

**SAINT KITTS AND NEVIS NATIONAL REPORT ON THE
STATUS OF LAND DEGRADATION AND PREPAREDNESS
FOR THE IMPLEMENTATION OF THE UNITED NATIONS
CONVENTION TO COMBAT DESERTIFICATION**

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Consultation with Varied Stakeholders***

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Executive Summary

St. Kitts and Nevis is a twin island country with a total landmass of just 269 square kilometers, and is part of the Eastern Caribbean chain of islands. The island of St. Kitts, the larger of the two, is 176 square kilometers in size and is located at latitude 17.3⁰ N, and longitude 62.8⁰ W. Nevis is 93 square kilometers and located at latitude 17⁰ 10' N, longitude 62⁰ 35' W, approximately 3 km south-east of St. Kitts. This country has a tropical and maritime climate that is heavily influenced by northeast trade winds, an average temperature of some 27 degrees Celsius, and annual average rainfall of 801.4 mm.

The island of St. Kitts generally rises from the coastline toward its mountain cluster. Three volcanic centers, their associated glacial deposits, and a chain of more maturely reduced residual hills linked by recent beach and saline deposits characterize the topography of the central northwest range.

Nevis lies on the inner volcanic arc of the Lesser Antilles and is comprised of nine distinct volcanic centers strung out southwest to northwest along a parallel of the inner volcanic arc. The central Nevis Peak is the most imposing of these centers rising to 985 meters in altitude, giving the island a conical appearance. Mount Lily (Windy Hill) to the north climbs to 309 meters with Saddle Hill in the south rising to 381 meters. The other subsidiary peak of note is Butlers Mountain (578 meters) which thickens the range in the central east of the island.

The island of St. Kitts is composed almost exclusively of volcanic rocks of andesite or dacite mineralogy. Its geology is similar to that of other volcanic islands in the Lesser Antillean Archipelago. The islands are the summits of a submerged mountain range which forms the eastern boundary of what is known as the Caribbean Tectonic Plate. St. Kitts is oriented northwest-southeast, about 80 km long and 16 km wide. The entire island archipelago is geologically young, having begun to form probably less than 50 million years ago, during the Miocene era. Volcanic activity occurred along the ridges of this arc during the Miocene era and has continued since.

Nevis is a volcanic island that began its formation in mid-Pliocene times (approximately 3.45 million years ago). However, the island comprises a number of discrete eruptive centers that range in age from mid-Pliocene to Pleistocene, these prevent any single model of the island's geological evolution. The geology of Nevis can be subdivided into four informal units: Volcanic of the eruptive centers, volcanogenic rocks - pyroclastics and lahars, fluvial and lacustrine deposits, and raised beaches.

The soils of St. Kitts have been studied and described in detail by Lang and Carroll (1966) and modified by Granger (1995). Edaphic conditions have been greatly influenced by the island's volcanic origins. Soils of a given type are in most cases a product of the extent to which a given volcanic parent material has weathered. Generally, the soils of St. Kitts can be placed into groups and types. According to Granger (1995), the soils are generally quite young pedogenically

showing very little weathering and profile development. Whereas the most developed soils are found on the steep wet upper slopes, the soils on the gentler, but drier, lower slopes show very little profile development.

In the first soil survey of Nevis conducted by Hardy and Rodrigues, it was noted then that Nevis' soils were generally impoverished with respect to potash and that they differ significantly from those on St. Kitts (Hardy and Rodrigues, 1947). The soil type in St. Kitts is predominantly a sandy loam while the Nevis soil is clayey.

The climate of St. Kitts and Nevis is classified as tropical marine. Generally, steady northeast trade winds and tropical oceanic cyclonic movements influence it. Furthermore, the islands enjoy warm even temperatures with a mean of approximately 27⁰ Celsius. Seasonal and diurnal variations in temperature are small.

Rainfall is mainly orographic and increases in amount and frequency with the altitude. Except for the Southeast Peninsula (SEP) which is very dry, mean annual rainfall ranges from about 16 cm in the coastal areas, to about 60 cm in the central mountain ranges. The situation at the SEP is quite different, with mean annual precipitation varying from 15.6 cm on the peaks to 13.6 cm at Cockleshell Bay.

While some Caribbean countries such as Dominica have undisturbed and extensive forests, the present vegetation of St. Kitts and Nevis provides evidence of great disturbance by human activity. In the lowland areas intensive land use has removed all vestiges of the natural vegetation. Although the mountain peaks are still covered by forest, they do not have virgin forest characteristics. Lower slopes are covered by secondary growth on abandoned farms. The vegetation, which comprises about 243 species of trees (Beard, 1946), supports wildlife.

The most significant factor that influences vegetation distribution in St. Kitts and Nevis and other small islands is the distribution of rainfall. Islands with several peaks cause moisture laden air to rise as it moves in a westerly direction. As a result, when the moisture cools and precipitates rain, most of it occurs consistently on the upper slopes and toward the leeward side of the island. Other factors that contribute to the variations in microclimates and the change in vegetation distribution includes altitude, temperature, humidity, saltiness of the air, the intensity and incidence of sunshine, wind exposure, and soil types. These factors in totality significantly influence the bio-diversity of the island.

Water drains in a radial pattern from the central mountain range in St. Kitts to the ocean, interrupted only by the minor volcanic cones at Brimstone Hill, Ottley's mountain, Sandy Point Hill and Monkey Hill. Most of the water channels are deep and steep-sided, and are usually dry along all or most of their stretches. Only the relatively large Wingfield and Cayon rivers flow almost to the sea for much of the wettest part of the year.

Water drains in a radial pattern from Nevis Peak to the ocean through ten (10) major drainage

basins and is interrupted only by the smaller volcanic cones of Hurricane, Saddle and Round Hills. These basins comprise ephemeral ghauts that may consist of up to three stream orders namely Camps River, Barns Ghaut and Kitt Ghaut. In some basins water is channelled from 457 cm above sea level through relatively straight ghauts with steep but not extended sides. The steep sloping sides of the ghauts favour rapid run-off that causes a quick flow of water to the island's coastal areas. This is coupled with the fact that the rain forest is very small and readily exposes any run-off to open evaporation, thereby reducing the amount of available recharge. In addition, the gently sloping peripheral/coastal section of Nevis is not extensive enough to allow for substantial recharge. Almost all of the ghauts are ephemeral except the Bath Stream, which flows year-round to the sea from springs less than 1.6-km inland. Most of the other ghauts flow intermittently, about 3 to 4 times annually, but more excessively after rainfall.

Most of the country's major watersheds are concentrated in the central area of the islands. The area's forest resources provide a reliable rainwater storage service. Rainwater is intercepted by the forest canopy and then absorbed by the soil and root systems.

The coastal and marine ecosystem in St. Kitts includes coral reefs, sea grass beds, mangroves, salt ponds, diverse aquatic life, and the coastline. As an island territory, St. Kitts has a fragile 78.1-km long coastline in need of special protective measures for ecological, environmental and economic reasons. It consists of 34.7 km cliff (rocks), 10.8 km cobble, 6.3 km boulders and rocks, 13.1 km black volcanic sand, and 13.2 km golden sand.

Processes of erosion and accretion are occurring at different points on the coast. This is a result of natural factors such as hurricanes, and manmade causes such as beach sand mining, construction too close to the shore, and pollution. While law strictly prohibits large-scale removal of beach sand, it is still being practiced illegally in some places.

Coastal erosion is a serious problem in view of the fact that the beaches represent a very important resource to the island. Not only are they heavily used for local recreation, but they are also a vital part of the tourism product. Additionally, they protect coastal infrastructure during storms and periods of high wave activity.

Coral reefs and sea grass habitats are generally found along the southwest coast between Nag's Head and the southern end of Basseterre Bay, on the northwest coast between Sandy Point and Dieppe Bay, on the east coast between Conaree and North Friar's Bay, and on the southeast coast adjacent to the Narrows. Most coral habitats are relatively small with less species diversity than is typical of similar habitats in the Eastern Caribbean. Deep reefs with species diversity are found off Sandy Point and Guinea Point, and in the Narrows. Sea grass beds, dominated by turtle grass and manatee grass species are mostly common in the SEP of the island.

Mangroves were once abundant. This is no longer the case. The main and most extensive mangrove habitat in St. Kitts occurs in the SEP. Hawksbill and green sea turtles are found around the entire coast. In addition, a large number of resident and migratory birds depend on

the mangrove and pond communities for feeding and nesting. Thus extensive effort is needed to conserve what remains and arrest the decline of these important habitats.

The St. Kitts Sugar Manufacturing Corporation (SSMC) and the Public Works Department, with very limited resources, have been putting measures in place to arrest the severe land degradation along College ghaut (ravine). SSMC's interest in this activity is influenced by the fact that sugarcane fields in close proximity are progressively undermined by severe erosion. The Public Works Department recognizes that where this ghaut passes suffers severe land degradation in relatively highly populated areas. There is a real threat to human life.

Many other ghauts on the island have severe erosion problems almost with similar intensity to that of College ghaut with the exception, however, that they may not be passing through highly populated areas. Degradation along these ghauts undermines arable farmlands, mainly sugar lands. Also excessive silt from erosion is deposited into the sea, contributing to negative effects on the sea grass beds, coral reefs and other spawning grounds in the marine environs.

Most of the arable lands in St. Kitts are under sugarcane cultivation. This crop which is a member of the grass family, when managed efficiently, is very useful in preventing the erosion of sandy loam soils, the type that is predominant in St. Kitts.

Arable lands in the upper land areas of the island where sugarcane cultivation takes place suffer erosion where there is absence of sound contouring principles and terracing.

Unscientific as well as illicit farming occurs in some sections of the forest thus predisposing the land to degradation. Many areas in the forest where there are landslides result from this type of farming.

Mining of sand for building purposes has undermined many beaches. In the process, sand dunes, which are provided by nature for protection of beaches against tidal surges, are destroyed, and this process destroys the natural nesting habitats of turtles.

The island main road in St. Kitts traverses part of the coastline of Half Way Tree Village. That coastline is being eroded and so too is that part of the main road which traverses it. A bypass road may be necessary to protect road users.

A World Bank project is underway for the Old Road Bay area. It will analyze the condition of the bay area and determine whether the use of organic nets on the slopes will help protect the road. Huge rocks do fall down the shore occasionally and pose severe risks to road users.

Several factors contribute to severe land degradation on the peninsula. Massive deforestation in the past first predisposed the area. The land is volcanic in nature several slopes have been left unstable after a major road was cut through the hills. The rocks on the slopes pose real danger to

road users as they have not been cut back to their natural line.

There is an abundance of monkeys. In addition to being a health hazard, they are pests that destroy farmers' crops. They ravage sugarcane grown for export and destroy vegetation in sensitive areas thus contributing to predisposing areas to land degradation.

Land degradation is prevalent in low lying areas, especially Bath Village and Indian Castle in Nevis which receive the lowest amounts of rainfall and also suffer through extensive livestock grazing by small ruminants and a growing donkey population. As a result, there is a lack of vegetation, which leads to large tracts of sloping land that will be prone to erosion, and abundant levels of sea blast, leaving salt on land.

The stakeholders are the farmers, the St. Kitts Sugar Manufacturing Corporation, the fisheries department, the Government of St. Kitts and Nevis (GOSKN), land developers, the general public and help is sought from the Legal department.

The NGO community shows concern for environmental issues. It is comprised of the Nevis Historical and Conservation Society, the St. Kitts Heritage Society, the Leo/ Lions Club, the Jaycees, Rotary Club, Scouts, Boys Brigades, Girls Guides, Optimist Club, Anglican Young Peoples Association (AYPA), Pathfinders Association, Business and Professional Women (BPW), and the local media.

St. Kitts and Nevis are also members of the Caribbean Conservation Association (CCA), a regional non-profit Organization dedicated to promoting policies and practices which contribute to conservation, protection and wise use of natural resources. The Caribbean Natural Resources Institute (CANARI), formerly the Eastern Caribbean Natural Area Management Programme (ECNAMP) also supports St. Kitts and Nevis in its goal to strengthen local capacity to manage the living resources critical to development in the Caribbean region.

The National Environmental Action Plan (NEAP) analyses the environmental issues affecting St. Kitts and Nevis in a comprehensive, multi-sectoral framework and sets forth a long-term strategy for maintaining the country's natural environment, the health and safety of its population, and its cultural heritage as economic development occurs. In proposing practical measures to forestall or remedy environmental problems, the analysis considers cross-sectoral links that affect renewable and non-renewable resources, as well as human activity. The objective is to set forth a long term national environmental policy and investment strategy based on comprehensive environmental analysis.

Like other small OECS countries, St. Kitts and Nevis faces substantial environmental challenges with limited managerial and technical resources to meet them. Hence, the national environmental priorities have to be carefully determined and the available resources, including those that can be marshaled through aid, used to maximum advantage.

The government also intends to build on the existing legal foundation to complete the legal and regulatory framework for environmental management through the promulgation of implementing regulations for existing legislation, the adoption of legislation requiring environmental impact assessments for all major public and private sector investment, and the revision of major laws such as the Public Health Act.

Actions to be taken to develop institutional capacity include (a) strengthening the technical capacity and increasing the financial resources of the National Conservation Commission; (b) developing the environmental role of the Physical Planning Unit; and (c) improving the capacity of all Ministries with environmental responsibilities.

One of the major problems being faced is that there are not sufficient or updated laws or regulations in existence that deal with combating desertification. And for the laws that do apply, there is a lack of enforcement.

The National Conservation and Environmental Protection Act (NCEPA) 1987 provides some protection. It has been discovered that there is a severe shortage of legal draft personnel to prepare to prepare regulations for making the Act more useful. Here the National Conservation Commission, which is provided for under the NCEPA Act needs to be strengthened.

The Federation of St. Kitts and Nevis is not yet in a position to present to the Conference of Parties a fully developed National Action Programme. Our government will take a planned approach, however. And it will be a fully integrated approach, along the lines set out by the Convention.

1.0 GENERAL INTRODUCTION

1.1 Location

St. Kitts and Nevis is a twin island country with a total landmass of just 269 square kilometers, and is part of the Eastern Caribbean chain of islands. The island of St. Kitts, the larger of the two, is 176 square kilometers in size and is located at latitude 17.3⁰ N, and longitude 62.8⁰ W. Nevis is 93 square kilometers and located at latitude 17⁰ 10' N, longitude 62⁰ 35' W, approximately 3 km south-east of St. Kitts. This country has a tropical and maritime climate that is heavily influenced by northeast trade winds, an average temperature of some 27 degrees Celsius, and annual average rainfall of 801.4 mm.

1.2 Topography

The island of St. Kitts generally rises from the coastline toward its mountain cluster. Three volcanic centers, their associated glacial deposits, and a chain of more maturely reduced residual hills linked by recent beach and saline deposits characterize the topography of the central northwest range.

The highest point is Mt. Liamuiga, rising with a pronounced crater to 1,156 meters (m). Southeast of Mt. Liamuiga, the now dormant volcanic chain continues with the middle range and the southeast range. The summit of Verchild's Mountain is the highest point of the middle range with more than 976 m above sea level. A broad gently sloping saddle of about 457 m high known as Phillips, and Wingfield levels separate the middle range from the southeast range. The highest point of the southeast range is 900 m. Both ranges consist of a number of irregular related peaks, and their glacial slopes are steeper and shorter towards the leeward coast after which the land descends into the Basseterre valley. The Canada hills on the north eastern part of the island, rising to about 335 m are separated by a deep depression from the Morne and Conaree hills, which terminate in the neck of the South East Peninsula (SEP).

The SEP is largely characterized by tied islands, about one third of a mile wide and with peaks of up to 180- 213 m. The southern extremity has hills with elevation up to 335 m. The peaks of all these mountains are less than seven kilometers from the sea, an indication of the island's high relief, which in turn, has had and will continue to have an important orographic influence on the climate, on land use, and on the general physical development of the island.

The terrain slopes down steeply from the central peaks, flattening out to gentle slopes and low cliffs towards the coastal fringe. Thus, most flat or moderately sloped land occurs near the coastal area, so most urban and agricultural developments have occurred in these areas. Minor domes protrude from these lower slopes at Brimstone Hill, Ottley's Mountain, Sandy Point Hill and Monkey Hill. Furthermore, the slopes are characterized by deeply incised ghaunts with steep sides. These act as the primary channels for drainage.

Nevis lies on the inner volcanic arc of the Lesser Antilles and is comprised of nine distinct volcanic centers strung out southwest to northwest along a parallel of the inner volcanic arc. The central Nevis Peak is the most imposing of these centers rising to 985 meters in altitude, giving the island a conical appearance. Mount Lily (Windy Hill) to the north climbs to 309 meters with Saddle Hill in the south rising to 381 meters. The other subsidiary peak of note is Butlers Mountain (578 meters) which thickens the range in the central east of the island.

The terrain slopes down steeply from these peaks, at approximately 40%, but it flattens out to gentle slopes and low cliffs towards the coastal fringe. These slopes are characterized by deeply incised ghaunts with steep sides, which act as the primary channels for drainage. Most of the runoff through these ghaunts end up in the near-shore marine area, the rest either infiltrates downward to recharge the underground aquifers or collects in coastal lagoons.

1.3 Geology

A comprehensive literature review of the geology of St. Kitts and Nevis was compiled by Lang and Carroll (1964) and appears in their publication "Soil and Land Use Survey," and by Granger (1995) under the Agricultural Diversification Project. Modified extracts of those reviews are presented below.

The island of St. Kitts is composed almost exclusively of volcanic rocks of andesite or dacite mineralogy. Its geology is similar to that of other volcanic islands in the Lesser Antillean Archipelago. The islands are the summits of a submerged mountain range that forms the eastern boundary of what is known as the Caribbean Tectonic Plate. St. Kitts is oriented northwest-southeast, about 80 km long and 16 km wide. The entire island archipelago is geologically young, having begun to form probably less than 50 million years ago, during the Miocene era. Volcanic activity occurred along the ridges of this arc during the Miocene era and has continued since.

St. Kitts has since undergone numerous and considerable changes in elevation but is now relatively stable. Newer volcanics rest on a basement of older rocks, now only exposed where the newer deposits have been denuded. Evidence of older volcanic basement rocks can be seen on the face of the SEP and its extension to the Morne, Conaree and Canada hills. These volcanics are generally coarse agglomerate and intrusive andesites with subsidiary turfs. More recent cone deposits are seen in the centre of the main body of the island. There are three younger volcanic centres along the island's central spine. Middle range and Mount Olivees range appear similar in age. Mt. Liamuiga, the most northerly volcano has a youth appearance and was active in recent (geologic) time.

Nevis is a volcanic island that began its formation in mid-Pliocene times (approximately 3.45 million years ago). However, the island comprises a number of discrete eruptive centers that range in age from mid-Pliocene to Pleistocene. These prevent any single model of the island's

geological evolution. The geology of Nevis can be subdivided into four informal units: Volcanic of the eruptive centers, volcanigenic rocks - pyroclastics and lahars, fluvial and lacustrine deposits, and raised beaches.

1.4 Soil

The soils of St. Kitts have been studied and described in detail by Lang and Carroll (1966) and modified by Granger (1995). Edaphic conditions have been greatly influenced by the island's volcanic origins. Soils of a given type are in most cases a product of the extent to which a given volcanic parent material has weathered. According to Granger (1995) the soils are generally quite young pedogenically showing very little weathering and profile development. Whereas the most developed soils are found on the steep, wet upper slopes, the soils on the gentler but drier, lower slopes show very little profile development.

The soils of the lower slopes are developed in deep, coarse-textured and often gravelly and bouldery volcanic ash. They are excessively well drained with low water holding capacities, and they have a low clay and organic matter content.

At about the 500' ash contour the soils are wetter and show greater weathering and profile development. They have low clay content but higher contents of silt and fine sand. They have a higher water-holding capacity than the younger soils down slope, and are more leached but still have a high inherent nutrient level. The soils of the mountains above the 1000' ash contour have the greatest profile development with high clay contents and bright reddish or brownish colors due to the presence of free iron oxides. They have finer textures and high water-holding capacities. They are more leached than the soils down slope but still appear to be moderately fertile with high levels of organic matter.

In the first soil survey of Nevis conducted by Hardy and Rodrigues, it was noted then that Nevis' soils were generally impoverished with respect to potash and that they differ significantly from those on St. Kitts, (Hardy and Rodrigues, 1947).

Lang and Carroll who recognised 24 different soil series, of which four were subdivided into stony, rocky and stone-free phases, later surveyed the island. This work formed the basis of later works such as a report on potential soil conservation measures, (Darby *et al*, 1987). The fore-mentioned work of Lang and Carroll work has not been accepted without challenge; Knox noted that it could be faulted on the following grounds, (Knox, 1986):

- (a) The soil descriptions given are too brief to erect a workable taxonomy
- (b) The distinctions between soils recognised by Lang cannot be demonstrated convincingly in the field.
- (c) Given the range of soils recognised, the recommendations made for soil management are too few and too general.

1.5 Climate

The climate of St. Kitts and Nevis is classified as tropical marine. Generally, steady northeast trade winds and tropical oceanic cyclonic movements influence it. Furthermore, the islands enjoy warm even temperatures with a mean of approximately 27⁰ Celsius. Seasonal and diurnal variations in temperature are small.

Rainfall is mainly orographic and increases in amount and frequency with the altitude. Except for the Southeast Peninsula (SEP) which is very dry, mean annual rainfall ranges from about 16 cm in the coastal areas, to about 60 cm in the central mountain ranges. The situation at the SEP is quite different, with mean annual precipitation varying from 15.6 cm on the peaks to 13.6 cm at Cockleshell Bay.

Generally, rainfall is unevenly distributed between years and between months with a reliable wet period from August to November and driest months January to April. The relative humidity level is usually low in the dry season and high in the wet season. The mean value is 76 percent but ranges from 70 percent in March to 78 percent in September, October and November.

The prevailing wind is northeast trade with mean speeds ranging from 15- 30 kilometers per hour (kph). The periods of seasonal low pressure from July to September have higher wind speeds of 30- 45 kph. Land and sea breezes locally modify the regional pattern. The hurricane season extends from June to November, and there is a high annual frequency of tropical disturbances which generate squalls and high wind velocities.

1.6 Vegetation

While some Caribbean countries such as Dominica have undisturbed and extensive forests, the present vegetation of St. Kitts and Nevis provides evidence of great disturbance by human activity. In the lowland areas intensive land use has removed all vestiges of the natural vegetation. Although the mountain peaks are still covered by forest, they do not have virgin forest characteristics. Lower slopes are covered by secondary growth on abandoned farms. The vegetation, which comprises about 243 species of trees (Beard, 1946), supports wildlife.

Beard (1946) described five forest type remnants of the original vegetative cover.

- Rain forest: dominated by the mountain cabbage palm, with large trees of "Gumlin" (*Dacryodes excelsa*) and "Burrwood" (*Solanea* spp). There are 600 - 700 acres of this formation in St. Kitts on either side of the Olivees range.
- Dry evergreen forest: secondary forest occupying the lower margins of the forest, usually on land thrown out of cultivation. This group includes the useful

“Sweetwood” (*Lauraceae* spp.) and “Small-leaf” (*Myrtaceae* spp.) families. The undergrowth consists of densely growing shrubs and vines such as *Piper* spp. and various coffee type plants. The formation is of limited area.

- Palm brake covering land above an elevation of 365 and 550 meters. The forest consists mainly of the mountain cabbage palm (*Euterpe globosa*), with a few tree ferns and small trees.
- Elfin woodland appearing on peaks and ridges above 610 m. This is a low, tangled and windswept growth, loaded with epiphytes and mosses. This, together with Palm Brake, forms the vegetation of the summits of the ridges and peaks.
- Dry scrub woodland of the SEP. Beard suggests that this type has been heavily impacted by the past. The SEP and its extension into the Canada Hills were probably once forested with deciduous seasonal forest, but now supports a xerophytic scrub of acacia, agave, columnar and Turk’s Head cacti.

The most significant factor that influences vegetation distribution in St. Kitts and Nevis and other small islands is the distribution of rainfall. Islands with several peaks cause moisture laden air to rise as it moves in a westerly direction. As a result, when the moisture cools and precipitates rain, most of it occurs consistently on the upper slopes and toward the leeward side of the island.

Other factors that contribute to the variations in microclimates and the change in vegetation distribution includes altitude, temperature, humidity, saltiness of the air, the intensity and incidence of sunshine, wind exposure, and soil types. These factors in totality significantly influence the bio-diversity of the island.

1.7 Drainage and Water Resources

In St. Kitts, water drains in a radial pattern from the central mountain range to the ocean, interrupted only by the minor volcanic cones at Brimstone Hill, Ottley’s mountain, Sandy Point Hill and Monkey Hill. Most of the water channels are deep and steep-sided, and are usually dry along all or most of their stretches. Only the relatively large Wingfield and Cayon rivers flow almost to the sea for much of the wettest part of the year.

Water drains in a radial pattern from Nevis Peak to the ocean through ten (10) major drainage basins and is interrupted only by the smaller volcanic cones of Hurricane, Saddle and Round Hills. These basins comprise ephemeral ghauts that may consist of up to three stream orders namely Camps River, Barns Ghaut and Kitt Ghaut. In some basins water is channelled from 1500 feet above sea level through relatively straight ghauts with steep but not extended sides. The steep sloping sides of the ghauts favour rapid run-off that causes a quick flow of water to the island’s coastal areas. This is coupled with the fact that the rain forest is very small and readily exposes any run-off to open evaporation, thereby reducing the amount of available recharge. In addition, the gently sloping peripheral/coastal section of Nevis is not extensive enough to allow

for substantial recharge. Almost all of the ghauts are ephemeral except the Bath Stream, which flow year-round to the sea from springs less than 1-mile (1.6-km) inland. Most of the other ghauts flow intermittently, about 3 to 4 times annually, but more excessively after rainfall.

The primary source of fresh water in the island is rainfall. St. Kitts is the recipient of an average of about 20-cm of rainfall annually ranging from an estimated 37 cm in the higher elevations with arid conditions in the SEP.

1.7.1 Surface Water Resources

Most of the country's major watersheds are concentrated in the central area of the islands. The area's forest resources provide a reliable rainwater storage service. Rainwater is intercepted by the forest canopy and then absorbed by the soil and root systems.

The surface water flows are very variable and are insufficient to meet the current demands during most of the year. Six ghauts supply surface water on a year round basis in quantities sufficient to meet domestic demand in St. Kitts.

Storm runoff from heavy rainfall occurs infrequently and can cause traffic disruption, erosion and flooding of houses in the lower lying areas. The heavy runoff (2,000 to 5,000 cf.) occurs once every few years and lasts only a few hours.

1.7.2 Ground Water Resources

The groundwater resources of St. Kitts have been studied extensively by Ker, Priestman & Associates Ltd. (1987). A coastal aquifer is the main source of groundwater, with seven major groundwater basins. The amount of groundwater that can be ultimately tapped by tube wells has been estimated at 10 million gallons per day (mgd). The best yielding wells on the island are (and will continue to be) located in this aquifer.

Within the defined water catchment areas, various stringent protection measures in the form of legislation, development control and management are required. Water is a finite resource. The challenge for the nation, therefore, is to strike a balance between satisfying current and future water needs of people, agriculture, livestock and industry, and managing, conserving and protecting overall water resources in a sustainable way. To achieve this, existing sources of surface and groundwater have to be utilized and managed efficiently. Water should be regarded as a critical and integral element in physical development planning.

1.8 Coastal and Marine Ecosystems

1.8.1 The Coastline

The coastal and marine ecosystems in St. Kitts include coral reefs, sea grass beds, mangroves,

salt ponds, diverse aquatic life, and the coastline. As an island territory, St. Kitts has a fragile 78.1-km long coastline in need of special protective measures for ecological, environmental and economic reasons. It consists of 34.7 km cliff (rocks), 10.8 km cobble, 6.3 km boulders and rocks, 13.1 km black volcanic sand, and 13.2 km golden sand.

Processes of erosion and accretion are occurring at different points on the coast. This is a result of natural factors such as hurricanes and man made causes such as beach sand mining, construction too close to shore and pollution. While law strictly prohibits large-scale removal of beach sand, it is still being practiced illegally in some places.

As far as coastal erosion is concerned it is important to note that:

- Coastal erosion is a serious problem in view of the fact that the beaches represent a very important resource to the island. Not only are they heavily used for local recreation, but they are also a vital part of the tourism product. Additionally, they protect coastal infrastructure during storms and periods of high wave activity.
- Against this background, the Government of St. Kitts and Nevis (GOSKN) with assistance from UNESCO, conducts island wide beach profile studies, so as to provide a data base of medium to long term beach changes, erosion in the island, and set regulations for beach setbacks. Several different agencies are involved in the monitoring, including the SEP Board, Fisheries Management Unit (FMU), and the Department of Environment (DOE). Such an approach is an integral part of Integrated Coastal Zone Management (ICZM).
- There is a need for enforcement of laws against illegal sand mining. In addition, there is a need to promote appropriate alternative sand sources.

1.8.2 Critical Habitats

Coral reefs and sea grass habitats are generally found along the southwest coast between Nag's Head and the southern end of Basseterre Bay, on the northwest coast between Sandy Point and Dieppe Bay, on the east coast between Conaree and Friar's Bay and on the southeast coast adjacent to the Narrows. Most coral habitats are relatively small with less species diversity than is typical of similar habitats in the Eastern Caribbean. Deep reefs with species diversity are found off Sandy Point and Guinea Point, and in the Narrows. Sea grass beds, dominated by turtle grass and manatee grass species are mostly common in the SEP of the island.

Both coral reef and sea grass communities contribute to the following environmental processes:

- Provide habitat for commercially important fish species for example spiny lobster and queen conch depend upon both habitats at certain periods in their life cycles
- Produce nutrients that are important in sustaining the life of fish species and other organisms.

- Reefs act as barriers during periods of heavy wave attack, and are also important contributors to white sands.

Mangroves were once abundant. This is no longer the case. The main and most extensive mangrove habitat in St. Kitts occurs in the SEP. Hawksbill and green sea turtles are found around the entire coast. In addition, a large number of resident and migratory birds depend on the mangrove and pond communities for feeding and nesting. Thus extensive effort is needed to conserve what remains and arrest the decline of these important habitats.

1.9 Mining and Quarrying

No commercially valuable mineral deposits have been found on St. Kitts. Hence mining and quarrying activities are limited to earthen materials. Presently, there is only one quarry on St. Kitts and there are quarries on Nevis.

2.0 AFFECTED AREAS AND STAKEHOLDERS

2.1 Areas of Greatest Concern in St. Kitts

2.1.1 College Ghaut

The St. Kitts Sugar Manufacturing Corporation (SSMC) and the Public Works Department, with very limited resources, have been putting measures in place to arrest the severe land degradation along College ghaut (ravine). SSMC's interest in this activity is influenced by the fact that sugarcane fields in close proximity are progressively undermined by severe erosion. The Public Works Department recognizes that where this ghaut passes suffers severe land degradation in relatively highly populated areas. There is the real threat to human life.

Houses have been ruined and some small landowners have lost their lands due to severe erosions along College ghaut. Currently, the progressive relatively massive erosion threatens a sizable section of a village north of the city of Basseterre known as Lower Monkey Hill. Wades Garden, a part of the suburb of Basseterre, is similarly threatened.

In November 1998 unusually heavy rainfall in the mountain resulted in the flooding of the ghaut. Tremendous amounts of sand was deposited in sections of Basseterre and also deposited in part of the harbour adversely affecting marine navigation. This resulted in loss of life as well as tremendous property damage. An extensive engineering undertaking is necessary to mitigate and arrest this problem.

2.1.2 Other Ghauts

Many other ghauts on the island have severe erosion problems almost with similar intensity to that of College Ghaut with the exception, however, that they may not be passing through highly populated areas. Degradation along these ghauts undermines arable farmlands, mainly sugar lands. Also excessive silt from erosion is deposited into the sea, contributing to negative effects on the sea grass beds, coral reefs and other spawning grounds in the marine environs.

No study has been done to date to assess the effects of erosion on marine biodiversity around St. Kitts and Nevis. However, it may be safe to assume that fish populations in the waters have been progressively and drastically reduced over several years due to siltation- adversely impacting on the local fishing industry.

Squatting on the banks of ghauts predisposes the land to erosion and degradation. This is a problem. In addition to houses for human habitation constructed on the banks of ghauts or in close proximity, pigpens have been observed in the ghauts and along the banks.

2.2 The Arable Lands

Most of the arable lands in St. Kitts are under sugarcane cultivation. This crop which is a member of the grass family, when managed efficiently, is very useful in preventing the erosion of sandy loam soils, the type that is predominant in St. Kitts.

Ironically though, tremendous erosion takes place in those very lands where sugarcane is grown. Erosion does seem to only occur in fields that are in states of transition, fields that are recently ploughed; fields that are recently planted; fields that are burnt; fields where drainage systems are not properly maintained.

Arable lands in the upper land areas of the island where sugarcane cultivation takes place suffers erosion where there is absence of sound contouring principles the absence of terracing.

2.3 The Forest

Unscientific as well as illicit farming occurs in some sections of the forest thus predisposing the land to degradation. Many areas in the forest where there are landslides result from this type of farming.

2.4 Beaches

Mining of sand for building purposes has undermined many beaches. In the process sand dunes, which are provided by nature for protection of beaches against tidal surges, are destroyed, and by this process the natural nesting habitat of turtles are destroyed. There have been instances where sand dunes were destroyed by developers who were intent on

improving the aesthetics of the beaches. Thus the need for education and the creation of regulations and legislation for violating the coastal areas is apparent.

The south Frigate Bay beach, a major tourist attraction, has been terribly degraded. What was a beautiful white sand beach is now mostly a rocky beach.

The problems affecting the coastal areas can be rectified, at least in part, by putting a coastal zone management plan in place. This would deal with ecosystems and mitigation measures.

2.5 Half Way Tree Coastline

The island main road traverses part of the coastline of Half Way Tree Village. That coastline is being eroded and so too is that part of the main road which traverses it. A bypass road may be necessary to protect road users.

2.6 Old Road Bay

A World Bank project is underway for the Old Road Bay area. It will analyze the condition of the bay area and determine whether the use of organic nets on the slopes will help protect the road. Huge rocks do fall down the slope occasionally and pose severe risks to road users.

2.7 The South East Peninsula

This area is unique because it is private owned land. The problem is the balancing of private and public rights.

Several factors contribute to severe land degradation on the peninsula. Massive deforestation in the past first predisposed the area. The land is volcanic in nature several slopes have been left unstable after a major road was cut through the hills. The rocks on the slopes pose real danger to road users as they have not been cut back to their natural line.

There is an abundance of monkeys. In addition to being a health hazard, they are pests that destroy farmers' crops. They ravage sugarcane grown for export and destroy vegetation in sensitive areas thus contributing to predisposing areas to land degradation.

2.8 Low Ground Plain

Land degradation is prevalent in low lying areas, especially Bath Village and Indian Castle in Nevis which receive the lowest amounts of rainfall and also suffer through extensive livestock grazing by small ruminants and a growing donkey population. As a result, there is a lack of vegetation, which leads to large tracts of sloping land, which will be prone to erosion, and

abundant levels of sea blast, leaving salt on land.

2.9 Mining and Quarrying

Mining, quarrying, and the removal of topsoil for sale, though minimal, will eventually lead to desertification in some areas. Due to quarrying, the run-off from rainfall ends up as residue which flows onto the main road. The soil in this area becomes useless.

This problem is of greater concern on the island of Nevis. In St. Kitts there is one quarry and this government controlled. Here, engineers from the Public Works department manage the mining and quarrying of rocks. On Nevis there are quarries that are managed by the respective landowners and there is the serious problem of uncontrolled soil loss onto the main roads and into the marine environs.

2.10 Land Tenure

Land tenure is also a high-risk endeavor. Where the government owns land or there is absentee ownership of land and it is rented or leased, the land is often abused by the tenants. It is wasted and exploited, with mangrove and coastal vegetation being removed in some instances.

2.11 Fire

An overlooked problem that aids in the process of land degradation is fire. It is not only prevalent in the South East Peninsula and Conaree hill areas but also in other areas of both islands. Most of the time fires are deliberately set to burn trees for coals. However, it not only clears the land of vegetation but also degrades it. A solution is the stronger implementation of reforestation programs along with the use of firebreaks and forest rangers.

2.12 Stakeholders

The stakeholders are the farmers, the St. Kitts Sugar Manufacturing Corporation, the Fisheries department, the Government of St. Kitts and Nevis (GOSKN), land developers, the general public and help is sought from the Legal department.

2.13 The Non-governmental Organization (NGO) Community

The NGO community shows concern also. It is comprised of the Nevis Historical and Conservation Society, the St. Kitts Heritage Society, the Leo/ Lions Club, the Jaycees, Rotary Club, Scouts, Boys Brigades, Girls Guides, Optimist Club, Anglican Young Peoples Association (AYPA), Pathfinders Association, Business and Professional Women (BPW), And the local

media.

The principal NGO in Nevis concerned with environmental issues is the Nevis Historical and Conservation Society (NHCS), which, inter alia, aims to promote and facilitate the protection and preservation of the ecology and natural life forms on the island. On St. Kitts, the St. Christopher Heritage Society (SCHS) has as its major goals and objectives the safeguarding and preservation of the country's environmental, historical, and cultural national heritage. The SCHS served as the local NGO coordinator for the implementation of the Country Environmental Profile (CEP) and produces a journal entitled Heritage.

St. Kitts and Nevis are also members of the Caribbean Conservation Association (CCA), a regional non-profit Organization dedicated to promoting policies and practices which contribute to conservation, protection and wise use of natural resources. The Caribbean Natural Resources Institute (CNRI), formerly the Eastern Caribbean Natural Area Management Programme (ECNAMP) also supports St. Kitts and Nevis in its goal to strengthen local capacity to manage the living resources critical to development in the Caribbean region.

The problems facing the NGOs are insufficient financing, lack of concrete structure of plans or group goals and objectives, lack of awareness, lack of commitment, lack of human resources, and political and legal obstacles.

3.0 PAST, PRESENT AND FUTURE PLANS AIMED AT COMBATING DIVERSIFICATION

3.1 The National Environmental Action Plan

The National Environmental Action Plan (NEAP) analyses the environmental issues affecting St. Kitts and Nevis in a comprehensive, multi-sectoral framework and sets forth a long-term strategy for maintaining the country's natural environment, the health and safety of its population, and its cultural heritage as economic development occurs. In proposing practical measures to forestall or remedy environmental problems, the analysis considers cross-sectoral links that affect renewable and non-renewable resources, as well as human activity. The objective is to set forth a long term national environmental policy and investment strategy based on comprehensive environmental analysis.

Accordingly, the NEAP examines the quality of the environment; biodiversity; and the use of natural resources, including air, land, water, forest, and wildlife. It assesses how economic and institutional issues associated with the management of these resources are affecting development and human health and well being. On the basis of these analyses, the NEAP sets forth priorities and related policy recommendations in the following areas: (a) public awareness of environmental issues; (b) a national strategy for environmental protection; (c) specific legislative

actions, programs, and investment projects to address priority problems; (d) the management of natural resources, particularly endangered species and habitats; (e) the reversal of environmental degradation; and (f) protection of the public from environmental pollution and natural hazards.

Much work has already been done on the environmental problems faced by the country, and the NEAP draws heavily from that work -- including the Country Environmental Profile (CEP), the Tropical Forestry Action Plan (TFAP), and the Five Year Development Plan. A Government team, assisted by consultants financed by the World Bank, provided the initial draft of the NEAP. The NEAP was then circulated for review and comment to a number of Government agencies, private sector representatives, and NGOs.

The document is a blueprint for addressing issues of development, planning and environmental management. Through the adoption of the NEAP, GOSKN shows that it is committed to the concept of sustainable development and is seeking, as a matter of priority, appropriate policies and mechanisms for translating word into action. Accordingly, GOSKN will use this NEAP to incorporate environmental policies and actions into its development strategy for the next ten years, and will include the investment requirements identified in its public sector investment program (PSIP) and in its requests for external assistance. The government intends that its macroeconomic and sector policies would reflect the findings of both the NEAP and the Medium Term Economic Strategy Paper (MTESP) in order to ensure sustainable development of its resources. The NEAP is also considered as a rolling environmental plan that will require constant updating as circumstances change, and the general public, private sector interests and NGO will be involved in this process.

3.2 Environmental Actions

Like other small OECS countries, St. Kitts and Nevis faces substantial environmental challenges with limited managerial and technical resources to meet them. Hence, the national environmental priorities have to be carefully determined and the available resources, including those that can be marshaled through aid, used to maximum advantage.

The development of human resources is perhaps the centerpiece of the programs of sustainable development. Therefore, the building of human potential and capacity to enhance the quality of life is given special attention. Particularly attention is being paid to the improvement of education and training programs; the improvement of environmental and conservation management; the adoption of appropriate programs for participation of the private sector, NGO, and the public in the identification, formulation and implementation of sustainable development activities.

The government also intends to build on the existing legal foundation to complete the legal and regulatory framework for environmental management through the promulgation of implementing regulations for existing legislation, the adoption of legislation requiring environmental impact assessments for all major public and private sector investment, and the revision of major laws such as the Public Health Act.

Actions to be taken to develop institutional capacity include (a) strengthening the technical capacity and increasing the financial resources of the National Conservation Commission; (b) developing the environmental role of the Physical Planning Unit; and (c) improving the capacity of all Ministries with environmental responsibilities.

The Government is to prepare an integrated coastal zone management plan that will incorporate appropriate economic policies, incentives and controls providing for resource-based services (water supply, waste disposal, power) to be properly priced and violations (sand mining, effluent discharge, deforestation) more effectively deterred. The plan will encourage community consultation and participation in measures to improve coastal zone.

4.0 MECHANISMS FOR COORDINATION OF IMPLEMENTATION OF THE CONVENTION ON DROUGHT AND DESERTIFICATION

4.1 National Conservation Commission

One of the major problems being faced is that there are not sufficient or updated laws or regulations in existence that deal with combating desertification. And for the laws that do apply, there is a lack of enforcement.

The National Conservation and Environmental Protection Act (NCEPA) 1987 provides some protection. It has been discovered that there is a severe shortage of legal draft personnel to prepare to prepare regulations for making the Act more useful. Here the National Conservation Commission, which is provided for under the NCEPA Act needs to be strengthened.

4.2 Coordinating Body

The Conservation Commission could form a Coordinating Body for implementation of the Convention on Drought and Desertification.

There would be different areas of concerns so there would be a representative from each of the following fields:

- (a) Legal
- (b) Agriculture
- (c) Environment
- (d) Health

- (e) Water
- (f) Education
- (g) Housing
- (h) Planning
- (i) NGOs
- (j) Media
- (k) National Emergency Management Association (NEMA)

The Objectives of this Committee would be to:

- Sensitize committee members to the importance of taking steps to combat desertification
- Look at budgets of stakeholders and subsidize them to support their efforts to combat desertification.
- Funds need to be identified to create media packets to inform all segments of the population about all facets of desertification. Education is the most critical key to minimize and eliminate desertification.
- Establish data base on land degradation by making use of existing information and researching further to generate more facts.
- Determine what measures can be taken to decrease desertification. For example, mechanics and power generation plants dump oil on land. Instead steps can be put into place to recycle or an oil burner that is not the polluting type as is used presently.
- Existing programs need to be examined to realize overlaps and avoid duplication.

Money can be allocated by Ministry of Finance through the United Nations Unilateral Fund when activities are in place.

4.3 Solutions for Obstacles to Implementation

- Duplication can be overcome by the sharing of information by all stakeholders to create greater transparency.
- Greater collaboration between the islands, Ministers, and departments.
- Opportunities must be deliberately created for the sharing of experiences among the stakeholders.
- There is a lack of trained staff. This can be remedied by having training programs,

workshops and courses geared initially at increasing the awareness of the problem and then building on that to ensure that staff members are equipped with the knowledge to carry out their tasks efficiently

- Further institutional capacity is needed.
- All of the stakeholders and NGO can take steps to increase public awareness and participation in the fight against desertification.

4.4 Recommendations to National Parliament

- (1) Make breaking Environmental laws criminal acts and make fines realistic and steeper.
- (2) Upgrade and pass new legislation to support combating of desertification.

5.0 IDENTIFICATION OF RESOURCES FOR IMPLEMENTATION OF CONVENTION

5.1 Financial Resources

There are no bilateral agreements. St. Kitts and Nevis is not in a position to set up or allocate funds for areas relevant to the combating of desertification. There is no soil conservation fund. While there are donor countries who offer assistance, there is no donor specifically for land degradation.

The Global Mechanism has contributed funds to carry out two projects namely (i) Enabling St. Kitts and Nevis to prepare its first National Communication in response to its commitments to the United Nations Framework Convention on Climate Change and (ii) Biodiversity Enabling Project.

Factors relating to limited human resource capacity contributed to the late start of phase projects. These projects were only initiated in March/ April 2000. A National Action Plan will be formulated from these projects.

Several activities relate to a Plan of Action for the Caribbean Region. CPACC (Caribbean Planning for the Adaptation to Climate Change) includes activities relating to gender participation, enhancement of legislative framework to combat desertification, increasing capacities, education and public awareness, technical scientific technological cooperation, establishment of early warning systems for drought and desertification, search for the development of supplementary economic activities for agricultural and forestry activities, consideration of sustainable management for natural resources (water, soils, forests, biodiversity)

as well as issues of land tenure.

Note that the GEF operational focal point is the department of environment.

The Department of Environment has a Director of Environment, a Chief Officer supported by two Conservation Officers, a Project/Environmental Education Officer and a Parks and Beaches Unit headed by a coordinator who is assisted by four supervisors.

The Director of Environment has a Master's degree, the Chief Conservation Officer and Project Officer have Bachelor degrees while the Conservation Officers are high school graduates.

Resources for the national funding of projects are limited. Tremendous amount of capacity building is needed in the department.

6.0 PLANNED NATIONAL ACTION IMPLEMENTATION PROCESS

The Federation of St. Kitts and Nevis is not yet in a position to present to the Conference of Parties a fully developed National Action Programme. Our government will take a planned approach, however. And it will be a fully integrated approach, along the lines set out by the Convention.

Other areas are being planned for the National Action Programme. They are in line with Article 4 of the Regional Annex for Latin America and the Caribbean and include most of the following sectors:

- Increasing capacities, education, awareness, scientific and technical cooperation, development of financial resources and the financial mechanisms to fund the implementation of the Convention.
- Develop measures to improve the economic environment such as eradicating poverty and creating a better quality of life for the people.
- Achieving food security and sustainable development and management of agricultural and forest resources.
- Dealing with sustainable management of natural resources in high altitude areas.
- Rationalize use of water and soil resources.
- Formulation and application of emergency plans to deal with the effects of drought.
- Strengthening or establishment of early warning systems for drought and desertification.

- Conservation and sustainable use of biodiversity in accordance with the Convention of Biodiversity.
- Establishing or strengthening of the Legal Framework and decentralization where possible, so that the local authorities and NGO and CBOs youth and women's groups can fully participate in the struggle against desertification and drought.
- Outline the planned approaches to the seeking of funds and support from International partners, as well as locally.

Conclusion

The fight against desertification is a real one and the problems associated with conditions that lead to land degradation are continuing to worsen. This National Report on desertification control contains a synopsis of the state of land degradation in the Federation of St. Kitts and Nevis, the present situation and the efforts being made as well as planned measures for dealing with these conditions. There is a definite need for the review and streamlining of legislation targeted at arresting the abuse of the natural resources in the country. The Government as much as possible will provide financial support for activities to combat desertification. Such support for national activities must nonetheless be matched by a co-ordinated regional approach to investment in reversing the conditions and concessional financial assistance from the international community.

Taking into account the special challenges and vulnerabilities of St. Kitts and Nevis, and the recognition of the need for a multi-sectoral, integrated approach to combating desertification, we greatly appreciate the efforts of the UNCCD Secretariat. The limitations in St. Kitts and Nevis were recognized by the Secretariat and financial assistance was given for the preparation of this St. Kitts and Nevis report.

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