Scotland District.	Collecting & analyzing data	Dry season 2011	Soil Conservation Unit	Improved record keeping & management of records - Increased vegetative	Better management within the Scotand District	Equipment will not be damaged Accurate records and readings may not be	200,000.00

	-To use annual erosion rates to develop re-vegetation programmes for the relevant areas & minimize negative impacts of erosion on the environment - Develop a map using GIS that can be continuously updated.				cover		kept	
Measurement of Property Damage and People displaced due to Flooding and/or Landslides	- To identify & record the number of properties, people displaced due to flooding and landslides over time - To measure the percentage population living in areas subject to significant risk as a result of potential hazards e.g. land slippage & floods -To develop a database of areas where monocultures and overgrazing occur so that the appropriate mitigation measures and remediation activities can be put in place to allow the area to recover where necessary or prevent irreparable damage being caused to the land area -To develop public awareness initiatives	Collecting and analyzing data - Development of an action plan or guidelines or rescue plans in relation to resolving issues pertaining to property damage, people being displaced due to flooding and landslides -Development of public awareness programmes that inform the population about events specific to land degradation that can cause property damage and displacement and how they can minimize or avoid the negative impacts both on their lives and the environment	2011	Disaster Management Agency	Improved records of properties damaged, people displaced due to flooding/landslides -Ability to gauge/predict number of people that may be affected by land degradation & improvement in response time & implementation of restoration efforts to assist persons affected	Maintenance of a current database	Limitations to the amount of data that can be collected	120,000.00

Measurement of Activities that threaten to cause Erosion e.g. monocultures, overgrazing	To develop a database of areas where monocultures and overgrazing occur around the island - To map areas where activities that threaten to cause erosion may occur	Collect data -Develop a database of activities that threaten to cause erosion Develop a GIS database in relation to the areas that are currently degraded or under threaten erosion	2011	Soil Conservation Unit, Ministry of Agriculture in partnership with the Environment Division of the Ministry of Environment, Water resources and Drainage	Improved ability to monitor areas that threaten to cause erosion	Development and maintenance of a current database	Limitations to the amount of data that can be collected	70,000.00

5.9 Funding Mechanisms

There are a number of potential funding mechanisms which are available to assist with regards to desertification activities in Barbados and specific project development related to land degradation. The Global Environment Facility (GEF) established in 1991, is an independent financial organization that provides grants to developing countries for projects that benefit the global environment and promote sustainable livelihoods in local communities. GEF grants support projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

Recently, in order to support the implementation of the aims of the UNCCD, the Global Environment Facility (GEF), adopted an Operational Programme on Sustainable Land Management. Under this Operational Programme the Global Mechanism has a major role to play in working with Parties to the Convention and other stakeholders including UN Agencies and the donor community in financial resource mobilization.

There are three themes which GEF focuses on in Land Degradation and these are:

(i) **Agriculture**. -Sustainable agricultural practices—such as crop diversification, crop rotation, water harvesting, and small-scale irrigation schemes—can help the productivity of both rain-fed and irrigated agriculture

(ii) **Rangeland**. GEF promotes sustainable rangeland management through the strengthening of viable traditional rangeland management systems and other measures that improve soil and water conservation, while supporting GEF's goal of conservation and sustainable use of biodiversity; and

(iii) **Forest**. GEF financing may include pilot or demonstration activities aimed at preserving viable indigenous forest and woodland management systems. These activities may involve innovative schemes to secure financial, socio-economic, and ecological sustainability.

GEF has different types of projects, these include large scale projects which are often over US$ 5 million dollars, medium sized projects of less than US$1 million and small grants of up to US$50,000. The small grants programme is administered through the United Nations Development Programme.

The GEF however is not the only source of financial resource which can be exploited for funding projects relating to land degradation and desertification. The Food and Agricultural Organization has a **Technical Cooperation Programme (TCP).** The TCP projects are available to FAO Member Nations on the basis of their priorities and expressed needs. TCP assistance is given to projects of an urgent and unforeseen nature that could not be foreseen in FAO's regular programme of work. Other characteristics are its speed in approval; limited project duration; low costs; practical orientation; catalytic

role and the complementarity with other sources of assistance. The criteria, which govern the nature and the types of TCP technical cooperation, as laid down by the FAO Governing Bodies, require that requests from governments:

(a) give emphasis to increasing production in food and agriculture, fisheries or forestry, with a view to increasing incomes of small-scale producers and rural workers;

(b) be accorded high priority by the Government, which must also ensure that the required local support facilities and services will be available and that follow-up action will be taken;

(c) be directed to an urgent and specific problem or need, limited to a particular sector or area, and involve practical action with well-defined objectives and expected results;

(d) complement, without duplicating, other development activities, fill a critical gap and, where possible, serve as a catalyst for a larger-scale activity;

(e) be limited in duration, preferably from one to three months (in no case should the overall duration of project activities exceed 24 months)

(f) be limited in cost, not exceeding the upward limit of US$400 000 per project and preferably much lower, and involve the most effective and least costly method of execution;

There are a number of other organizations which may be interested in funding desertification projects once they are related to agriculture, land degradation and sustainable livelihoods. The Inter American Institute for Co-operation on Agriculture (IICA) may provide some small amounts of money for specific agricultural projects.

Other inter-governmental organizations that provide technical and financial assistance include:

(a) UNEP – The Partnership Initiative on Sustainable Land Management (PISLM) has been developed as one of the strategies of the technical work programme of the Caribbean SIDS Programme of the Forum of Ministers of Environment for Latin America and the Caribbean. The Caribbean SIDS Programme is being facilitated by UNEP/ROLAC as the secretariat for the Forum of Ministers of Environment for Latin America and the Caribbean.

PISLM is expected to assist with the identification and provision of tangible benefits to the Caribbean SIDS. The partners of the PISLM include GM/UNCCD, UNCCD Secretariat, UNEP, FAO, CARICOM Secretariat, and the University of the West Indies, Civil Society including (RIOD), GTZ and Caribbean SIDS.

The PISLM offers a useful approach and model based on partnership arrangements among all relevant stakeholders at the local, national, regional and international level. The Government of Barbados supports the PISLM as a regional platform for the implementation of the UNCCD. The PISLM contains the following sub-components:

- The elaboration of National Action Plans:

- Establishment of a Regional / Sub-regional Platform for the implementation of the UNCCD, including the building of complementarities with other MEAs:
- Elaboration of integrated sub-regional Action Plans (SRAP):
- Development of Methods and Tools for Monitoring and Measuring Land Degradation:
- Training, Research, Capacity Development and Policy Analysis
- South-South Cooperation:
- Targeted GEF Interventions:

(b) IFAD – The mission of the International Fund for Agricultural Development (IFAD) is enabling the rural poor to overcome poverty. The main focus of the Fund is on rural poverty reduction working with poor rural populations to:

- Eliminate poverty;
- Eliminate hunger and malnutrition;
- Raise productivity and incomes; and
- Improve the quality of lives of rural poor

IFAD works in partnership with others at various levels including governments, affected communities and other donor organizations. Its concentration on local activities provides the Fund with a role as a broker in bridging the gap between multilateral and bilateral donors on the one hand and civil society on the other.

IFAD provides grant funding to support technical assistance for the following purposes:

- To assist countries in undertaking feasibility studies for agricultural projects aimed at developing capabilities and skills;
- Expanding trained personnel and their integration into monitoring systems;
- Undertake special studies or pre-investment projects in problem areas such as drought prone areas;
- Support for research and extension activities such as the development of technology appropriate for small farms.

(c) GM/UNCCD - The *Global Mechanism* (GM) was established in accordance with Article 21 of the UNCCD, with a mandate to, "increase the effectiveness and efficiency of existing financial mechanisms and to promote actions leading to the mobilization and channeling of substantial financial resources, including for the transfer of technology, on a grant basis and/or on concessional terms, to affected developing country Parties. Under the newly established Operational Programme under the GEF for sustainable land management the Global Mechanism has a major role to play in working with Parties to the Convention and other stakeholders including UN Agencies and the donor community

in financial resource mobilization. The GM/UNCCD is one of the lead partners in the PISLM.

(d) UNDP-GEF: The UNDP has been designated by the GEF as one of its three Implementing Agencies. The role of the GEF is to help developing countries fund projects and programmes that protect the global environment. UNDP also manages the GEF Small Grants Programme.

GEF grants support projects related to Land Degradation. A land degradation portfolio has been established with US$63 million focusing on desertification and deforestation in developing countries, primarily in LDCs and SIDS, The US$63 million comprise US$31 million as grant funding and US$31 million as co-financing.

5.9.1 Civil Society and Funding for Sustainable Land Management

In many instances major groups (farmers, women, youth, labour, etc.) are frontline actors in the day to day implementation of measures related to the achievement of the objectives of the UNCCD. NGOs and CBOs have a critical role to play as key partners in the fight against land degradation and drought and should be enabled through the provision of adequate resources. In several instances it may be more prudent for civil society actors to take the initiative and lead in the formulation and execution of programmes, projects and plans for sustainable land management and drought mitigation.

Funding may be accessed by Non-Governmental Organisations (NGOs) that are interested in conservation projects and projects which enhance biodiversity. The Inter-American Foundation (IAF) is an independent agency of the United States government that provides grants to non-governmental and community-based organizations in Latin America and the Caribbean for innovative, sustainable and participatory self-help programs. The IAF primarily funds partnerships among grassroots and nonprofit organizations, businesses and local governments, directed at improving the quality of life of poor people and strengthening participation, accountability and democratic practices. The IAF could thus be used by NGOs being promoted by government.

Another possible source of funding for civil society is the United Nations Development Programme (UNDP) Small Grants Programme where NGOs can access funding of up to US $50,000.00.

5.10 The Way Forward

There are a number of clear steps still to be taken to advance the strategy and action plan to combat land degradation and drought in Barbados. These include:

(i) Formulation of a full public awareness and education programme, informed by a Knowledge, Attitudes and Perceptions Study (KAP). The programme should target specific stakeholders as well as the general public and should take a multi-sectoral, multi-media approach. This is key as success can only be achieved if concepts and practices are accepted and adopted on an individual basis.

(ii) Procurement and expansion of financial, human and technological resources. The need for institutional strengthening and capacity building cannot be ignored. The need for data collection and analysis, and the use of data in decision-making is also critical. Oftentimes when funding is low data collection is the first component cut from the budget, however if land degradation and drought are to be combated effectively, data collection at the primary and secondary level are components that must be supported.

(iii) Development, implementation and maintenance of a programme for monitoring and mitigating the effects of land degradation and drought. An early warning system should be built in. This would allow for both pro-active and reactive actions and would bring a more holistic approach to combating land degradation and mitigating against the impacts of land degradation and drought.

(iv) Development, documentation and protection of local, knowledge and practices with respect to hard and soft engineering solutions and other approaches to address land degradation and mitigate against the impacts of land degradation and drought. While experiences with respect to addressing desertification should be shared, intellectual property rights issues should also be addressed in this regard.

(v) Support and strengthen mechanisms for stakeholder participation in the implementation of the actions outlined in the National Action Programme. The participation of communities and stakeholders identified in the planning process is critical as the programme cannot be implemented successfully at the Government level alone.

(vi) Implementation and amendment of appropriate legislation to effectively support the NAP and related policies that address land degradation and drought prevention and mitigation.

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