GEF IWCAM ATLAS

Integrating Watershed & Coastal Areas Management

Caribbean Small Island Developing States

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Integrating Watershed and Coastal Areas Management in Caribbean Small Island Developing States

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CARIBBEAN ENVIRONMENT PROGRAMME

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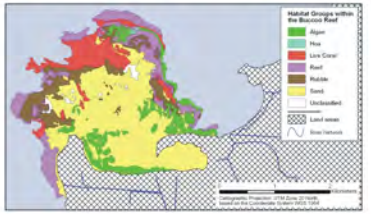

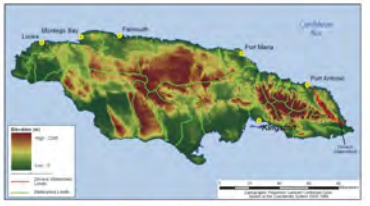

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Project Leadership:

The Global Environment Facility - Integrating Watershed and Coastal Areas Management (GEF -IWCAM)

http://iwcam.org/

Project Execution:

United Nations Environment Program -Caribbean Regional Coordinating Unit (UNEP-CAR/RCU)

http://www.cep.unep.org/

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General Introduction

The Global Environment Facility (GEF) funded Integrating Watershed and Coastal Areas Management in Caribbean SIDS (GEF-IWCAM) Project

Participating Countries
The GEF IWCAM project had thirteen (13) participating Caribbean Small Island Developing States (SIDS); Antigua & Barbuda, the Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, and Trinidad & Tobago.

Implementing Agencies
United Nations Environment Programme (UNEP); United Nations Development Programme (UNDP).

Executing Agencies
UNEP Caribbean Regional Coordinating Unit (CAR/RCU); Caribbean Environmental Health Institute (CEHI); United Nations Office of Project Services (UNOPS).

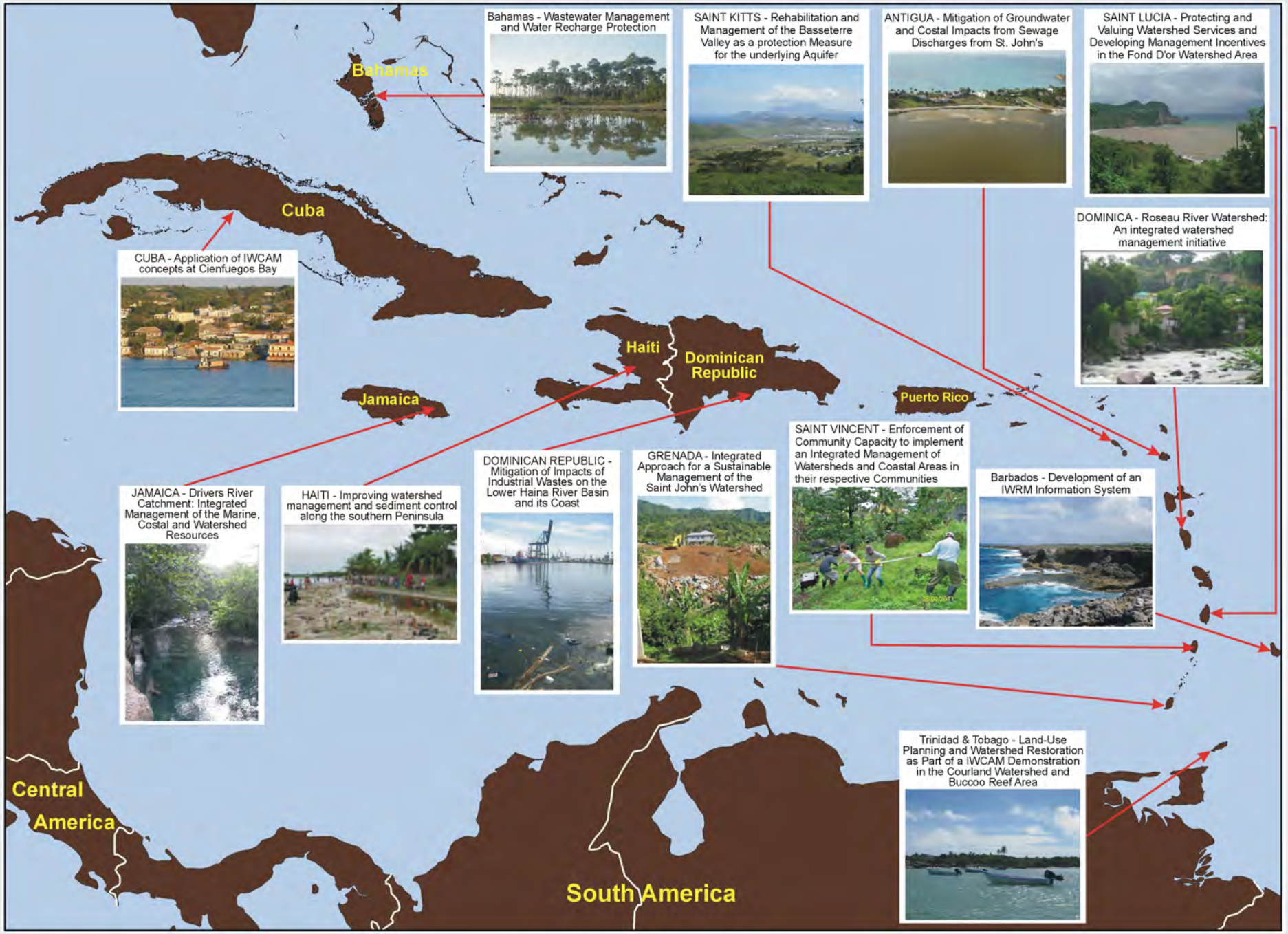
Funding
GEF Grant: US $13.99 million
Co-finance: US $98.27 million
Project Cost: US $112.26 million
Duration: June 2005 December 2011

Overview
Caribbean Small Island Developing States (SIDS) are characterized by small sizes and limited resources for development. There was an unsustainable sectoral approach to the management of their watershed and coastal resources. This resulted in the degradation of the environment and overexploitation of natural resources. Problems included diminishing freshwater supplies, degraded freshwater and coastal water quality, inappropriate land use, and poor sanitation.
SIDS were, as such, a priority for the introduction of integrated watershed and coastal areas management approaches

Project Description
The GEF-IWCAM Project's overall objective was the strengthening of the commitment and capacity of the participating countries to plan and manage their aquatic resources and ecosystems on a sustainable basis. Project activities focused upon improvements in integrated freshwater and coastal areas management on each island. Over a five-year period, the Project:

- Undertook regional management, coordination and evaluation of IWCAM objectives;
- Demonstrated technological and management approaches through execution of nine Demonstration Projects in eight of the Participating Countries;
- Assessed existing policy, legislation and institutional structures in support of IWCAM and promoted reforms within selected areas;
- Identified indicators for measuring IWCAM efficacy and implemented a programme of measurement and monitoring which will drive policy reforms; and
- Established networks, shared knowledge, and developed partnerships within the Caribbean SIDS for IWCAM.

Caribbean Islands - Overview Map



Part I: Demonstration Projects

McKinnon's Pond, Antigua Demo site

Mitigation of Groundwater and Coastal Impacts from Sewage Impacts from St. John's

McKinnon's Pond, located north of the capital, St. John's, is a coastal wetland and an important site for migrating birds, resident birds and water-fowls. It is also an important spawning habitat and nursery area for juvenile fish and shellfish. The majority of households in MacKinnon's use septic tanks, but the lack of regular pumping often resulted in septic failure and overflow, causing untreated effluent to go directly into drains. Most of this effluent drains into Mc Kinnons's Pond and the St. John's Harbour causing high levels of marine pollution. The construction of a road to link hotels and entertainment facilities at the northern and southern ends of the Pond resulted in an embankment that eliminated the natural link and connection of the Pond with the sea, impacting the wetland significantly.

The primary objective of the demonstration project was to address the issue of sewage and its impacts on the NW Coast of the Parish of St. John's.

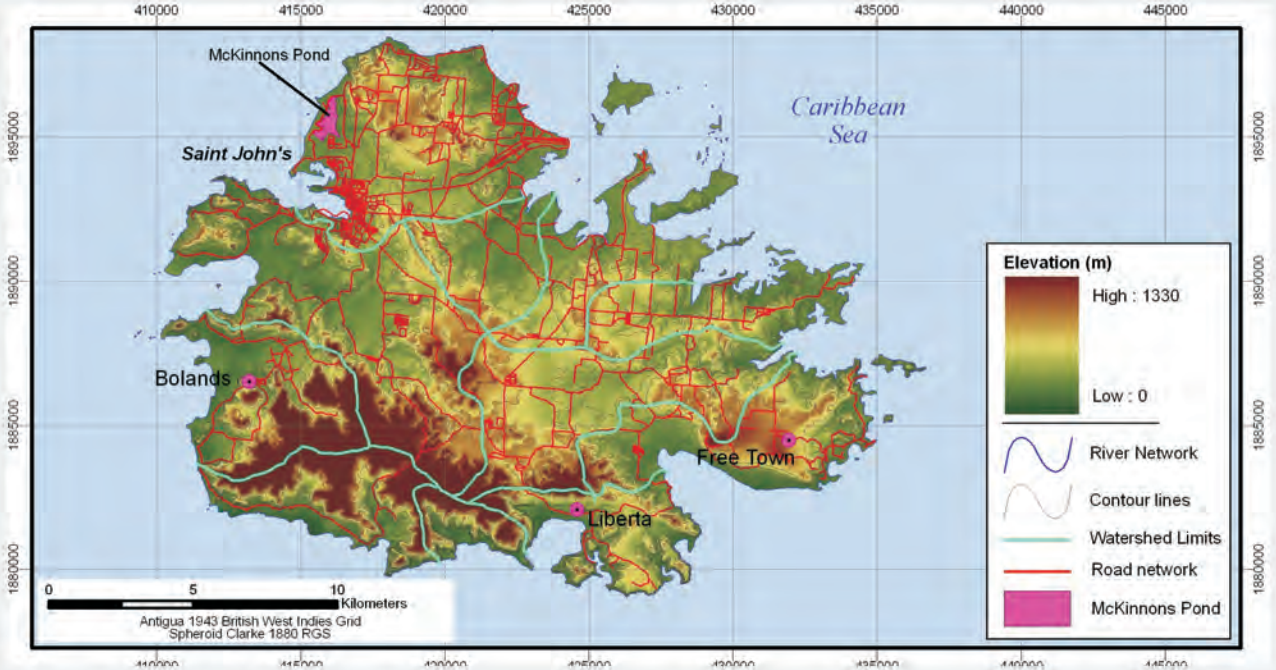
The main project partners included the: Environment Division - Ministry of Agriculture, Lands, Housing and the Environment, Central Board of Health - Ministry of Health, St. John's Development Corporation, Antigua Public Utilities Authority (APUA) and residents and business owners (including hotels) in the Mc Kinnon's area.

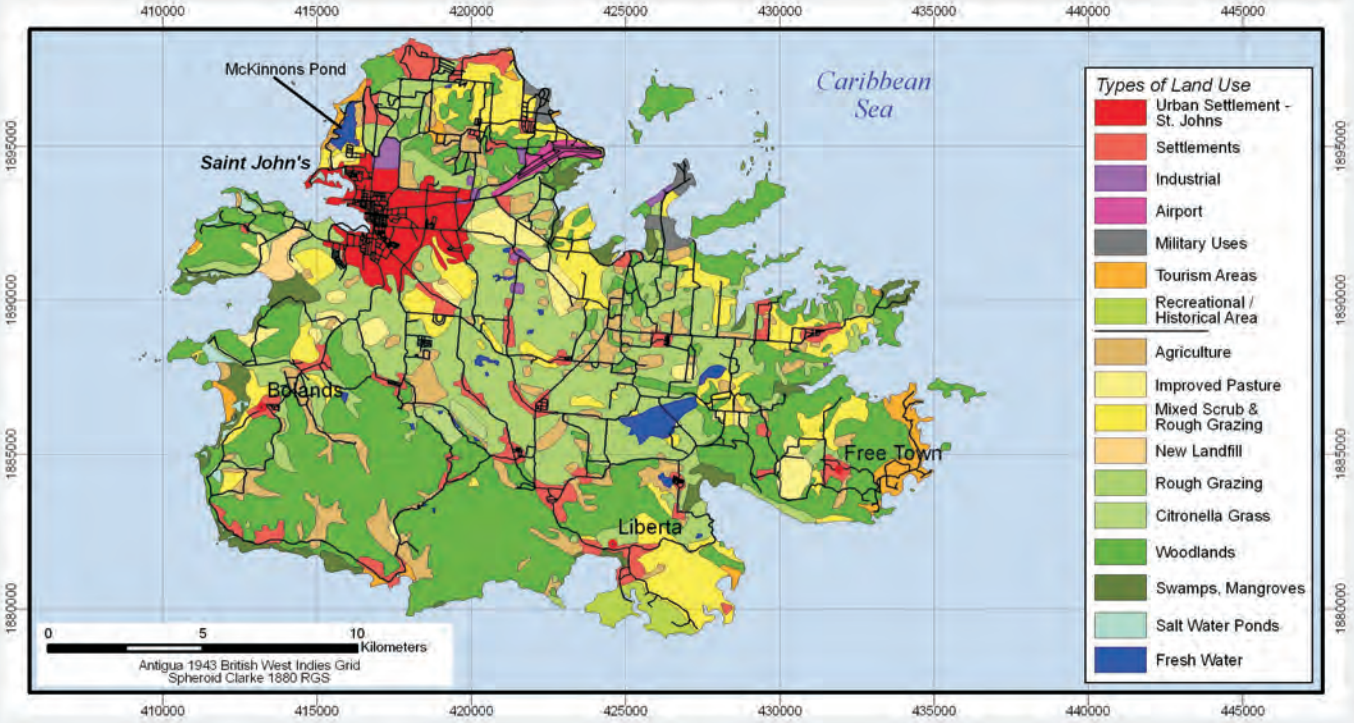
The main project activities and achievements were: (i) Public education and awareness; (ii) Establishment of a water quality baseline; (iii) Sewerage Management Strategy; (iv) Legislative Review; (v) Demonstration sewage system small Membrane Bio Reactor (MBR), which generated effluent that was used for irrigation of nearby agricultural plots; and (vi) Utilization of small-bore sewers to convey septic tank effluent, which previously overflowed into street surface drains.

The resulting impact of the demonstration project was improvement in effluent and water quality in McKinnon's Pond and greater public awareness on the need for improved wastewater management.

Students of Villa Primary School await a presentation on the demonstration project

Antigua & Barbuda - Overview Maps





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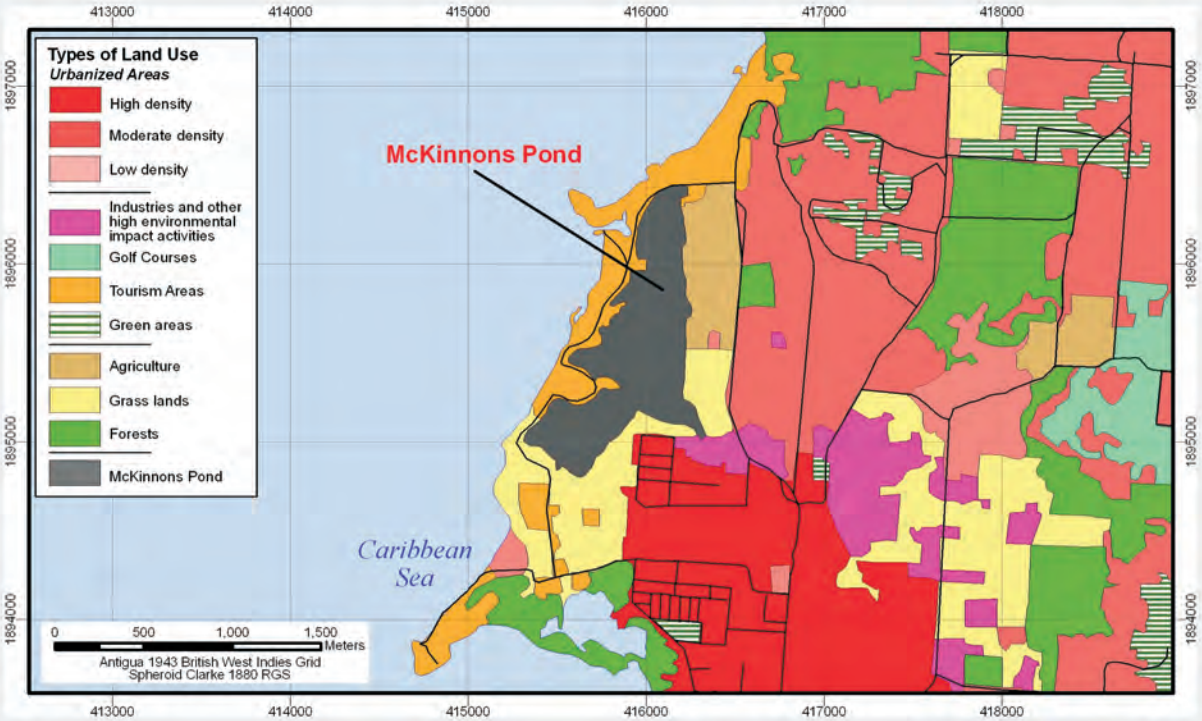
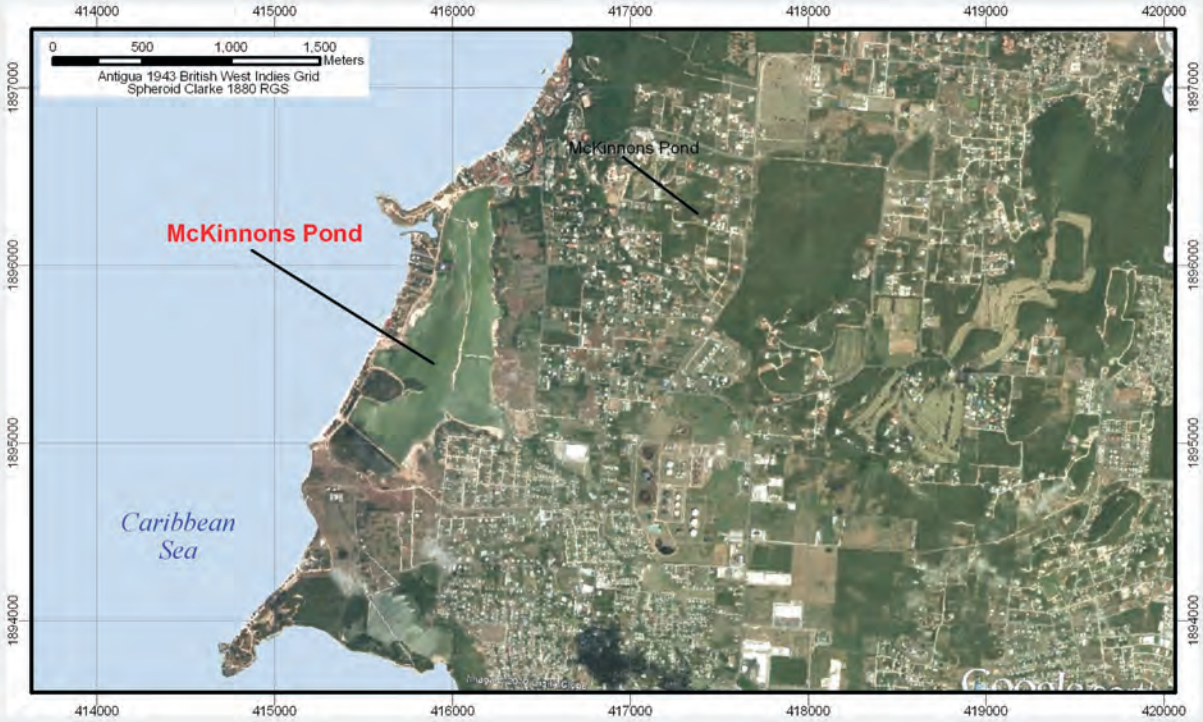
Antigua & Barbuda - McKinnons Ponds (1)





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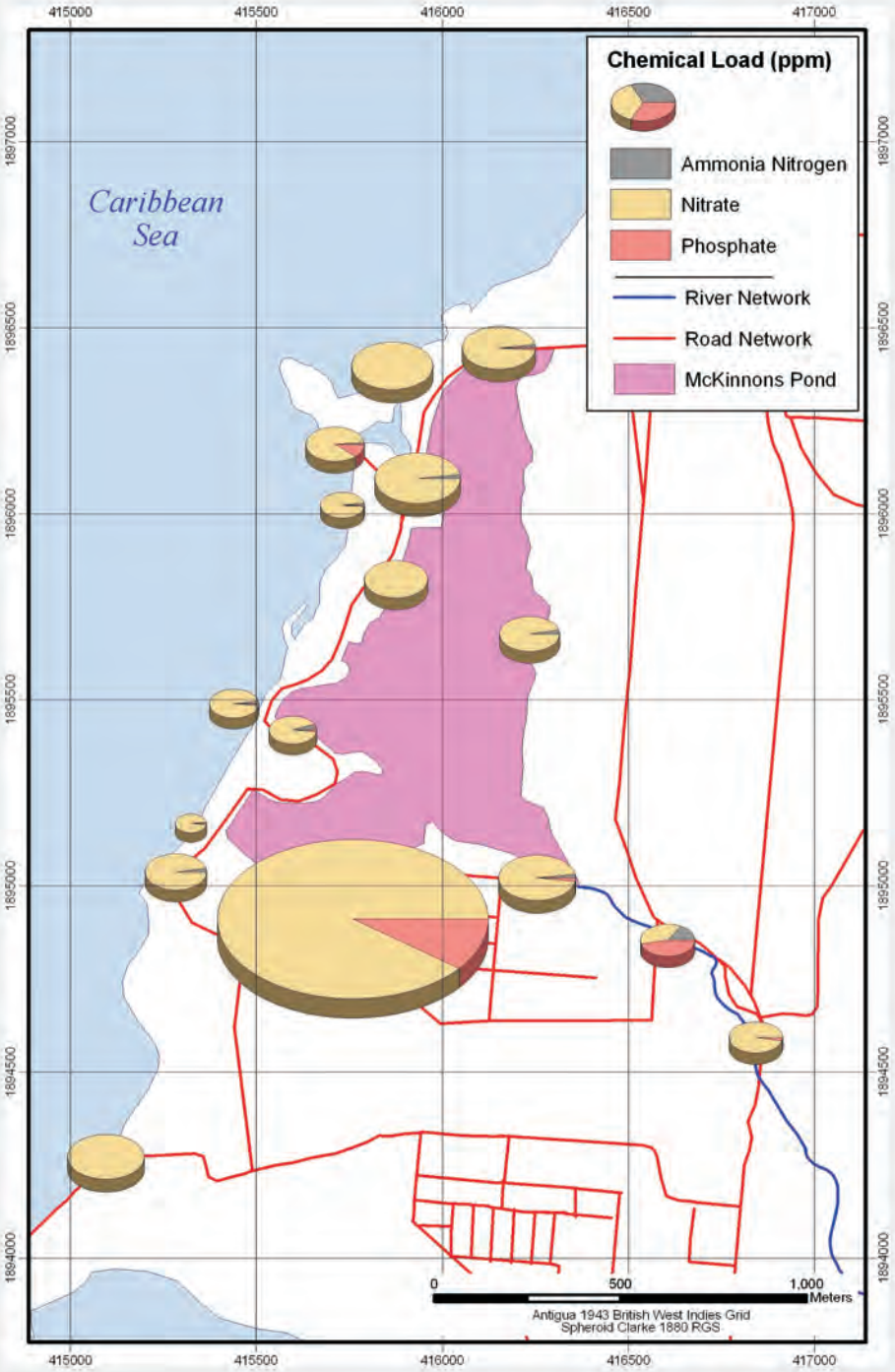
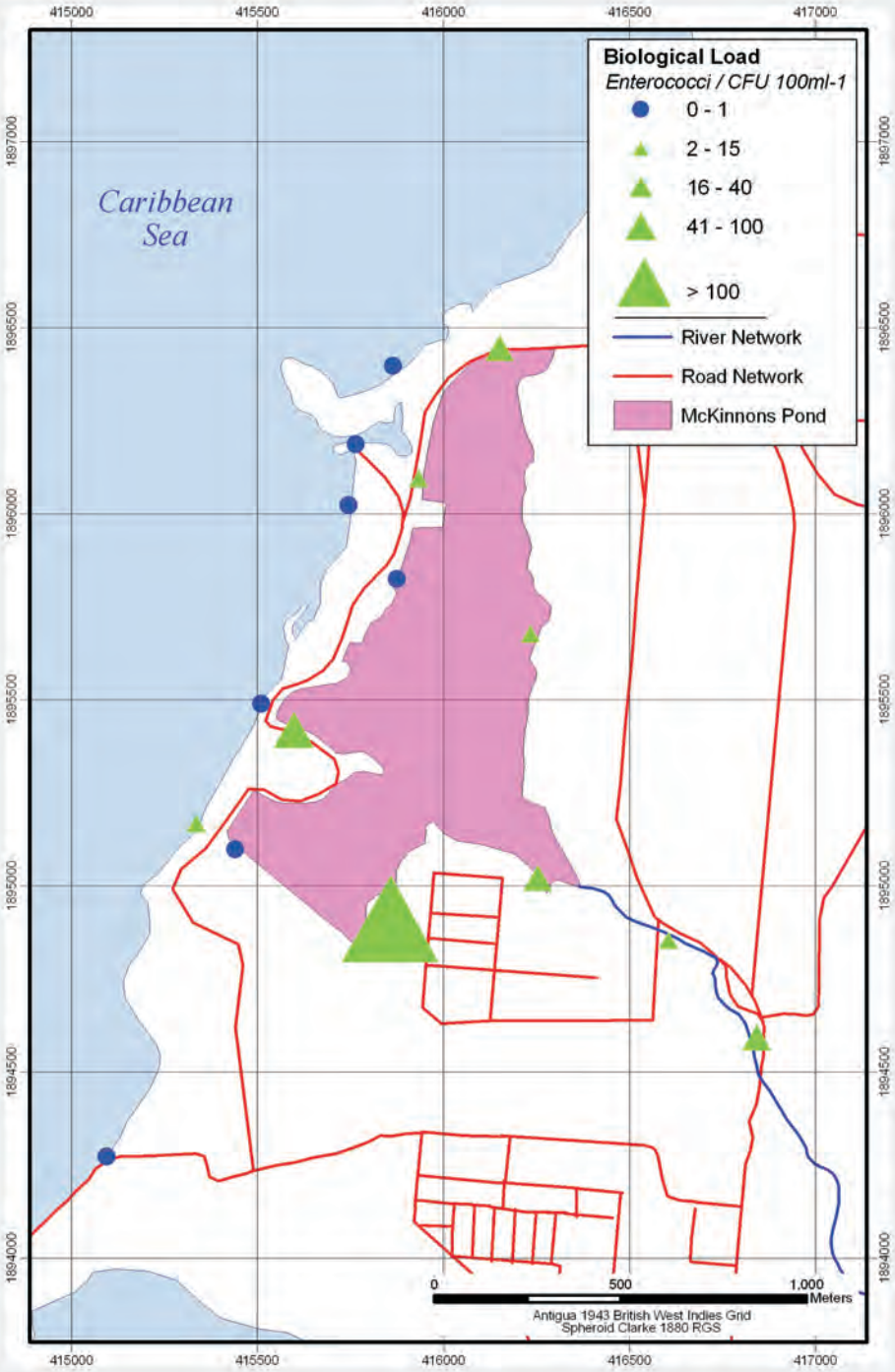
Antigua & Barbuda - McKinnons Ponds (2)





Elizabeth Harbour - Exuma

Wastewater Management at Elizabeth Harbour Marina, Exuma

Elizabeth Harbour in the Exuma Keys is visited by as many as 600 boats per day, but it did not have waste disposal facilities for solid and liquid wastes. Additionally, because there are no moorings or designated anchorage areas at Elizabeth Harbour, anchoring caused damage to sensitive biological habitats. Elizabeth Harbour has a history of contamination from sewage discharged mainly from visiting yachts, but also from waterside commercial establishments such as restaurants and shops. Visiting vessels pump grey and black waste-water into the harbour causing environmental degradation and eutrophication.

The objective of the demonstration project was to demonstrate how waste-water facilities can be retroactively installed and sustainably managed, and how incentives for use (or disincentives for violation of legal requirements) could be effectively established.

The project partners included: The Bahamas Environment, Science and Technology (BEST) Commission, Bahamas Water and Sewerage Corporation, Department of Environmental Health Services, Bahamas Reef Environment Educational Foundation, Engineering Technical Services, Harbour Solutions Pump-out Services, Elizabeth Harbour yachting community, and Sandals Resort Foundation.

The main project activities and achievements were: (i) Installation of a wastewater treatment plant; (ii) Partnership with a private pump-out service operator which led to the start of pump-out services in the harbour; (iii) Partnership with Sandals Resorts, which agreed to accept wastewater into their facility until the wastewater treatment plant was completed; (iv) Installation of 15 moorings in a heavily used area where sea grass recovery can occur; (v) Establishment of a harbour inspection and coastal water quality monitoring program by the Department of Environmental Health Services; (vi) Formation of the Elizabeth Harbour Steering Committee on Exuma; (vii) Stakeholder involvement (the yachting community and land-based communities on Exuma) through town meetings, interviews and participation in meetings; (viii) Development of educational materials and completion of a teacher training workshop to increase awareness about harbour pollution (BREEF).

Water Quality Monitoring - Programme Exuma

Bahamas, Andros - Introduction

Land and Sea Use Planning for Water Recharge Protection in Andros, Bahamas

Andros, the largest island in the Bahamian Archipelago, is home of the Bahamas' largest freshwater aquifers, vast tidal creek wetlands, and one of the world's largest barrier reefs. This demonstration project aimed to protect these sensitive freshwater and coastal resources through the development of a Land and Sea Use Plan (LSUP).

The main project partners were: The Bahamas Environment, Science and Technology (BEST) Commission; The Nature Conservancy; The Bahamas Water & Sewerage Corporation; Bahamas National GIS Centre; Andros Conservancy and Trust; Nature's Hope for South Andros; Andros local government steering committees; Conservation Strategy Fund; and the University of Florida and Nova Southeastern University.

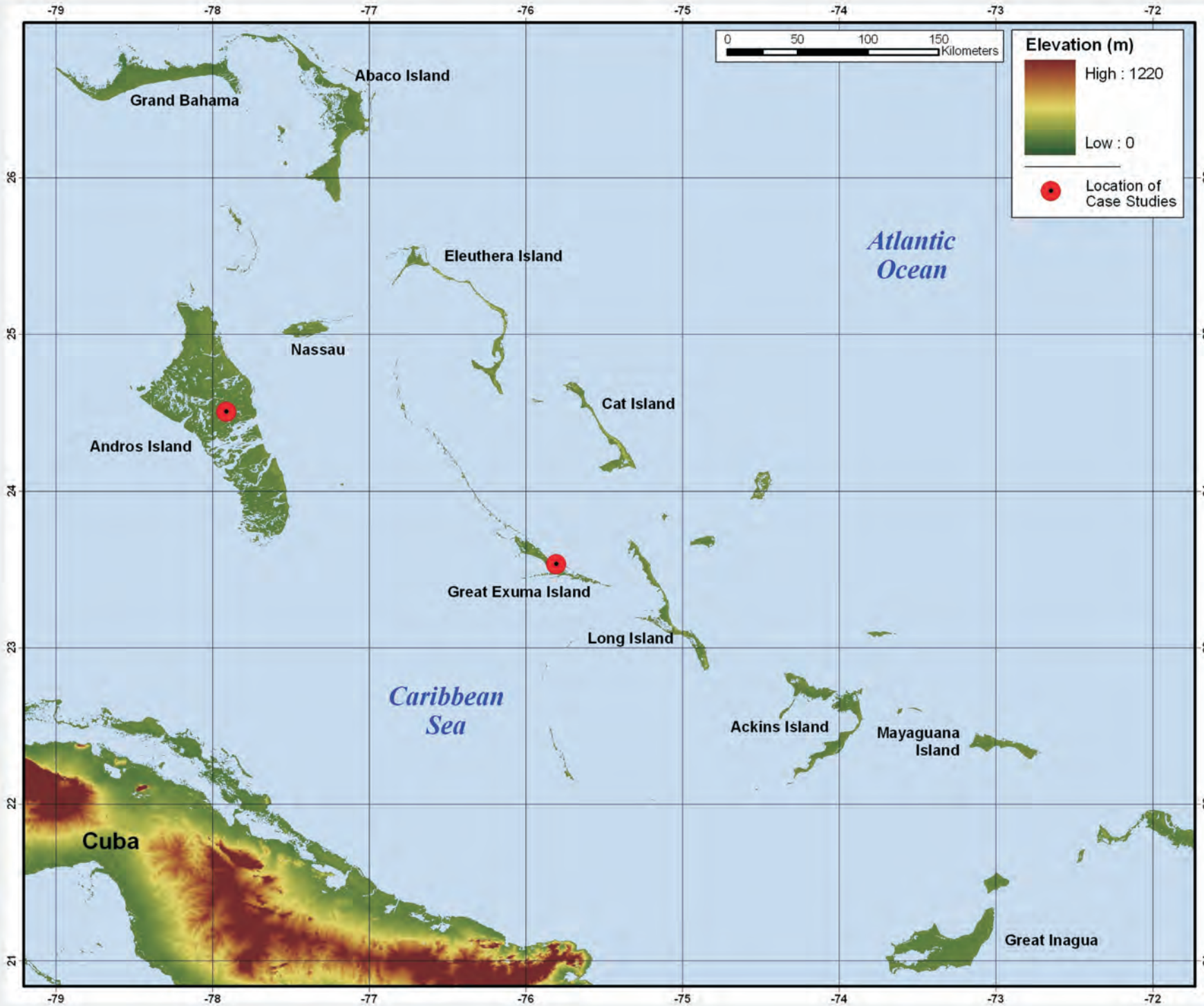
Tidal Creek Wetland, Andros

The main project activities and achievements were (i) Aggregation of imagery and data to allow for the establishment of natural resource targets as part of the baseline inventory of land and sea biodiversity; (ii) Rapid Ecological Assessment of the west coast of Andros; (iii) Development of a Conservation Area Plan; (iv) Community awareness and project strategy meetings in the major settlements of Andros; (v) Geographic Information Systems (GIS) stakeholder meeting and experts workshop to assist in the design of a data collection, sharing and management mechanism; (vi) Preparation of land and sea area zoning plan for future use, development and conservation; (vii) Development of an Ecotourism Plan; (viii) Coordinating an Economic Valuation of Resources and Biodiversity for the island; (ix) Development of a Water Conservation Strategy, (x) Small-scale demonstration of reducing water wastage; and (xi) Development of a Community Management and Self-Regulation Strategy.

Ecological Habitat Survey of a Tidal Creek Wetland

At the conclusion of this project, communities, local government, and central government were more empowered to effectively protect the rich land and sea resources of Andros, supported by sustainable management, monitoring, and use of a range of technologies. The Forestry Bill 2010, and the Planning and Subdivisions Act 2010 will utilize the LSUP developed from this project. Additionally the LSUP will be used by the Bahamas Government for future zoning and to ensure sustainable development.

Bahamas - Overview Map



Cuba - Introduction

Application of IWCAM Concepts at Cienfuegos Bay and Watershed

Cienfuegos Bay, Cuba

Located in the South-Central part of Cuba, Cienfuegos Bay and its watershed have traditionally suffered from the absence of integrated environmental management. This area is 2, 210 km² in area and is one of the biggest hydrological systems in the country. Several rivers flow towards the bay forming a complex estuary. These rivers are impacted by several land-based point sources of pollution. Some of the main environmental problems included: (i) Increase of wastewater flow into the basins, leading to eutrophication; (ii) Increase of soil erosion processes causing excessive areas of sedimentation within watercourses and ultimately within the bay; (iii) Loss of soil fertility and deforestation; (iv) Increased levels of salinity and sediments affecting drinking and irrigation waters; (v) Degraded natural ecosystems with inherent risks to biodiversity and natural resource drinking and irrigation waters; (v) Degraded natural ecosystems with inherent risks to biodiversity and natural resource accessibility/productivity (e.g. fisheries and recreational usage) and (vi) General threats to human health.

The key areas of focus for the project were: Water Resource and Supply Management, Soil Management and Conservation, Education and Awareness and the development of stronger Cross-sectoral Stakeholder Capacity for watershed management.

The main project partners were: Centre for Engineering and Management of Coasts and Bays, Centre of Environmental Studies of Cienfuegos, Cienfuegos Municipal Government, Environmental Agency, Ministry of Agriculture, Ministry of Public Health, Ministry of the Interior, Ministry of Science, Technology and Environment, National Institute of Water Resources, and National Council of Watersheds.

The main project activities and achievements were: (i) Significant increase in monthly income for families working as farmers in the agroforestry and soil conservation demonstration farms, (ii) Implementation of best management practices leading to increased food productivity and reduced pollution; (iii) Construction, and implementation of an organic waste pretreatment plant for organic fertilizer production; (iv) Implementation of a monitoring programme for Cienfuegos including strengthened laboratory capacity; (v) Establishment of a Local Authority (Grupo Estatal de Trabajo de la Bahía de Cienfuegos) and (vi) Introduction of Masters and Diploma courses which are ongoing and totally sustained by the University of Cienfuegos and CEAC.

Bountiful Harvest, Cienfuegos Watershed

Cuba - Overview Maps (1)

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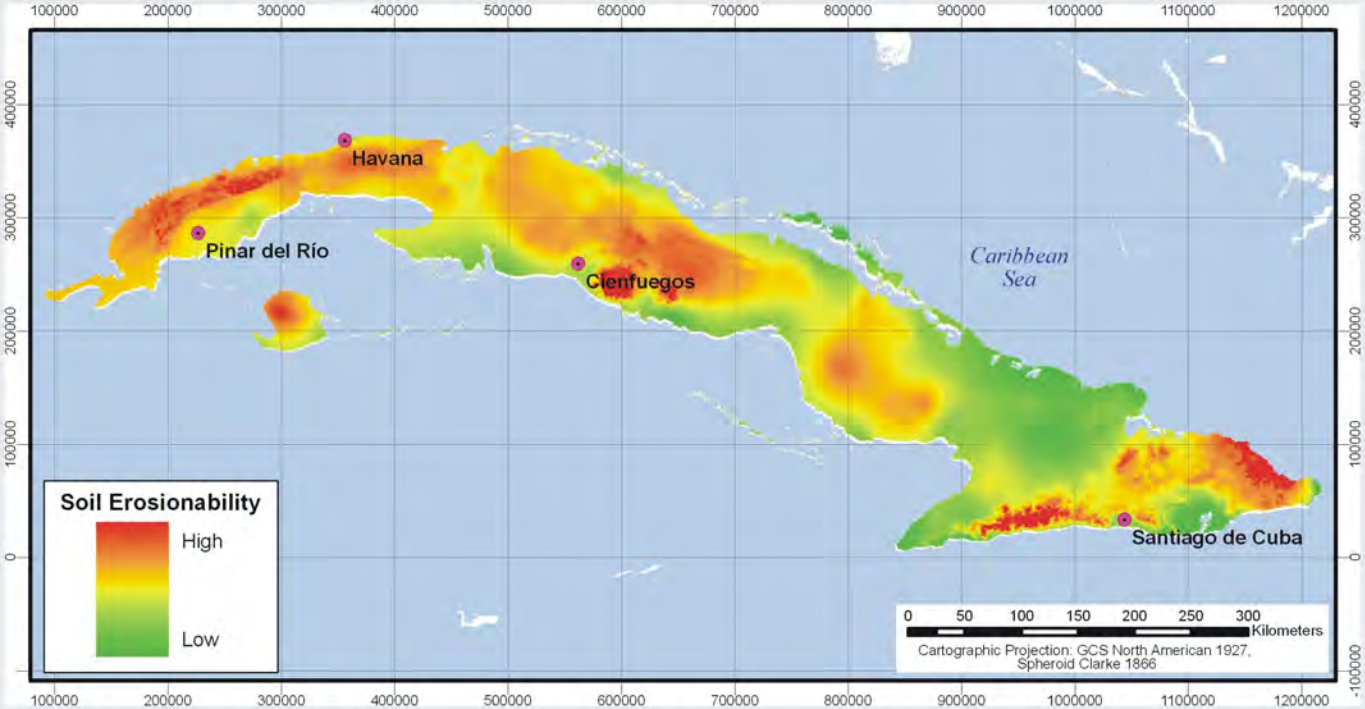
Cuba - Overview Maps (2)



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Water Quality Monitoring, Lower Haina River

Mitigation of Impacts of Industrial Wastes on the Lower Haina River Basin and its Coast

The Lower Haina River Basin is one of the Dominican Republic's main industrial conglomerations; it has over one hundred medium to large sized industries. The region is highly contaminated by solid and liquid wastes generated by the industries and communities. Final disposal of industrial waste is mostly carried out by third parties without environmental authorization. Difficulties in the management of the waste are further exacerbated by poor capacity and infrastructure.

The Dominican Republic's Demonstration Project aimed to reduce pollution in this hydrographic basin. The principal intervention was in the industrial sector with the implementation of clean production programmes to reduce contamination by developing recycling and re-utilisation mechanisms.

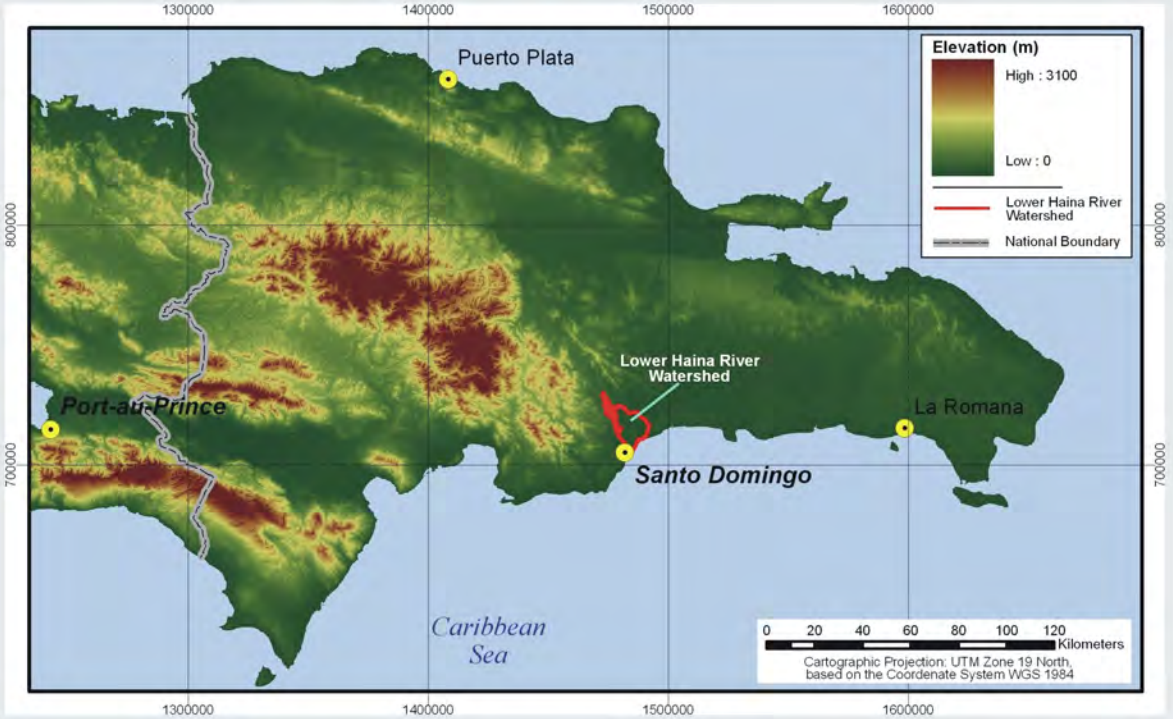
The main project partners were: (i) Haina Association of Industries and Businesses, (ii) Herrera Association of Industrial Businesses, (iii) Lower Haina Municipal Government (City Hall), (iv)Dominican Institute for Hydraulic Resources, (v) Autonomous University of Santo Domingo (UASD), (vi) Ministry of Education, (vii) Coordinator of Haina Neighborhood Councils, (viii) San Cristobal Province Directorate of the Ministry of Environment and Natural Resources.

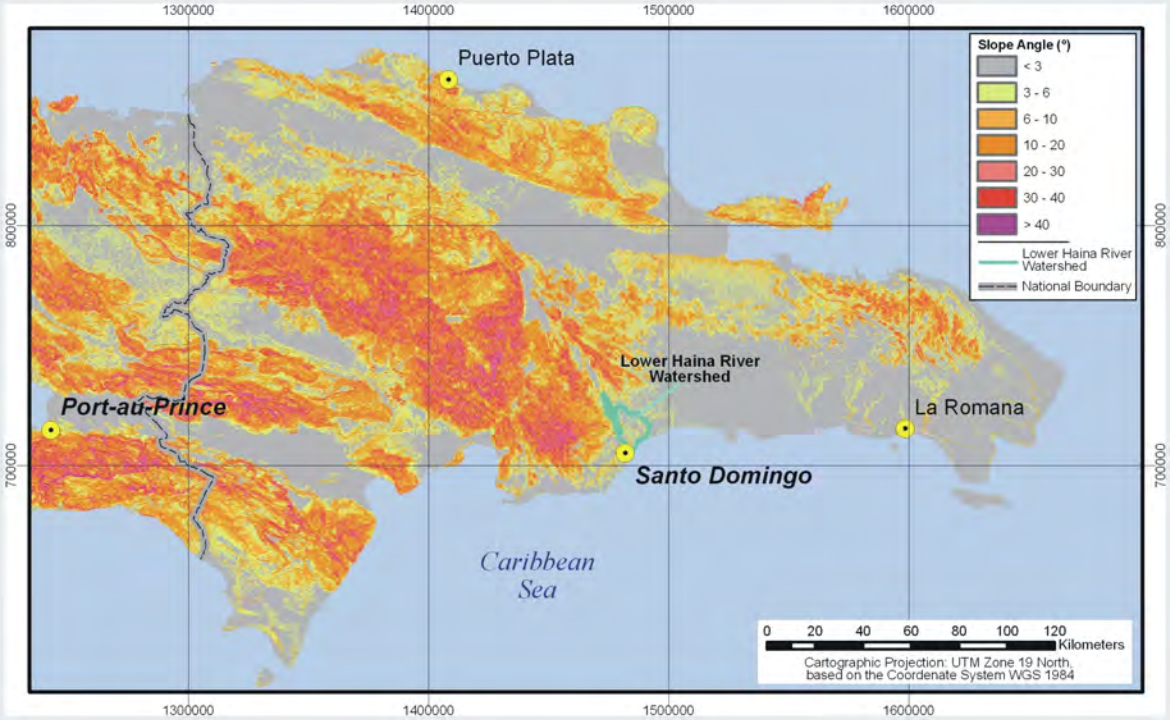
The main project activities and achievements included: (i) Establishment of a management infrastructure and strategy for the Haina River Basin; (ii) Legislative and policy review to provide incentives for reductions in discharges and emissions (iii) Identification and implementation of mechanisms to reduce point-source pollutants. Several Cleaner Production Mechanisms were also identified and implemented. Groups were formed to support the environmental protection and conservation work, e.g. the Volunteer Nature Guardians and the Environmental Defense Clubs.

The main impacts were attitude change amongst industries related to the management of industrial discharge; Improved communication between the industrial sector and the Ministry of Environment; In the medium term, there will be improvements in the air quality and management of solid waste and greater involvement of communities in watershed management efforts. The longer-term results would be a reduction in the pollution emitted by the industrial sector, improvements to water quality within the basin, and the creation of a sustainable management programme for the hydrographic basin.

Surveying Industries, Lower Haina River

Dominican Republic - Overview Maps





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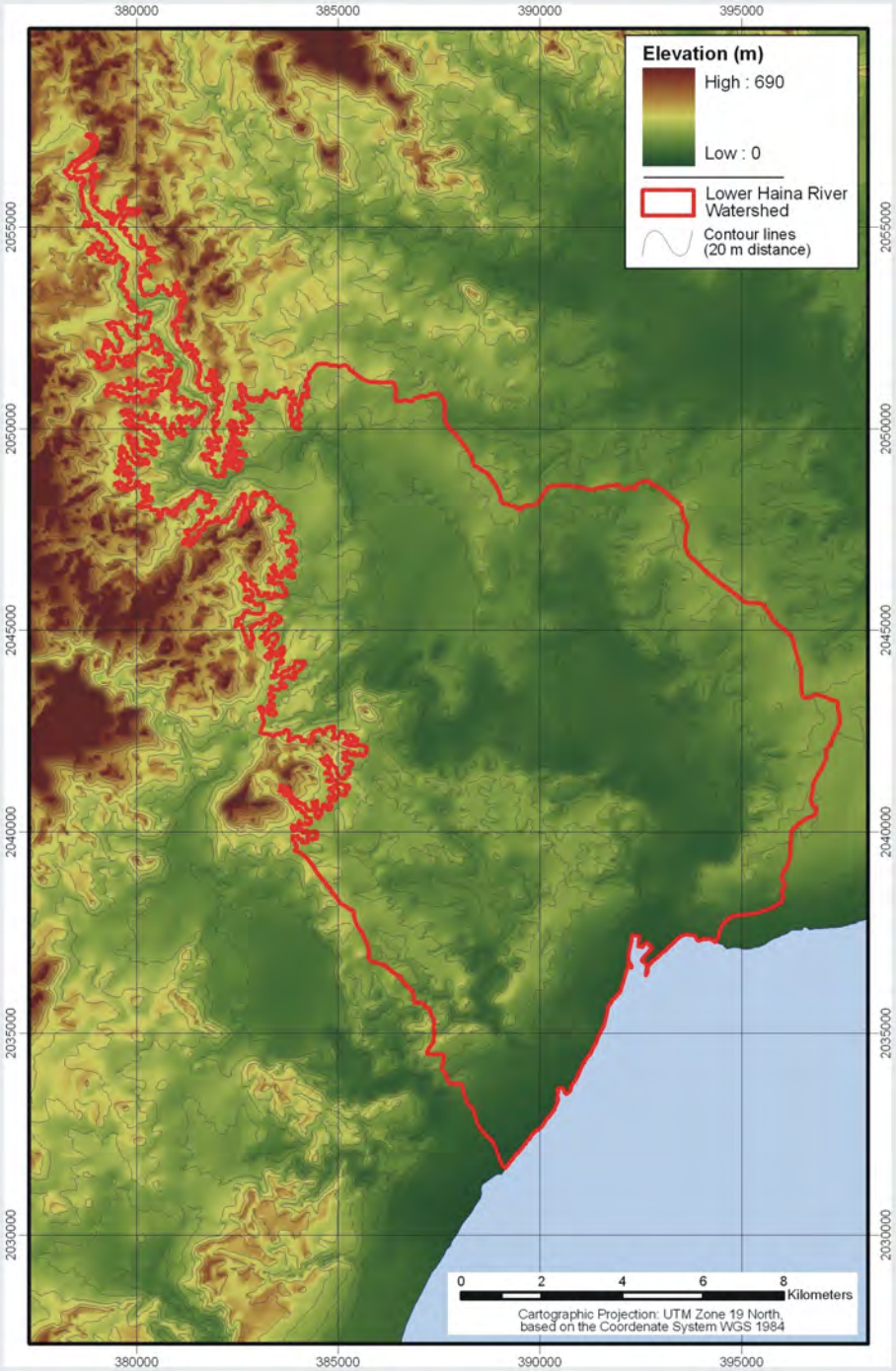
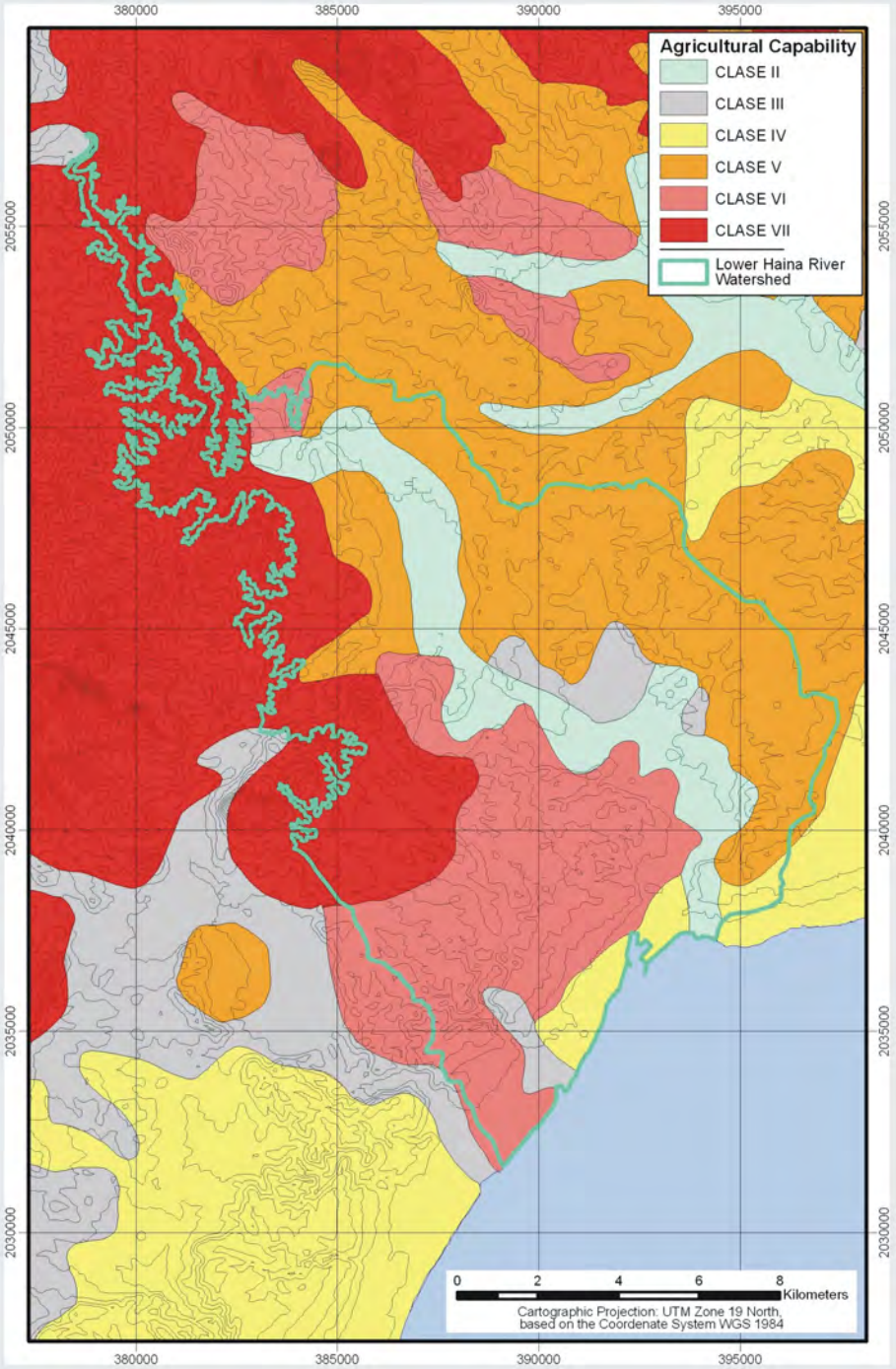
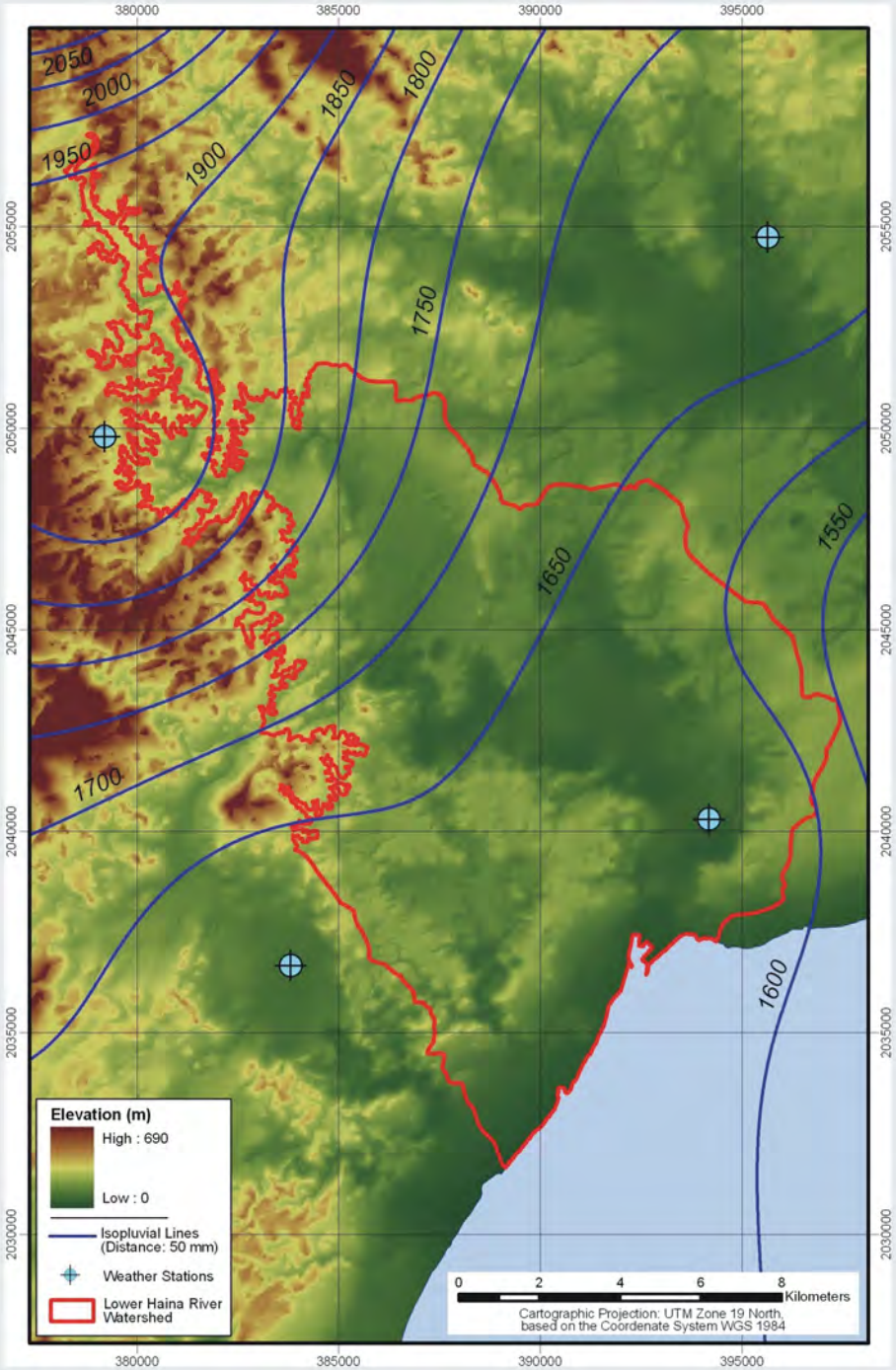
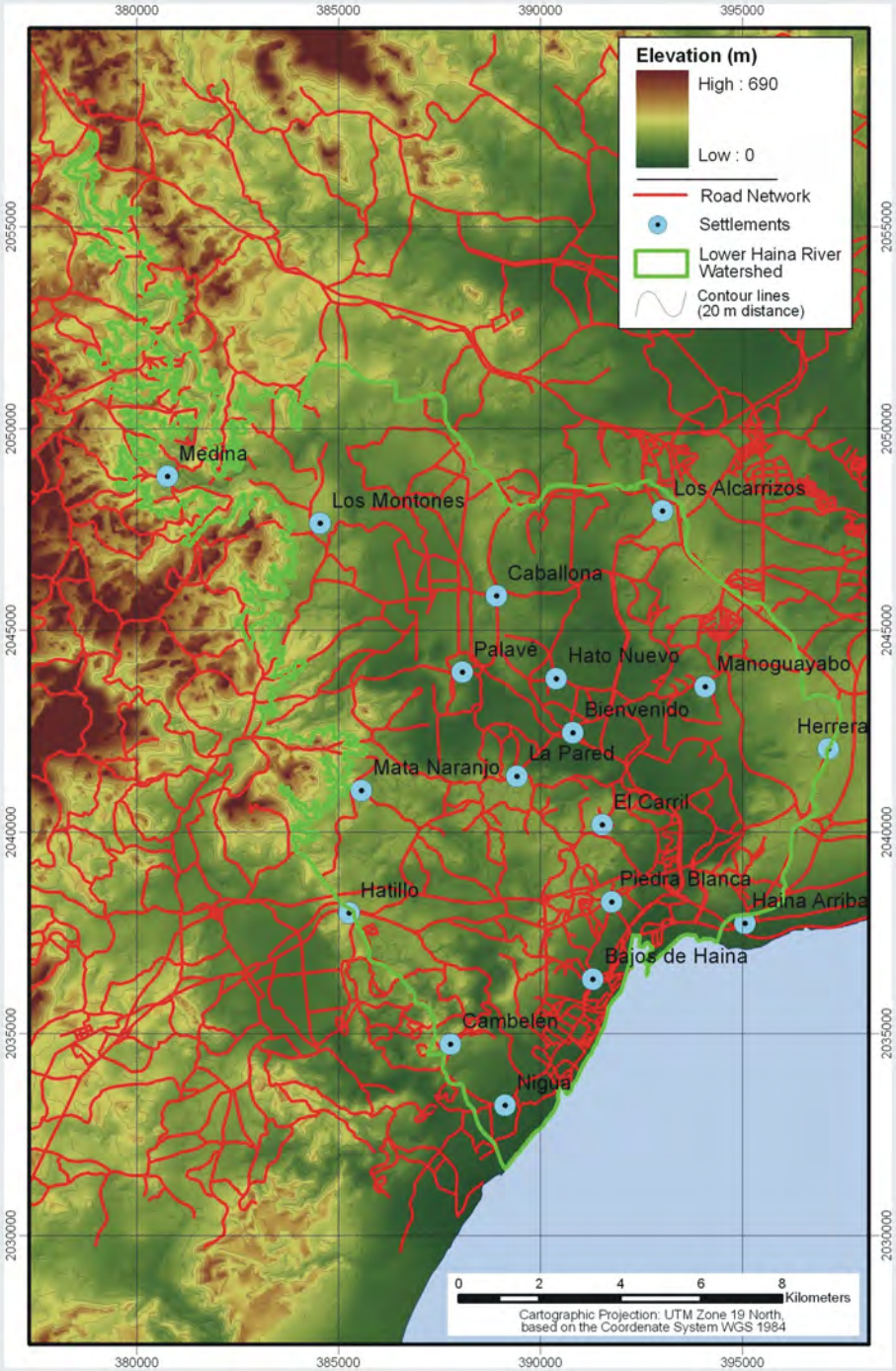
Dominican Republic - Lower Haina Watershed (1)



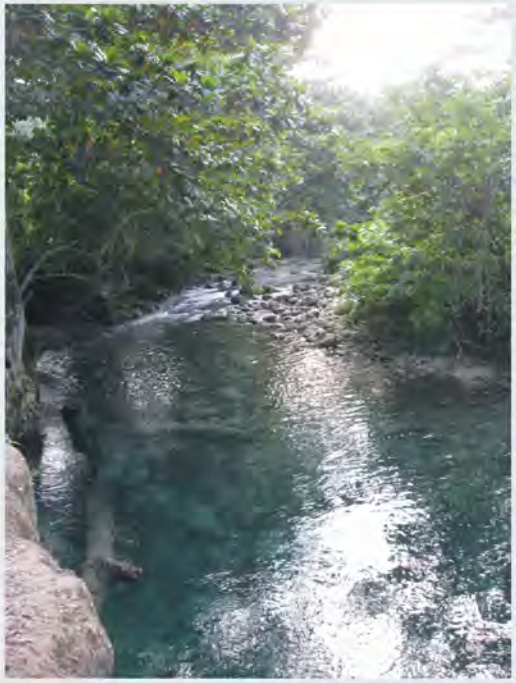


Dominican Republic - Lower Haina Watershed (2)





Jamaica - Introduction



Driver's River East Portland

An Integrated Approach to Managing the Marine, Coastal and Watershed Resources of East - Central Portland

Jamaica's GEF-IWCAM Demonstration Project developed and implemented a model Watershed Area Management Mechanism (WAMM) for the Driver's River Watershed, in Eastern Portland, incorporating the lessons and experiences gained in other Watershed Management Units and Small Island Developing States. Environmental challenges in the area are rooted in a number of interrelated causes which have physical, socio-economic and institutional dimensions. This project introduced a number of interventions aimed at preventing further degradation and for establishing a WAMM.

The main project partners were: Environmental Foundation of Jamaica (EFJ), Fisheries Division, Ministry of Agriculture, Forestry Department, Island Special Constabulary Force (ISCF), Portland Health Department, Ministry of Health, Meteorological Services, National Solid Waste Management Authority (NSWMA), Portland Parish Council, Portland Parish Development Committee (PPDC), Beneficiaries of the Demo Project's Grants programme all community based organizations.

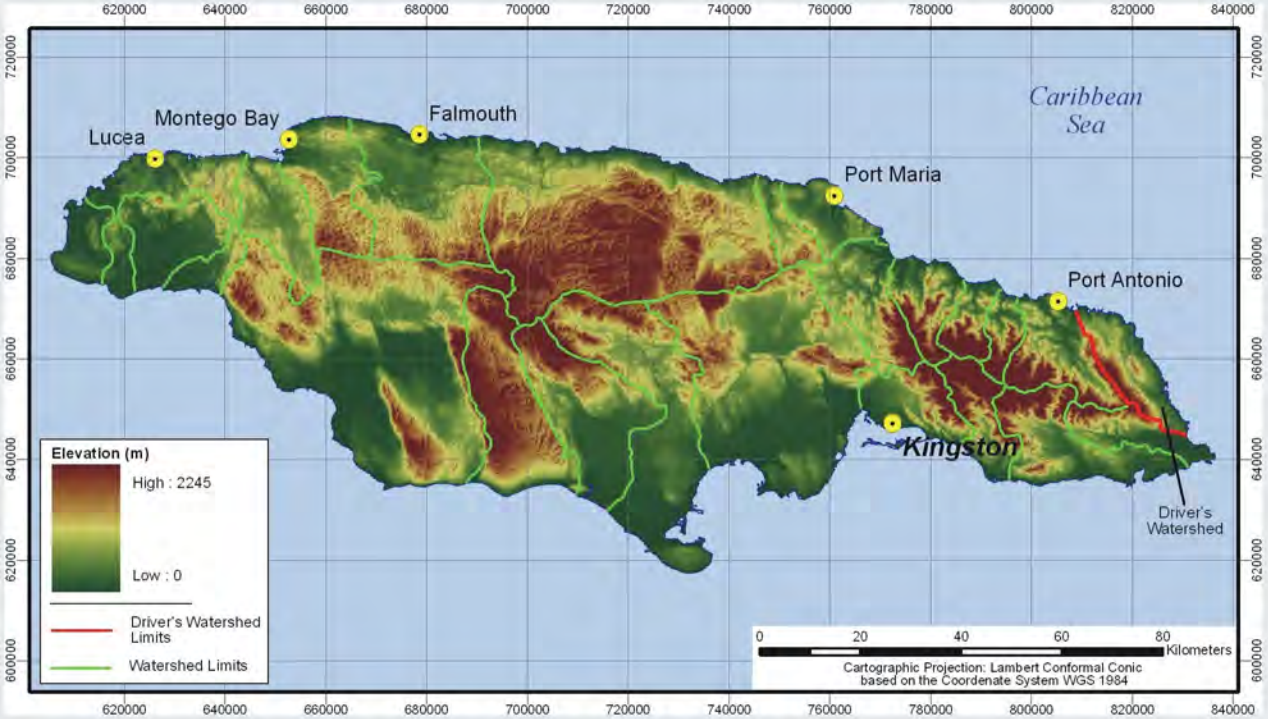
The main project activities and achievements included:

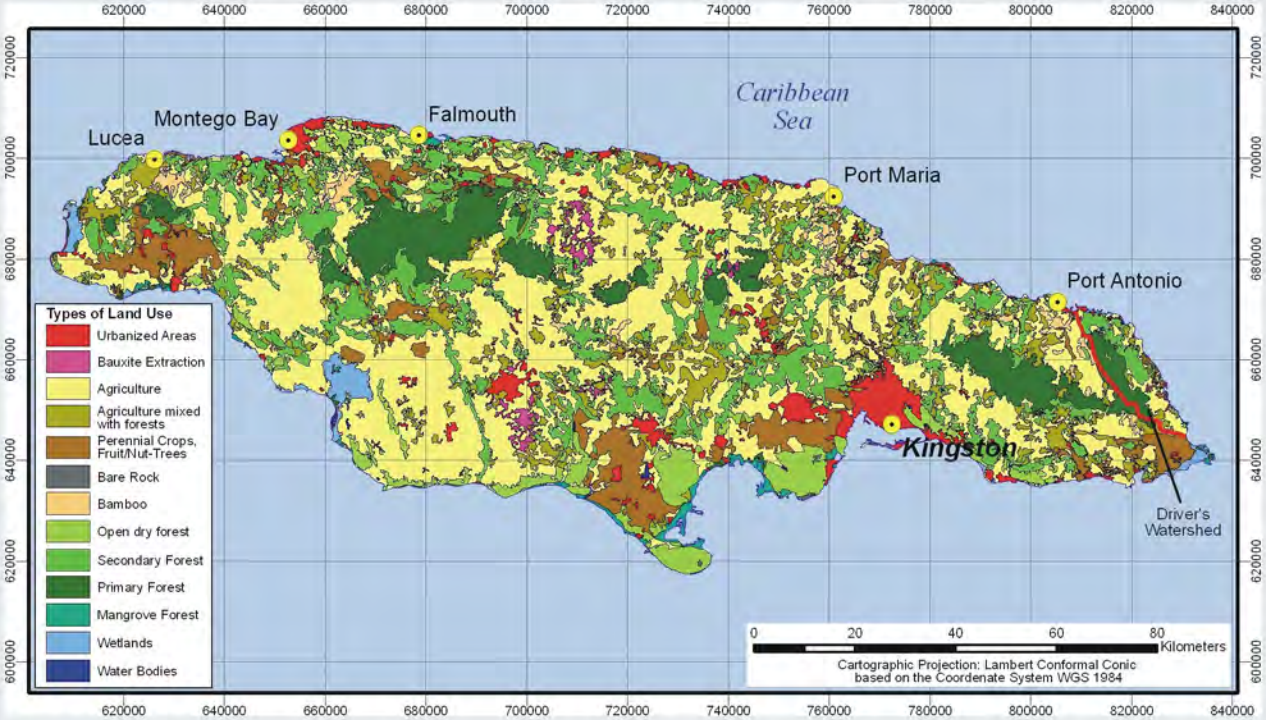
(i) a Small Grants Programme for community environmental projects; (ii) Community Water Sampling and data collection; (iii) Watershed Exchange and the establishment of an EnviroCentre for ongoing education and awareness programmes; (iv) Training in proposal writing, advocacy, administration of questionnaires, water resources management, bio-monitoring, and environmental law including compliance and enforcement; (v) Introduction of constructed wetland technology; (vi) commissioning of a community bio-monitoring programme; (vi) Strengthened partnership amongst state agencies, CBOs and NGOs and (vii) Development of the Watershed Area Management Model (WAMM).

The GEF-IWCAM Jamaica Demonstration Project demonstrated the importance of community participation, technical local capacity and institutional arrangements, and an enabling policy and legislative environment.

Tree Planting Driver's River Watershed

Jamaica - Overview





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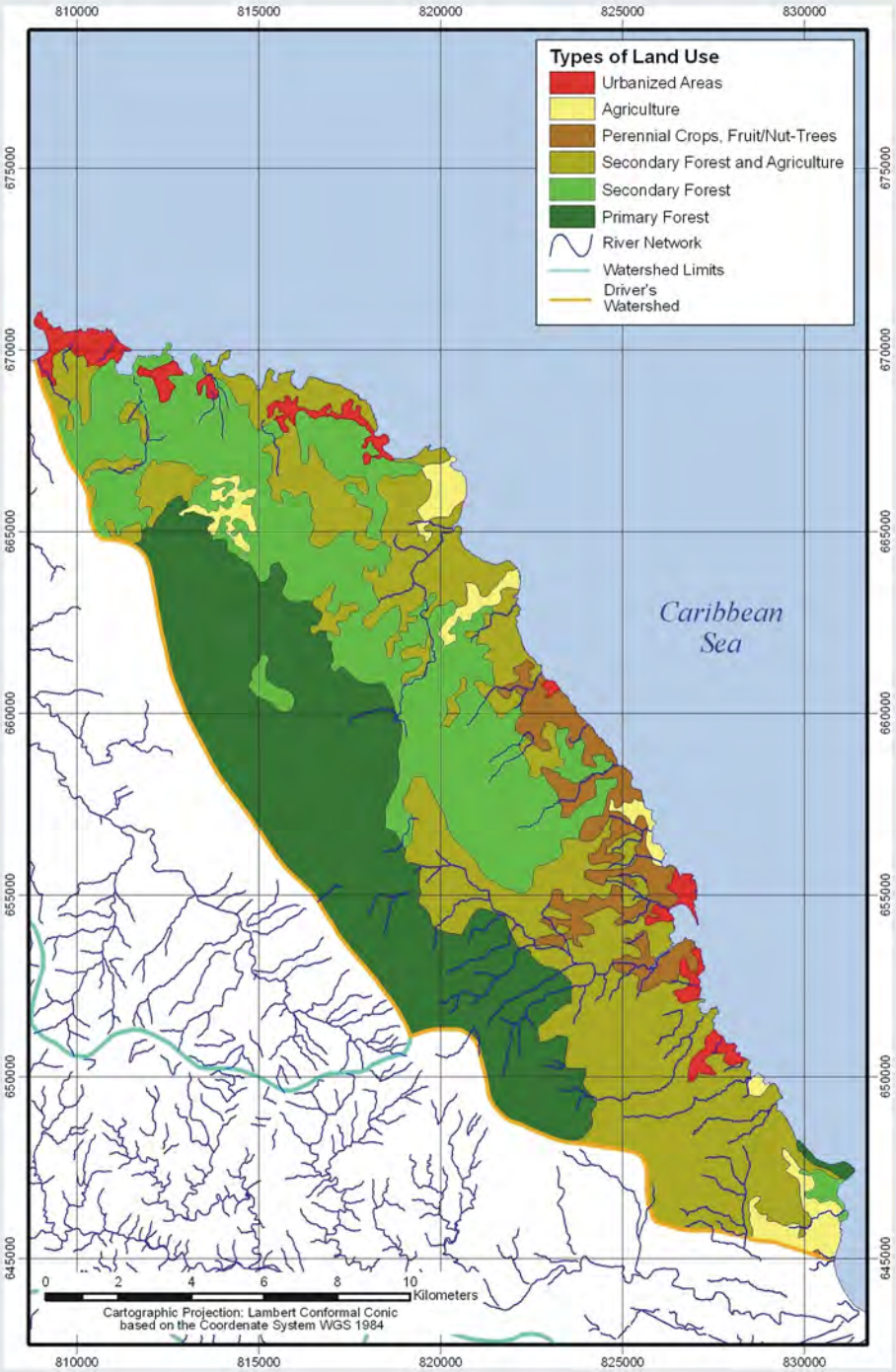
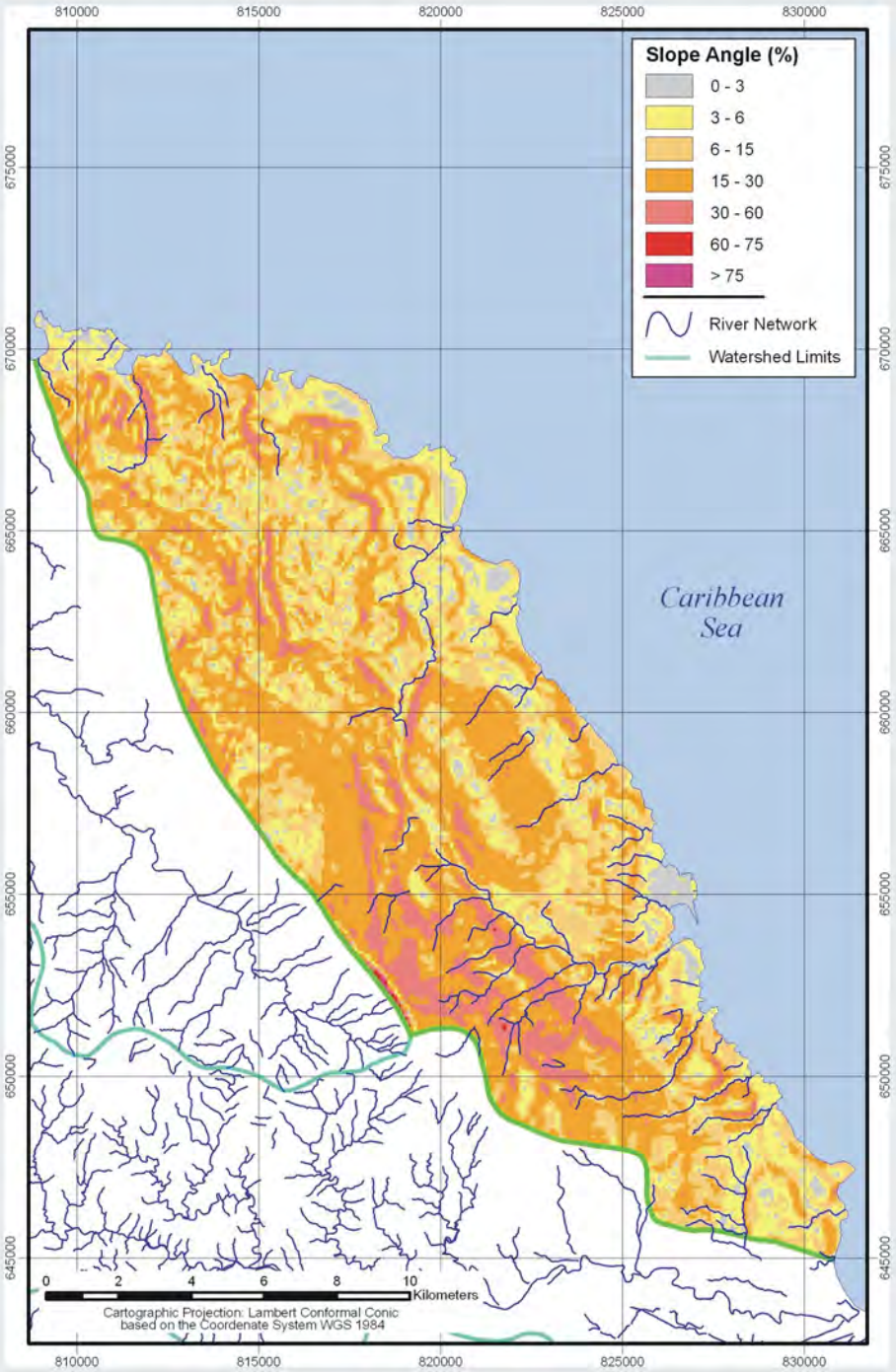
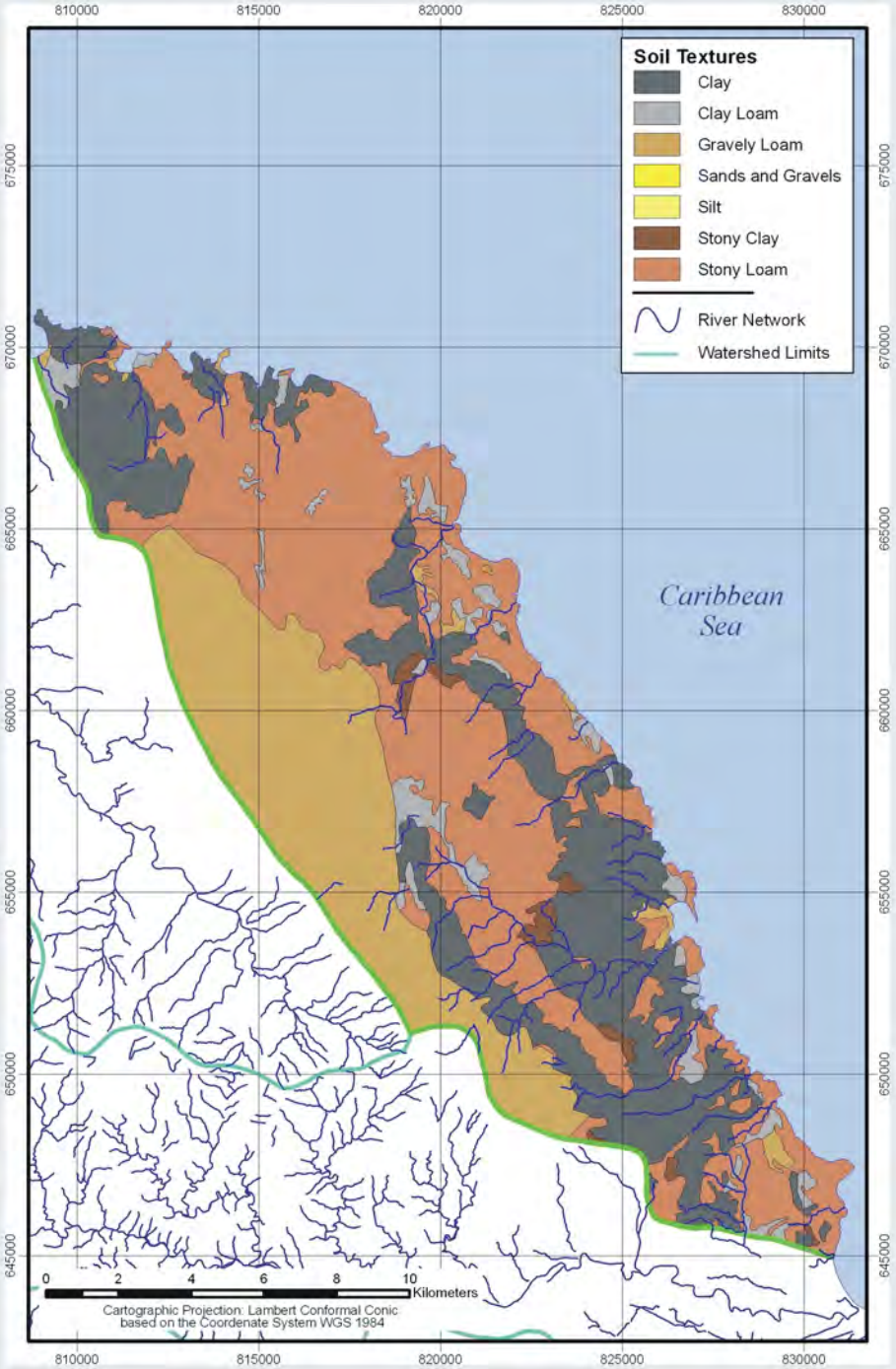
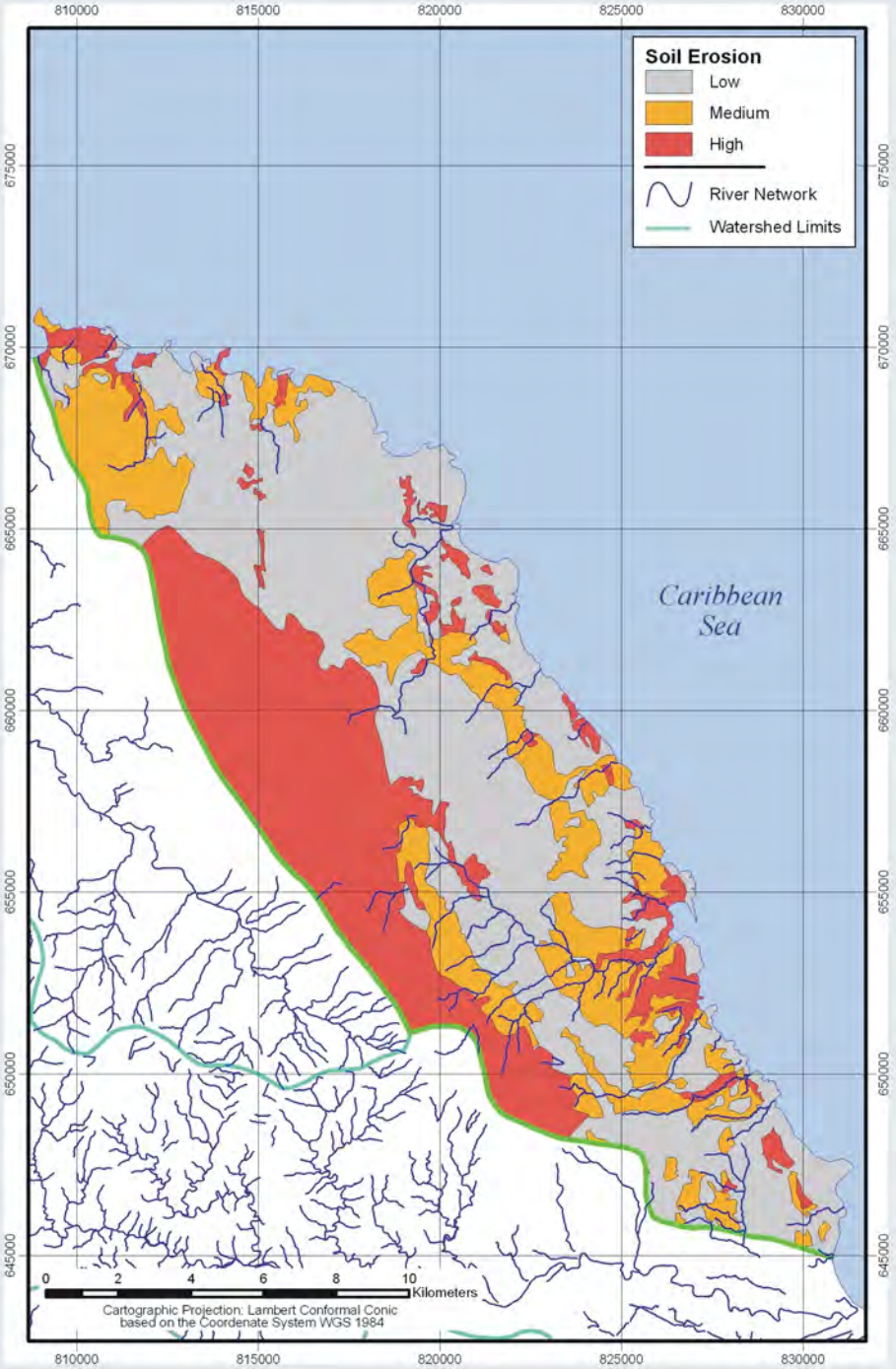
Jamaica - Driver's Watershed (1)





Jamaica - Driver's Watershed (2)





Basseterre Valley

Rehabilitation and Management of the Basseterre Valley as a Protection Measure for the Underlying Aquifer

The unconfined coastal aquifer underlying the Basseterre Valley is a significant economic and social asset for the people of St. Kitts & Nevis. The potable water extracted from this aquifer represents over 40% of the total water supply for St. Kitts. The area is subject to urban encroachment, inappropriate land use and threats from pollution.

The GEF-IWCAM Demonstration Project was developed and implemented using an integrated approach to help government and communities take practical actions to protect this vulnerable aquifer by demonstrating proper management and protection on three fronts: mitigation of threats from contaminants, protection of the aquifer and improved water resources management.

The two major outcomes of the project were a water resources management plan and establishment of a National Park in the well-field area.

The main project partners included several agencies within the Government of St. Kitts & Nevis including Water Services Department, Department of Physical Planning and Environment, Tourism, Agriculture, Finance, Legal Affairs as well as Communities in the Basseterre Valley Area.

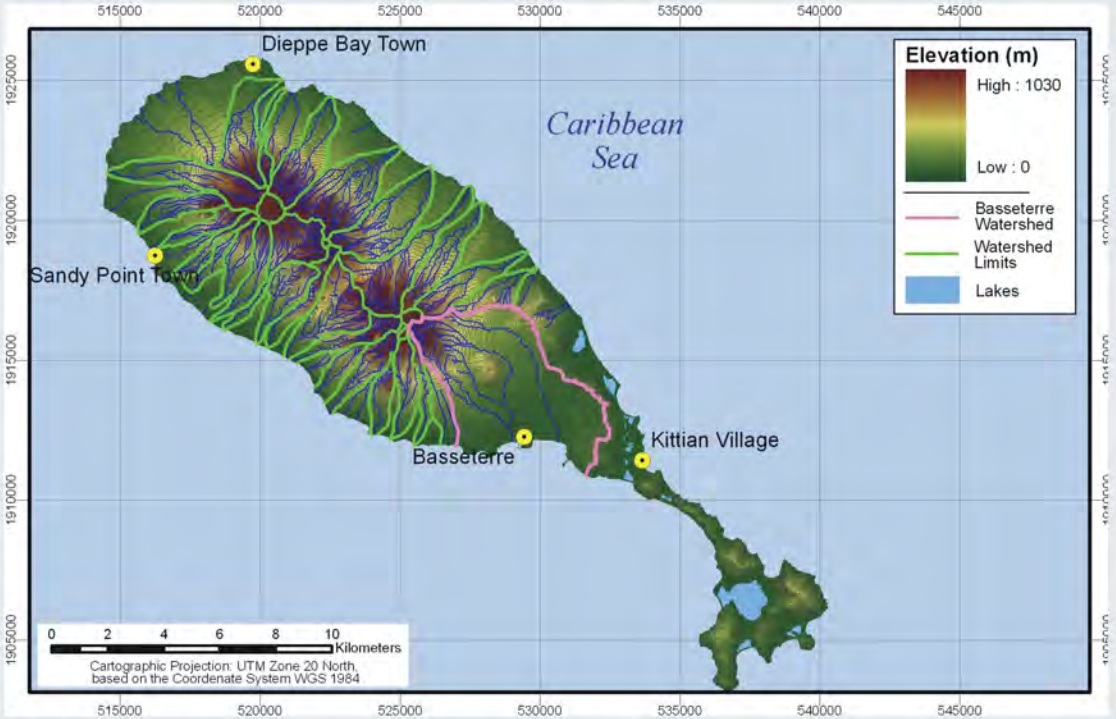
The main project activities and achievements included the Development of a Water Resources Management Plan which included: (i) Hydro geological survey of the aquifer; (ii) Land use survey; (iii) Survey on pollution sources; (iv) Policy and Legislative review; and (v) An action plan and timeline for implementation.

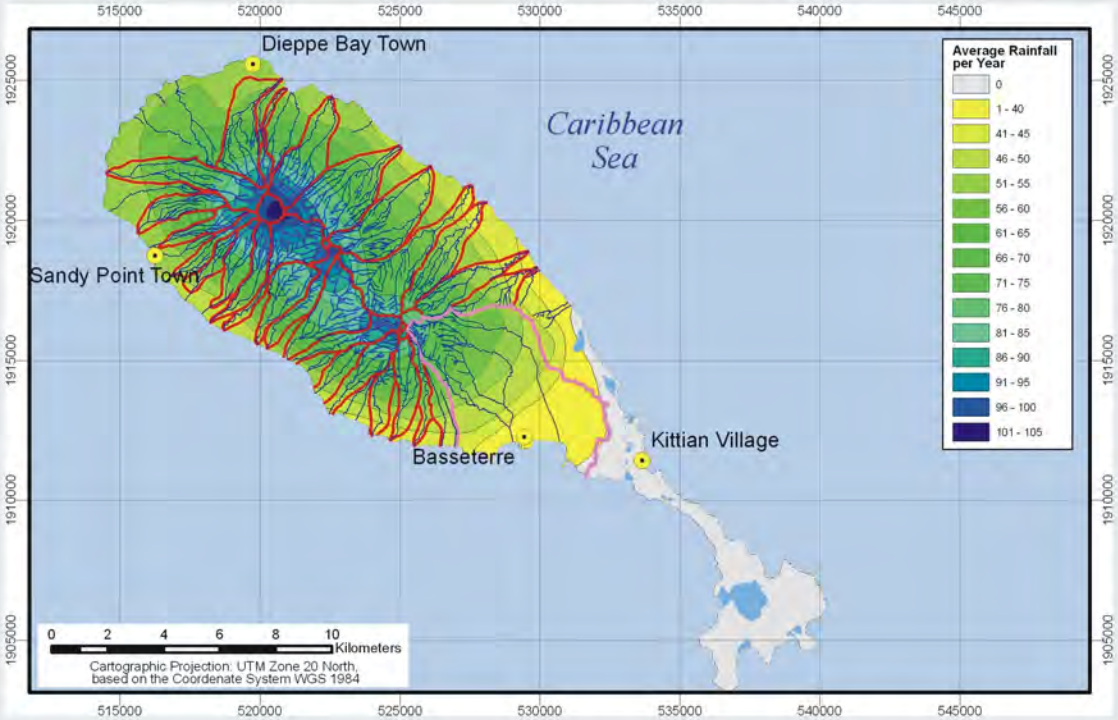
The sensitive well-field area was officially designated as the St. Kitts National Capitol Park under the National Conservation and Environmental Protection Act (1987) on April 21, 2011.

The study also revealed fluctuations in the fresh/salt water interface in response to long-term pumping. This highlights the need for proper well construction, an efficient pumping regime and continuous monitoring of coastal aquifers in small islands where water resources are scarce and vulnerable.

Designated National Park Area, Basseterre Valley

Saint Kitts & Nevis - Overview Maps





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Heavy Sedimentation Fond D'or Watershed

Protecting and Valuing Watershed Services and Developing Management Incentives in the Fond D'or Watershed Area of St. Lucia

The Fond D'or Watershed is the second largest watershed in St. Lucia. It is mostly hilly and the middle and lower watershed areas are commonly used for intensive cultivation and livestock production. Chronic water supply deficiencies are faced in the watershed. Major factors contributing to this situation include many years of inappropriate land management practices, including extensive deforestation.

The Demonstration Project aimed to: develop a model approach to participatory watershed management in the Fond D'or Watershed; develop mechanisms for sustainable natural resource management; capture lessons in policies, legislation and management strategies; and encourage national and regional replication.

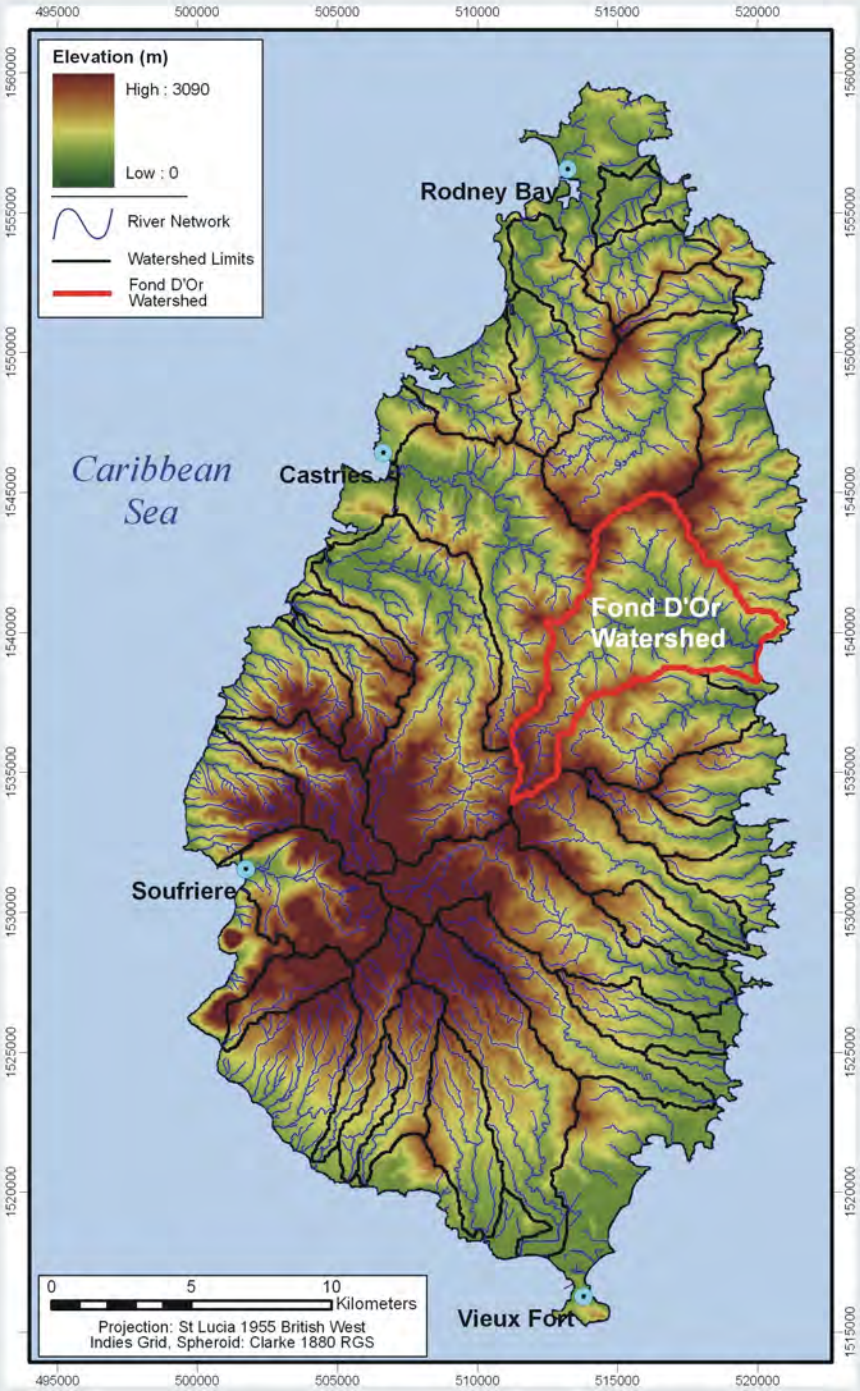
The main project partners were: Ministry of Agriculture, Lands, Forestry and Fisheries, Ministry of Physical Development, Environment and Housing, Ministry of Communications, Works, Transport and Public Utilities, Ministry of Health and 15 communities in the Fond D'or Watershed.

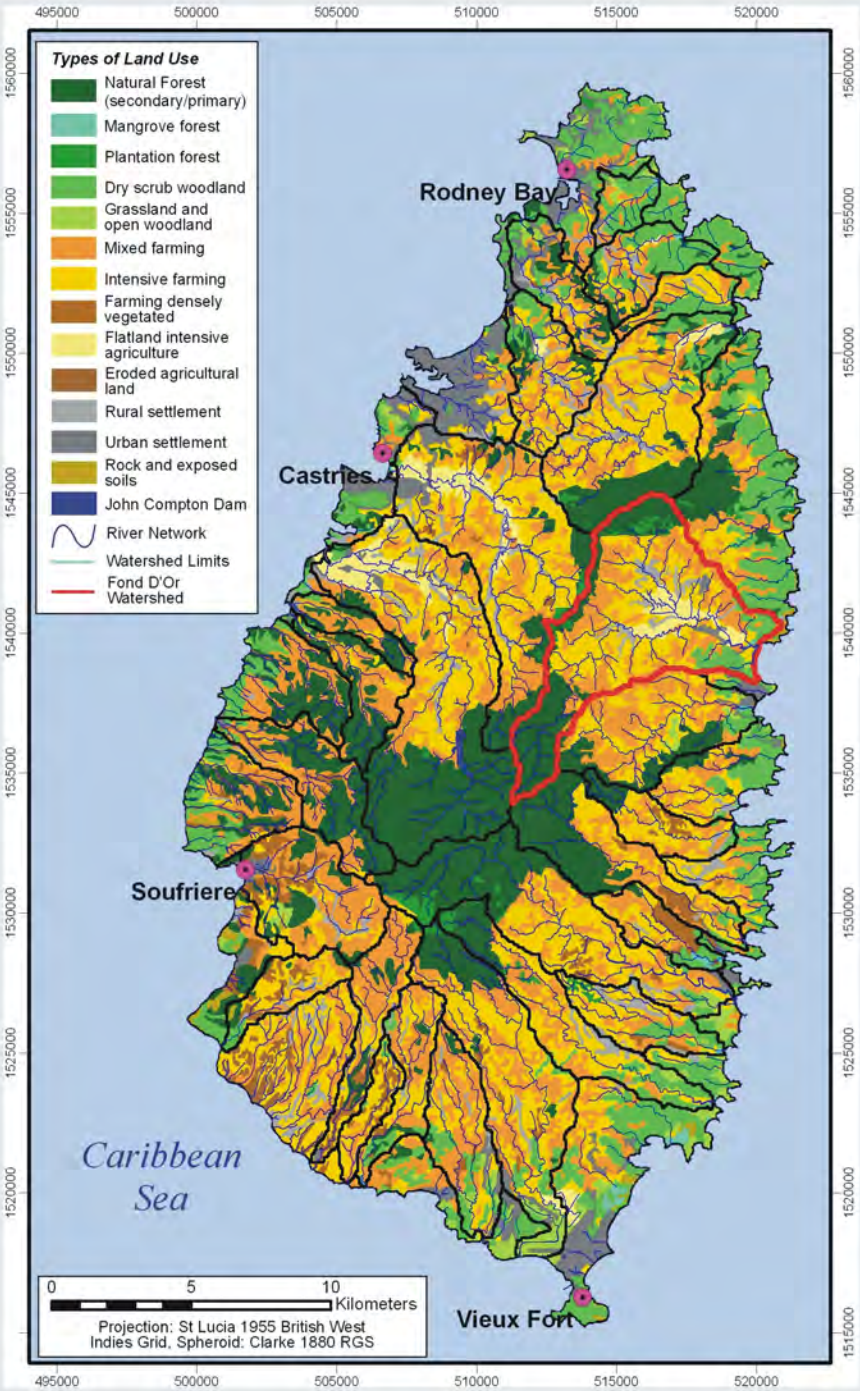
The main project activities and achievements included: Knowledge, Attitudes and Practices Survey (KAPS) ; Model Rainwater Harvesting (RWH); Public Awareness and Education; Training in Water Resources Management, Environmental Assessment and Monitoring; Waste Water Treatment Demonstration Sub-project; Compensation for Environmental Services (CES) Scheme; Model environmentally sustainable small-businesses bio-gas digester and car wash with filters; Transformation of the Watershed Management Committee into a Non-Governmental Organization; Development of an Integrated Watershed Management Strategy and Spatial Development Plan (IWMSSDP) and Preparation of Policy Briefs for Cabinet (RWH, Constructed Wetlands; River Water Quality Treatment; IWMSSDP).

The participatory aspect of this demonstration project was successful. Prior to the WMC, there existed a highly agitated, sensitized, educated, and environmentally receptive group of persons. The conversion of the WMC into an NGO, The Trust for the Management of Rivers (TMR), before the end of the project, was an attempt to ensure sustainability of the participatory approach to watershed management in the Fond D'or Watershed.

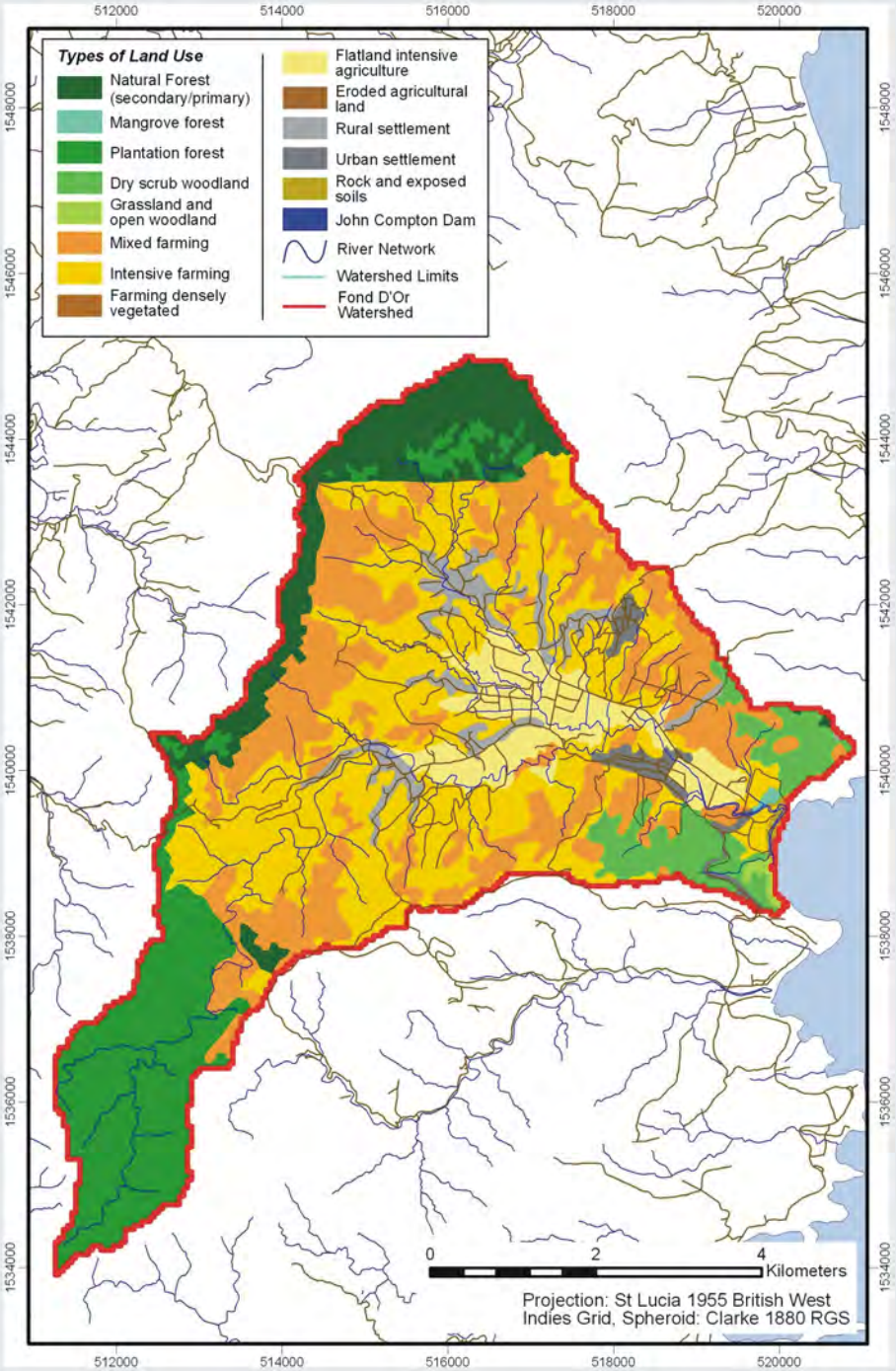
Construction of Wetland Filtration Unit

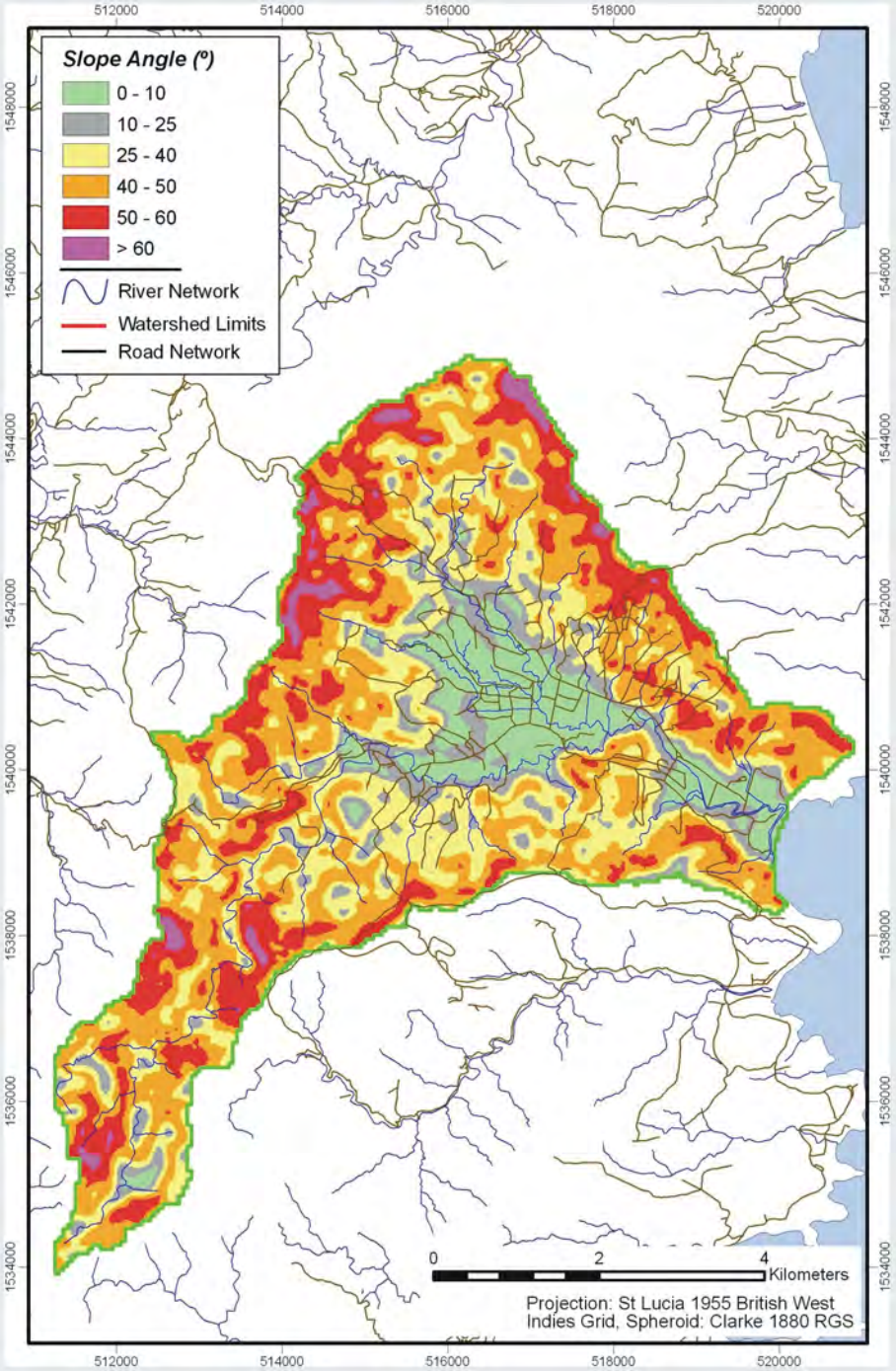
Saint Lucia - Overview Maps



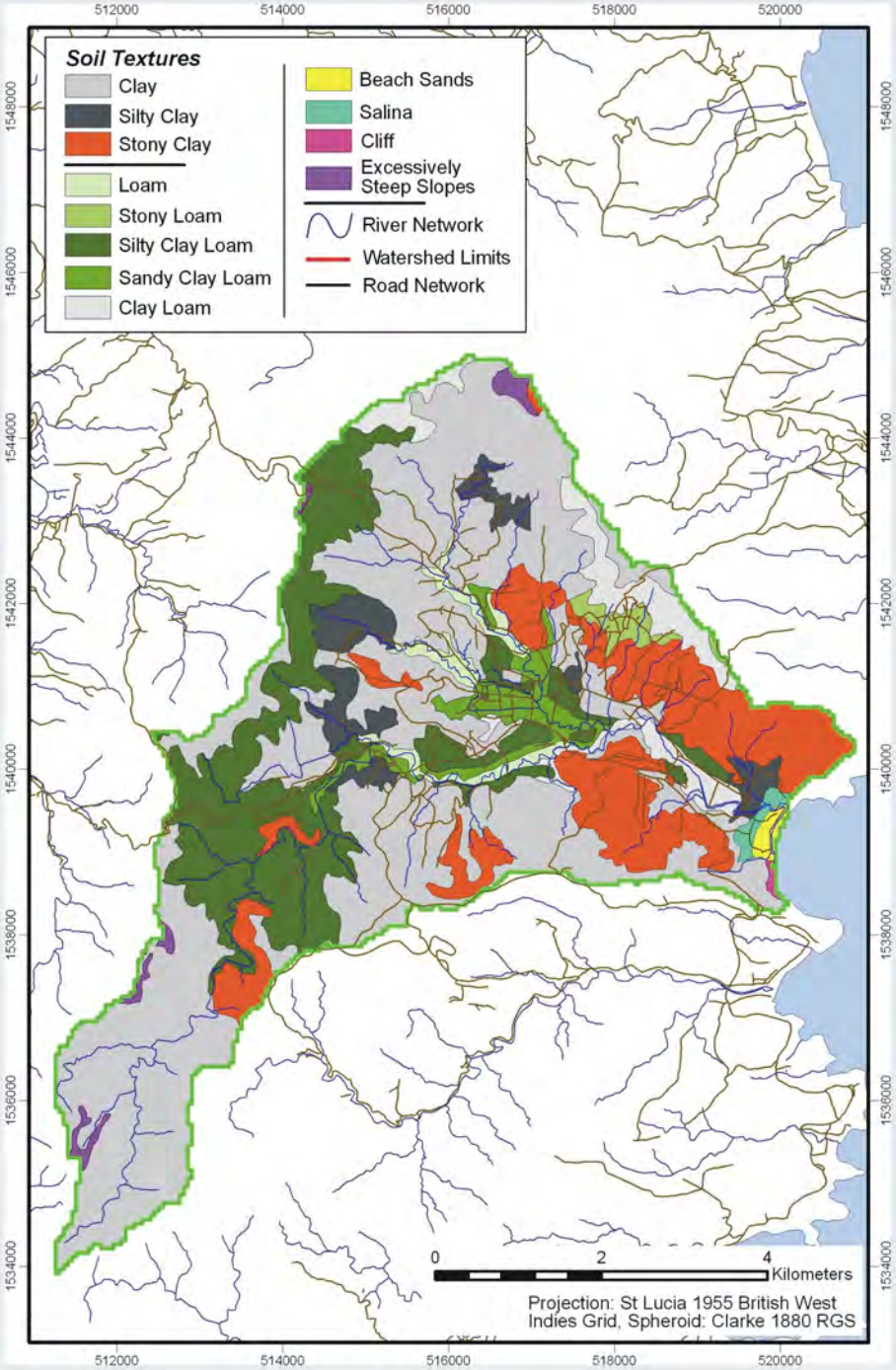


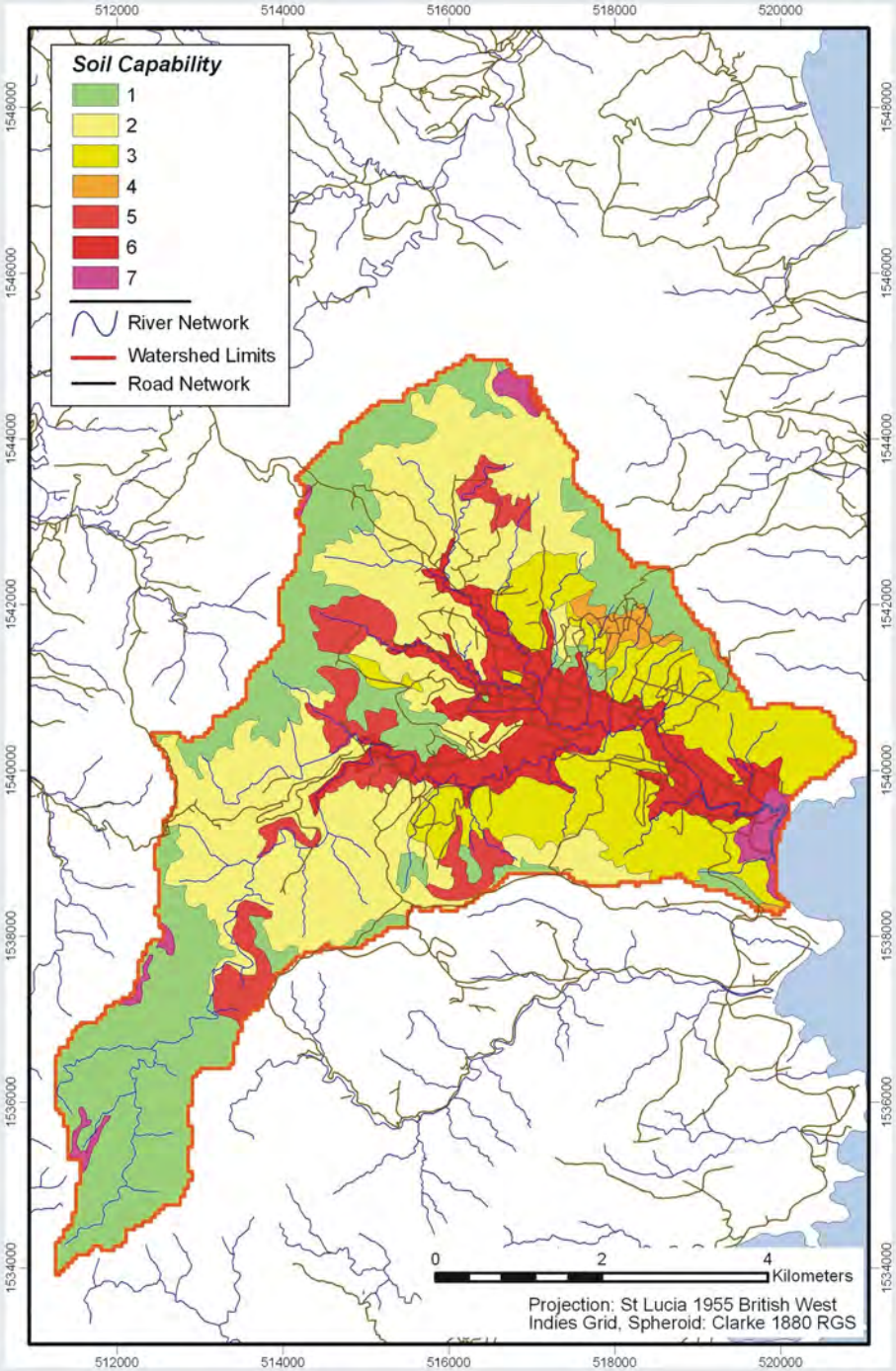
Saint Lucia - Fond D'Or Watershed (1)





Saint Lucia - Fond D'Or Watershed (2)





Video Transect Data Collection, Buccoo Reef

Community-linked Data Collection and Watershed Restoration as part of a focused IWCAM Demonstration in the Courland Watershed and Buccoo Reef Area

The Courland Watershed is Tobago's largest and most important water catchment area. It supplies water for rural villages on the entire west and south coast. The catchment drains into the coastal areas adjacent to Buccoo Reef. Changes in land use patterns in this watershed, in particular increasing deforestation as a result of poor farming practices and bush fires, have greatly affected the quality of run-off, and damaged the health of adjacent fringing coral reefs.

The project was designed to help highlight and subsequently reduce the causes of environmental degradation in Courland and surrounding watersheds, through a series of activities aimed at treating both the direct and root causes of the problem.

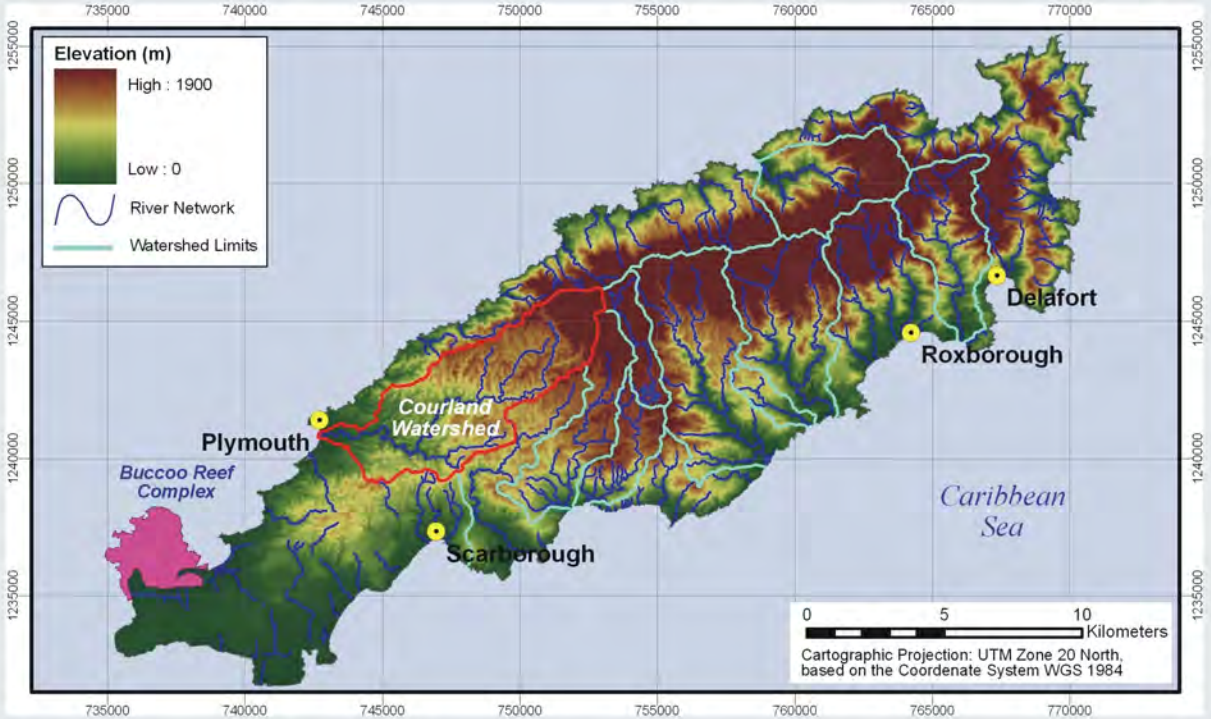
The main project partners were: Ministry of Planning, Housing and the Environment, Town and Country Planning, Tobago House of Assembly: Department of Natural Resources and the Environment; Information Technology Center; Department of Infrastructure and Public Utilities; Department of Education, Anse Formager Ecological Environmental Protection Group, Coral Cay Conservation (UK- NGO), Water and Sewage Authority, Fire Services Division and Central Statistical Office.

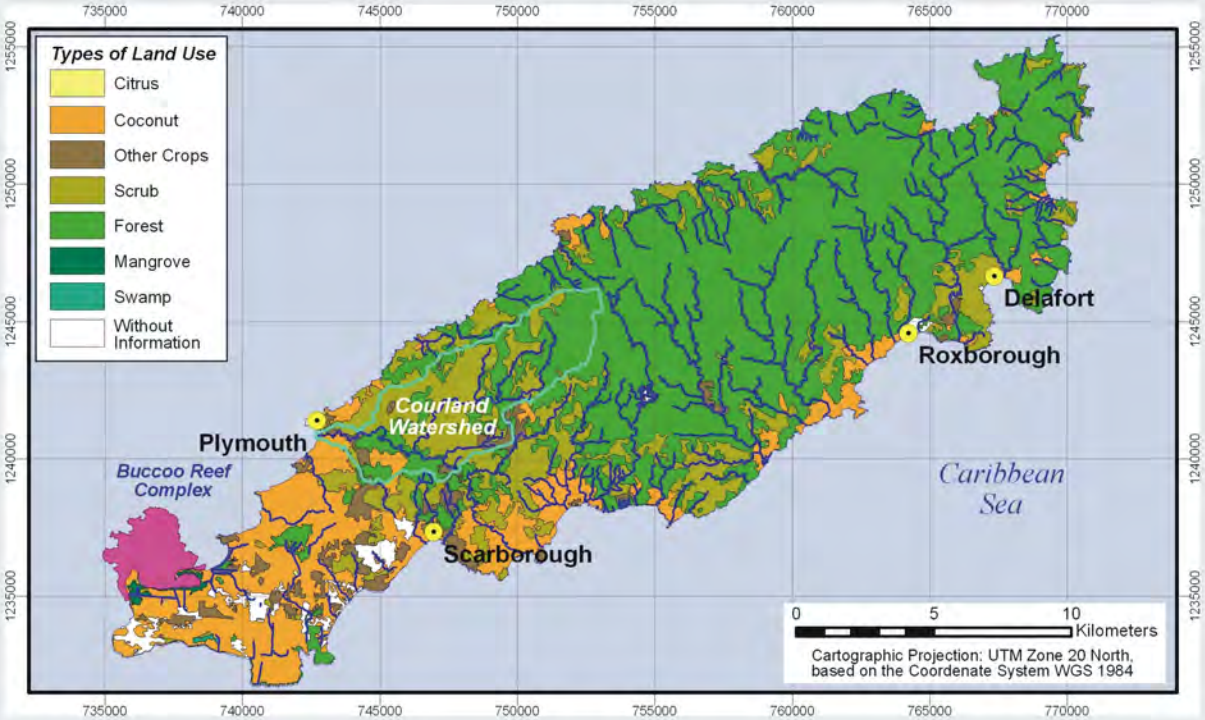
The main project activities and achievements were: (i) Initiation of reforestation and wild fire suppression awareness in the Courland Watershed; Public Awareness and Education; Geographic Information Systems mapping and data collection and training of other agencies in GIS ; Marine surveys, including reef checks and water quality; (ii) Establishment of permanent data collection and monitoring sites on land and in marine areas, including a data collection programme; (iii) Establishment of a viable community group within the Courland area to undertake and manage environmental protection activities; (iv) Diversion of a surface drain into constructed artificial wetland for wastewater treatment. (v) Production of films, documentaries and other educational materials to be used beyond the project.

The main impacts included changing of public perception on environmental issues, creation of partnerships, reforestation and increased public awareness and education.

Construction of Wetland Filtration Unit

Trinidad & Tobago - Overview Maps





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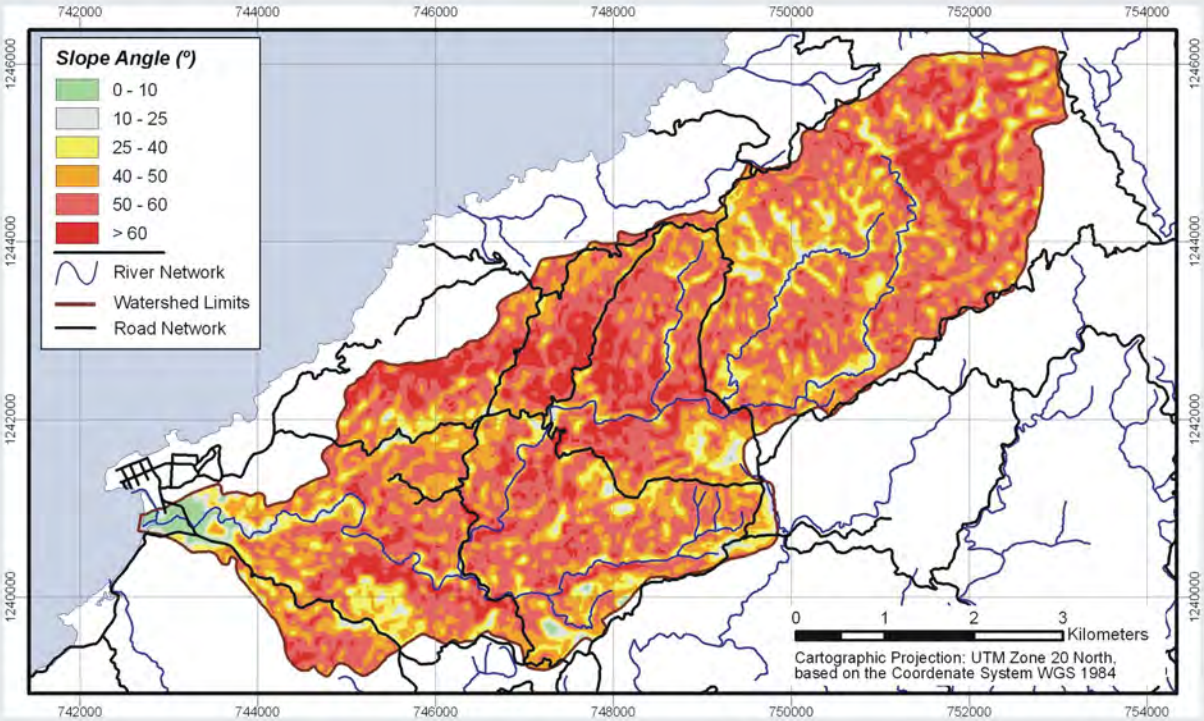
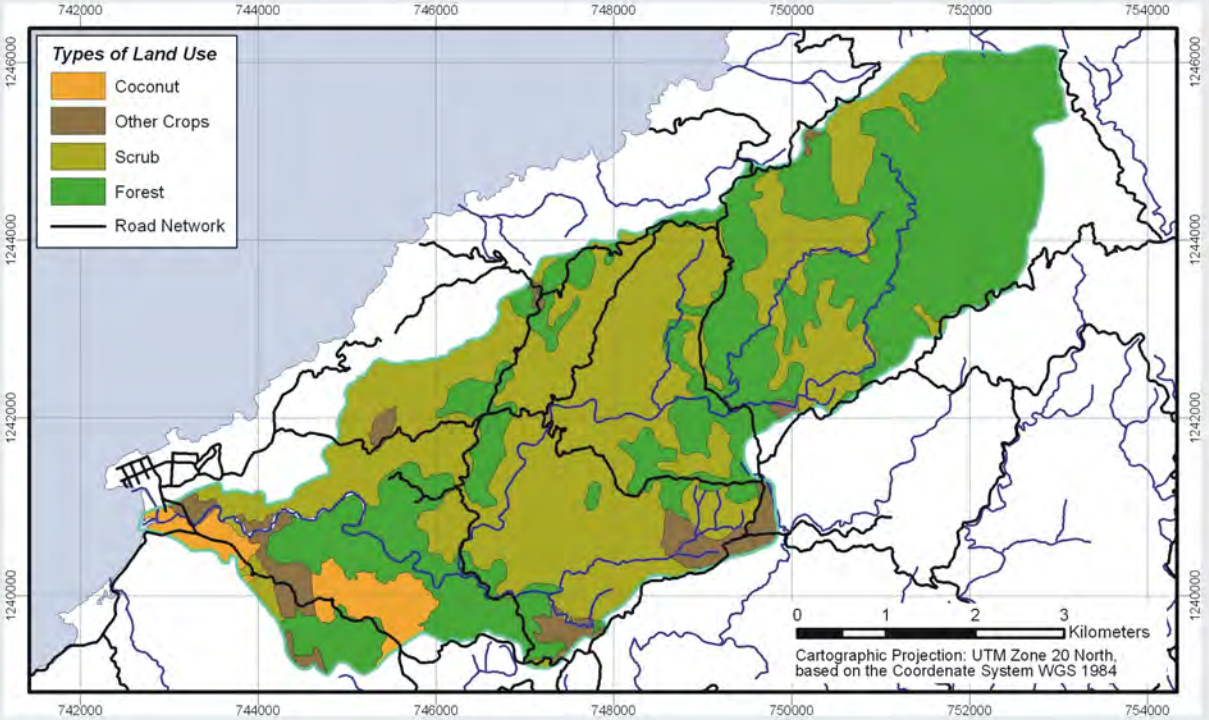
Trinidad & Tobago - Courland Watershed (1)





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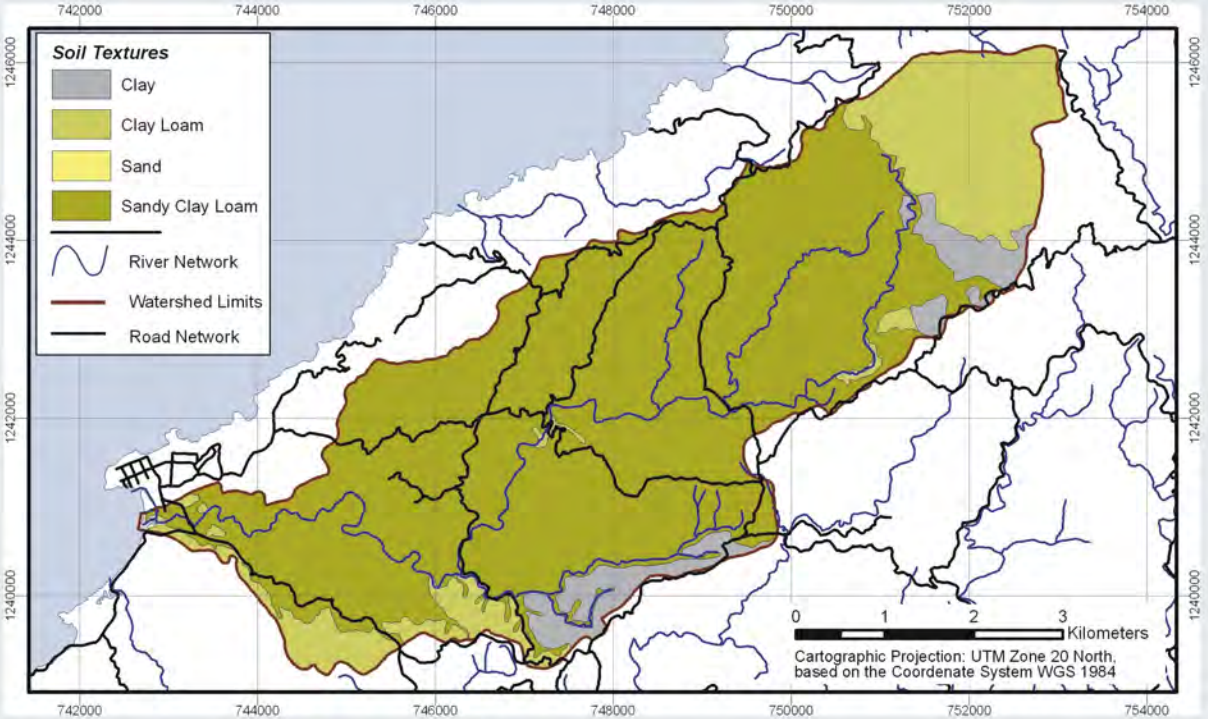
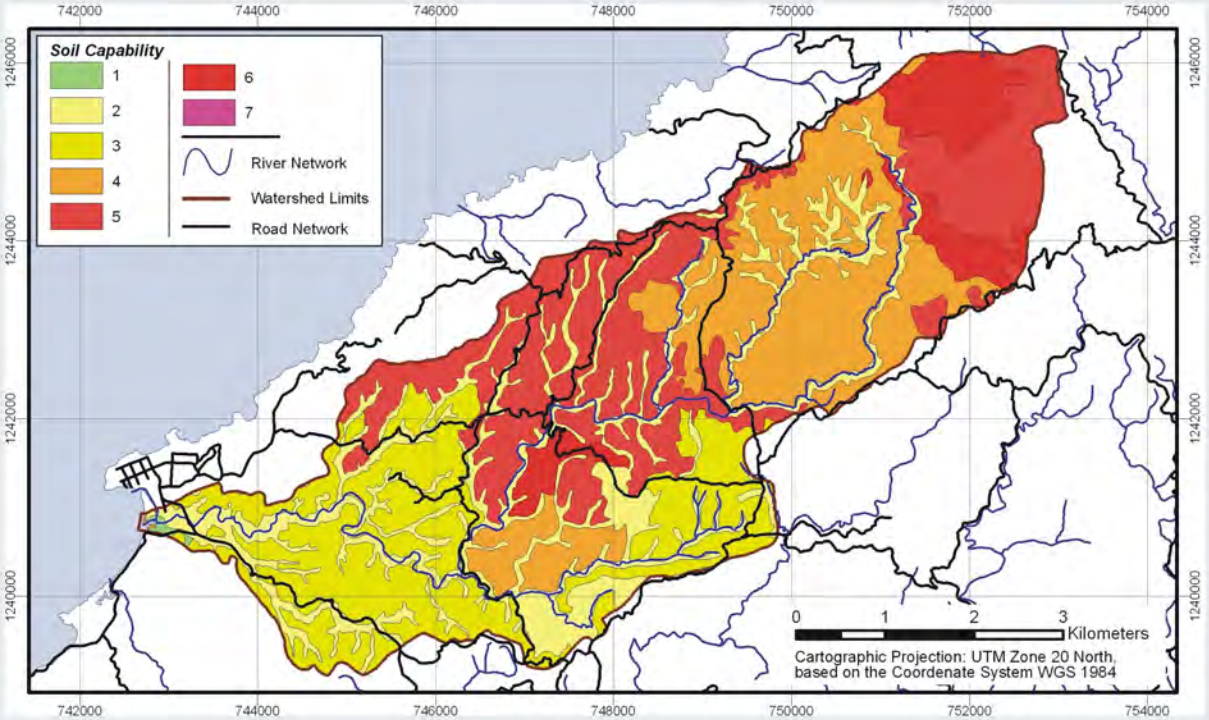
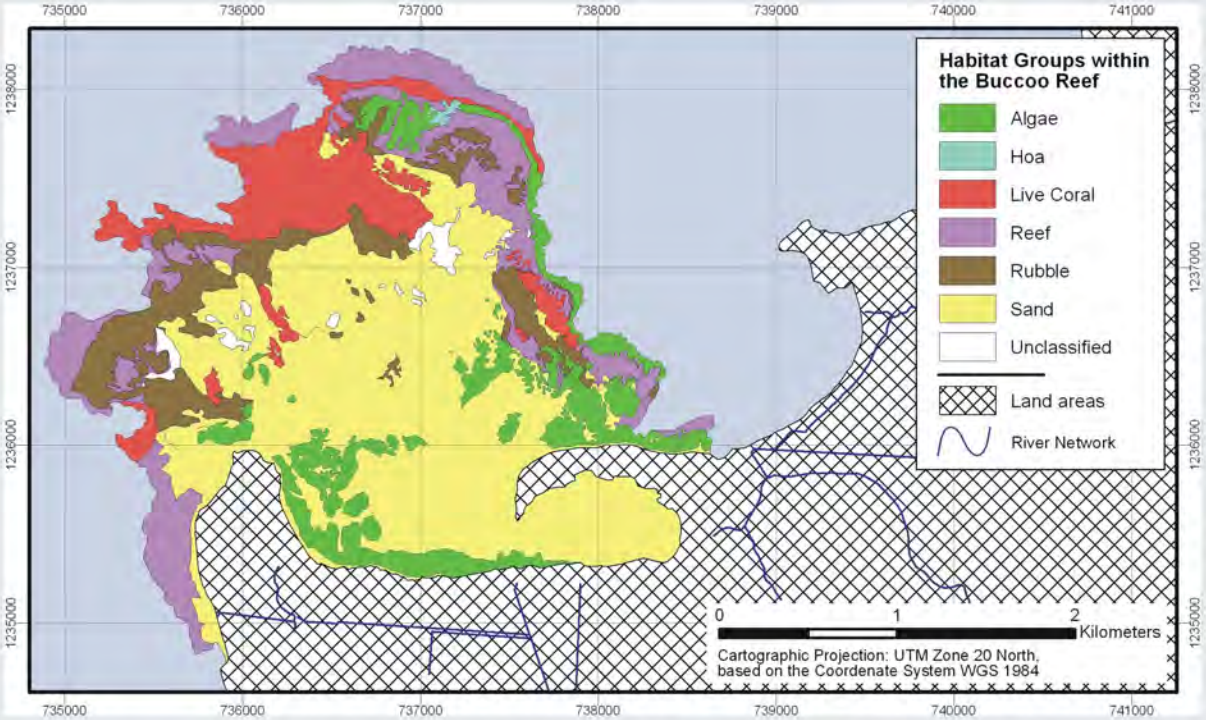
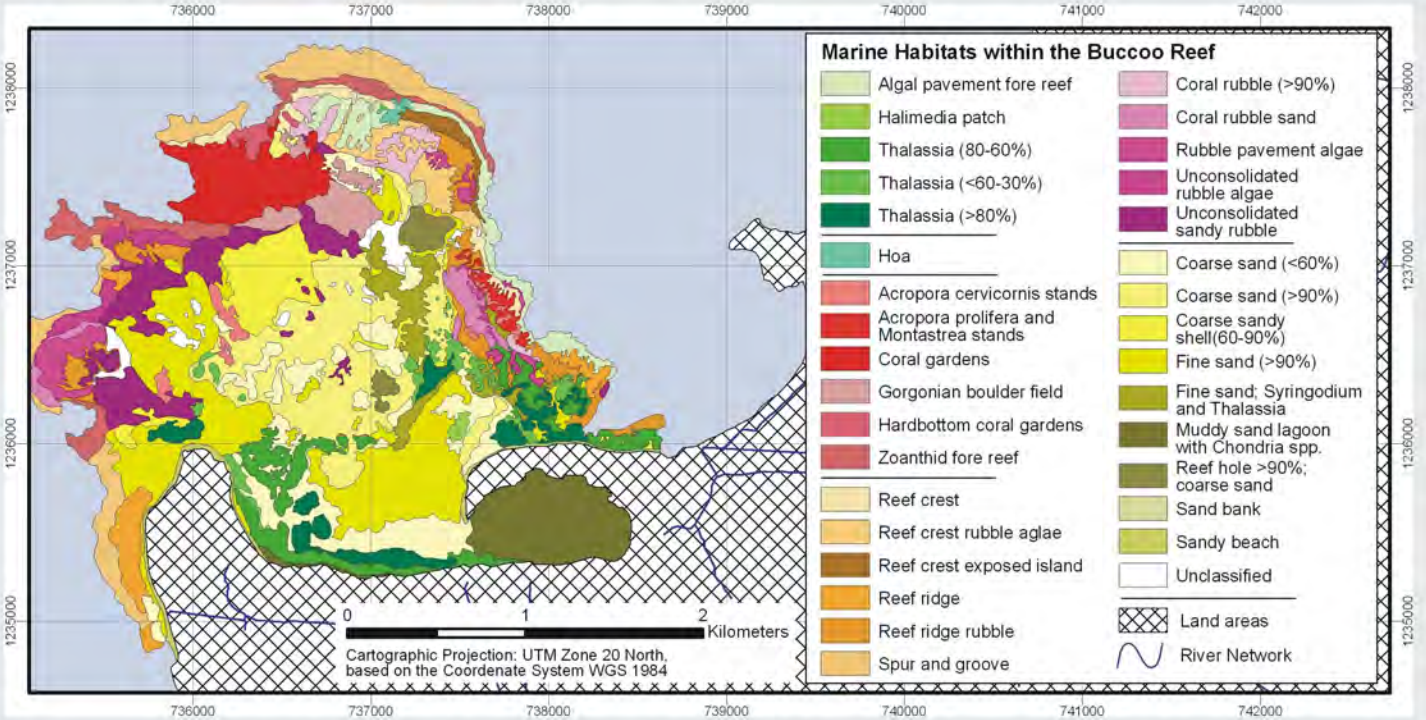
Trinidad & Tobago - Courland Watershed (2)





Trinidad & Tobago - Buccoo Reef





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Part II: Hot Spot Assessments and Pilot Projects

Hot Spot Assessments (HSA) supported the GEF IWCAM project objective for the "Development of IWCAM Processes, Stress Reduction and Environmental Status Indicators Framework."
These HSAs sought to:

- compile details on hotspots and sensitive areas within each of the pilot countries.
- identify critical areas in need of further action.
- recommend policy reforms necessary to resolve the identified issues.
- Provide technical support towards the ratification of the LBS Protocol.

Hot Spots were defined as areas which contain significant sources of pollution and/or as sensitive areas at high risk (or vulnerable to) being contaminated by pollutants.

Barbados - Introduction

North Coast -Barbados

Barbados is the most densely populated and water scarce country in the Wider Caribbean. It served as an ideal pilot for two studies (A and B) on Integrated Water Resources Management (IWRM) and the use of appropriate monitoring indicators for recreational water quality monitoring.

A: The development of an IWRM Information System for Barbados

The main objective was the development and deployment of a multi-agency Web-based, enterprise-wide Geographical Information System to assist in the collection, management and analysis of water related information in Barbados. *Project activities:* Contracting of Project Consultant; procurement of hardware and software; data collection; design and implementation of the Water Information System (WIS) involving; training; public awareness; web deployment; and preparation of experience notes. The implementing organization was the Barbados Water Authority.

Project outputs: Public awareness materials; experience notes; implementation and web deployment of WIS; cadre of well-trained professionals in the use and maintenance of the IWRM Information Management System (IMS); improved awareness of the IWRM IMS by Government ministries and agencies; functional and populated IWRM Information Management System.

B: Assessment of the Adequacy of Faecal Bacterial Pollution Indicators in Tropical Marine Recreational Waters

Project objective: Assess Microbiological Beach Water Quality, evaluate the appropriateness of selected indicator bacteria as faecal pollution indicators, and propose the most suitable microbial indicators for marine recreational water quality monitoring in tropical environments.

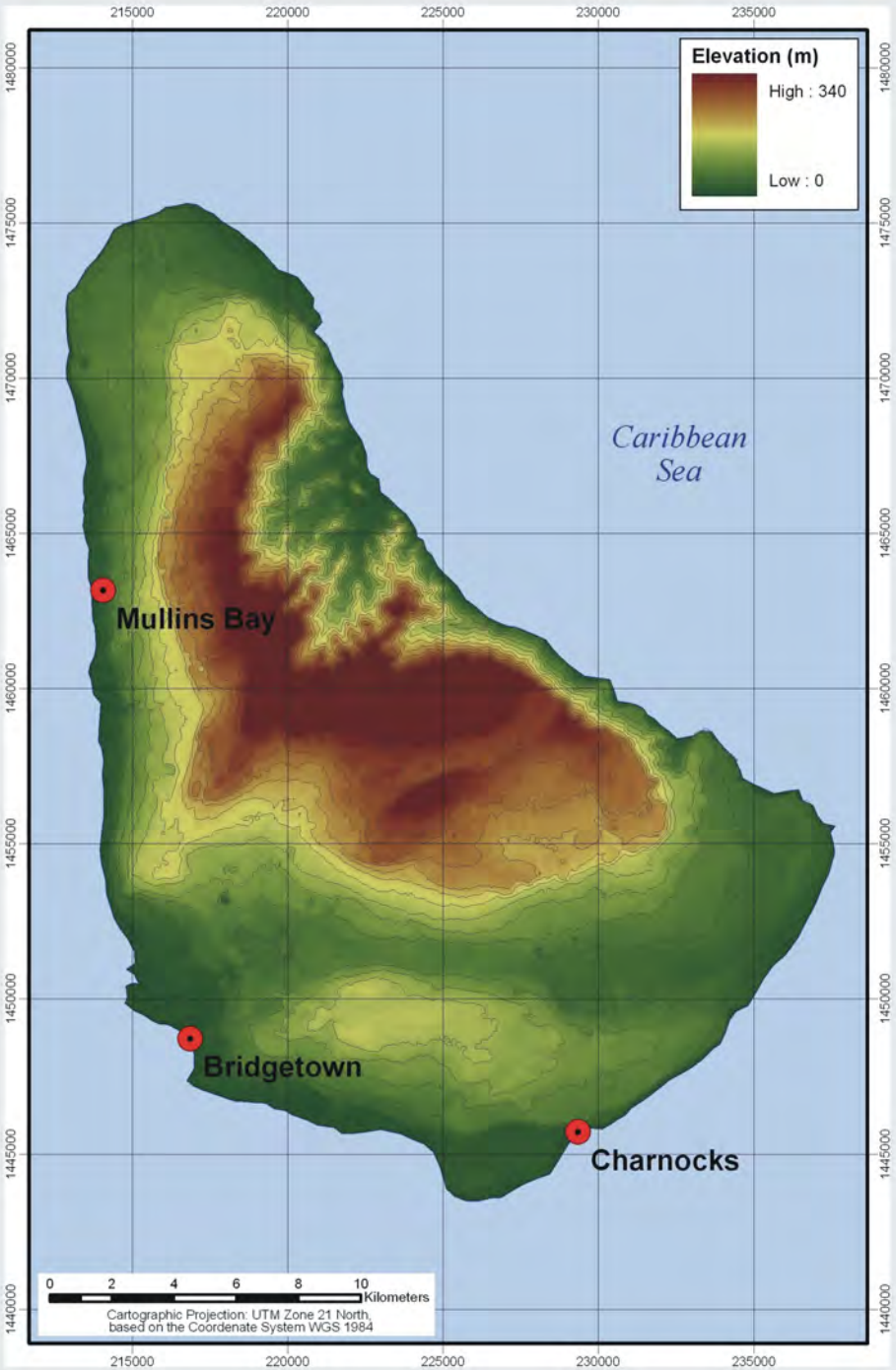
Project activities: Identification of candidate beaches; sampling and water analyses for conventional and candidate novel indicator organisms; analyses of results and determination of indicator pathogens correlation; and synthesis of report and presentation of results.

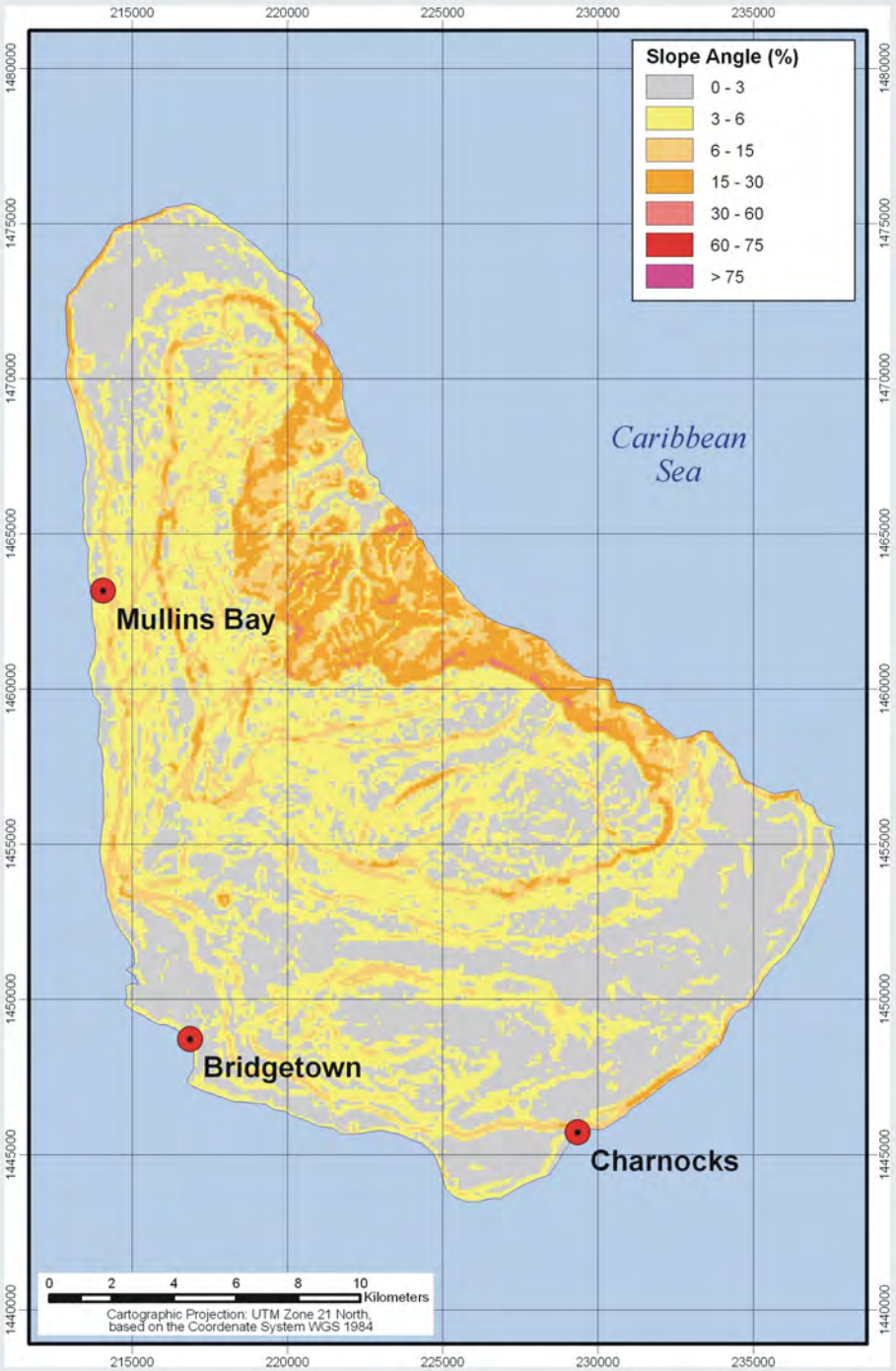
The Implementing organization was the Caribbean Eco-Health Programme & Atlantis Mobile Laboratory (AML).

Project outputs: Persons trained to conduct analyses for proposed novel microbial indicators and specific pathogens; accessible database containing results from Recreational Water Quality Monitoring; comprehensive review of the adequacy of the classical microbiological indicators for the assessment of pollution of the marine environment ; and report on the most suitable indicators for marine recreational water quality monitoring in the tropics.

Sampling- Holetown Barbados

Barbados - Overview Maps





Dominica - Introduction

Roseau River, Dominica

Roseau River Watershed: An integrated watershed management initiative

Dominica has approximately thirty five (35) Watershed Management units, none of which had a management plan. Communities make up an integral part of these watersheds and pollution results mainly from human land-based activities. The Roseau River Watershed encompasses the southwestern part of the island and is under threat from high nutrient and sediment loading. This pollution originates from improper solid and liquid waste disposal, river dredging, erosion, agricultural pesticide run-off and unplanned infrastructure developments in nearby urban areas.

The objective of the project was to design and implement a waterhed management initiative and identify support activities for reducing the impact of land-based sources of pollution.

The Ministry of Agriculture through the Division of Forestry, Wildlife and National Parks was responsible for project management and implementation.

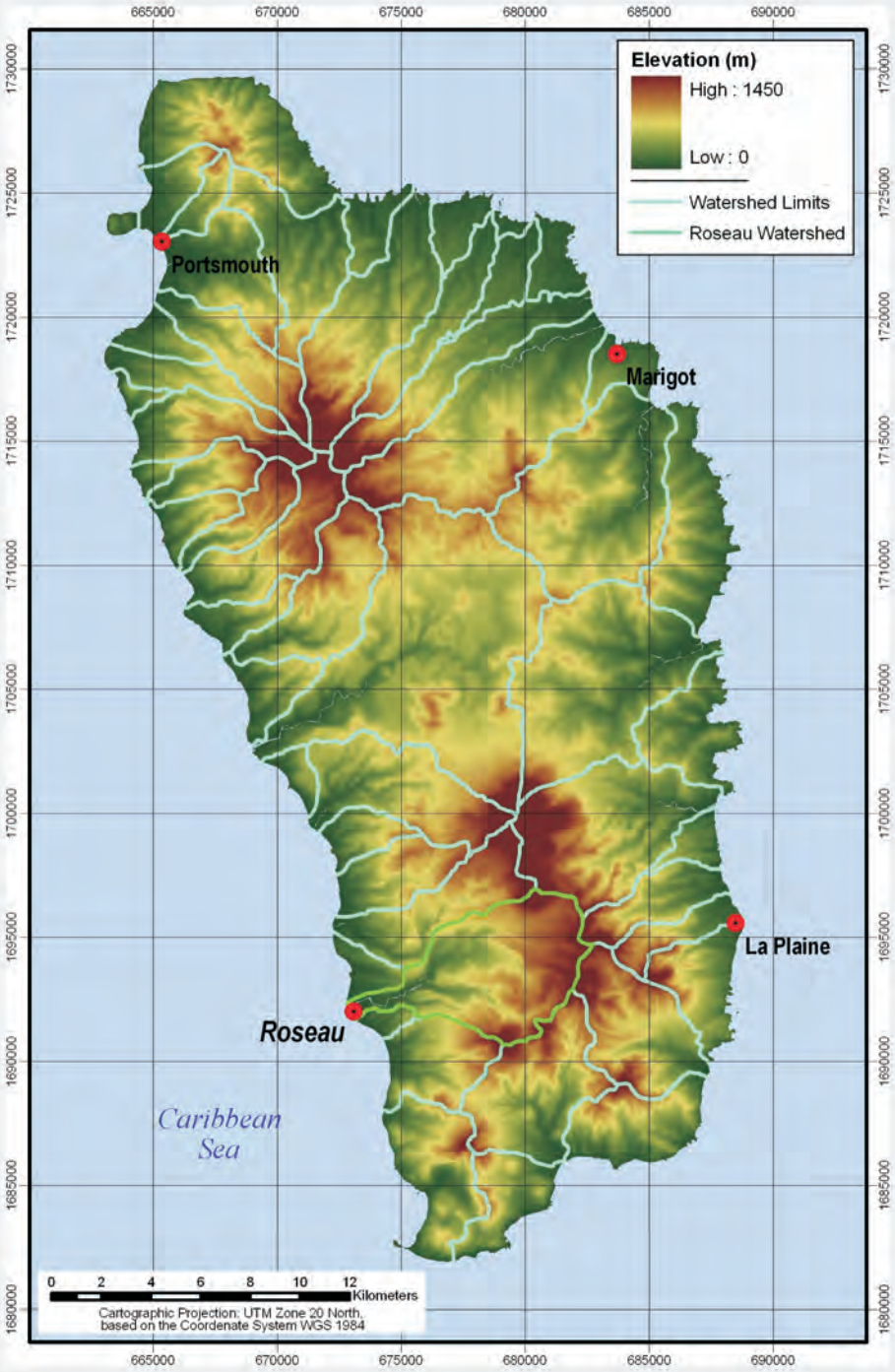
Partners included the: Caribbean Environmental Health Institute (CEHI), Dominica Electricity Service (DOMLEC), Dominica Water and Sewerage Company (DOWASCO), Caribbean Climate Change Centre (CCCC), Caribbean Disaster and Emergency Management Organization (CDEMA), the Government of Japan, and the Government of Dominica through the Disaster Management Office and Ministry of Health.

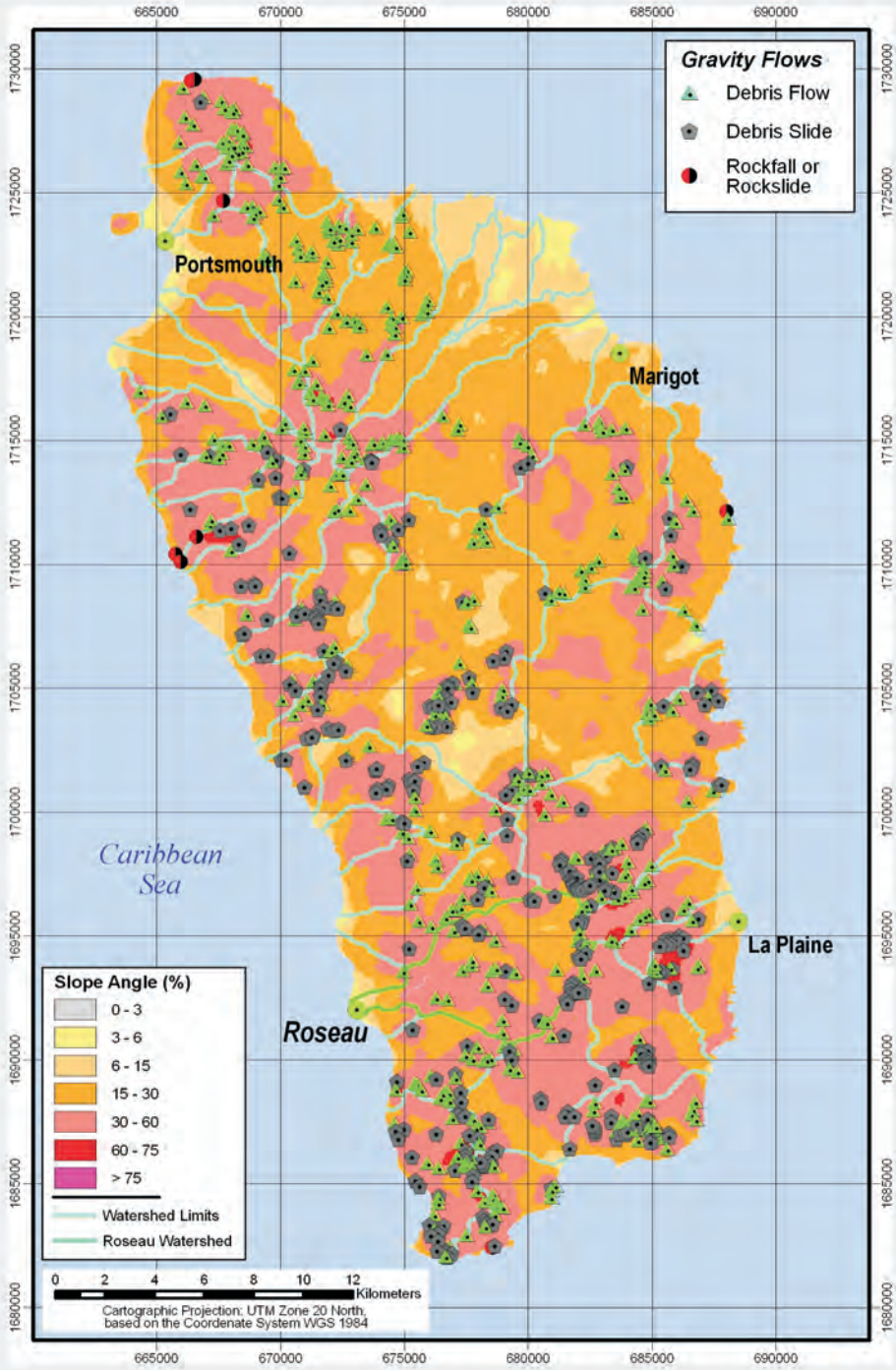
Activities included the Convening of public consultations with key stakeholders, development of project proposal including workplan, budget and implementation plan.

Project outputs included: Proposal and Budget for the Roseau Watershed Management Master Plan; Execution plan; Press Release; Stakeholder Consultation report.

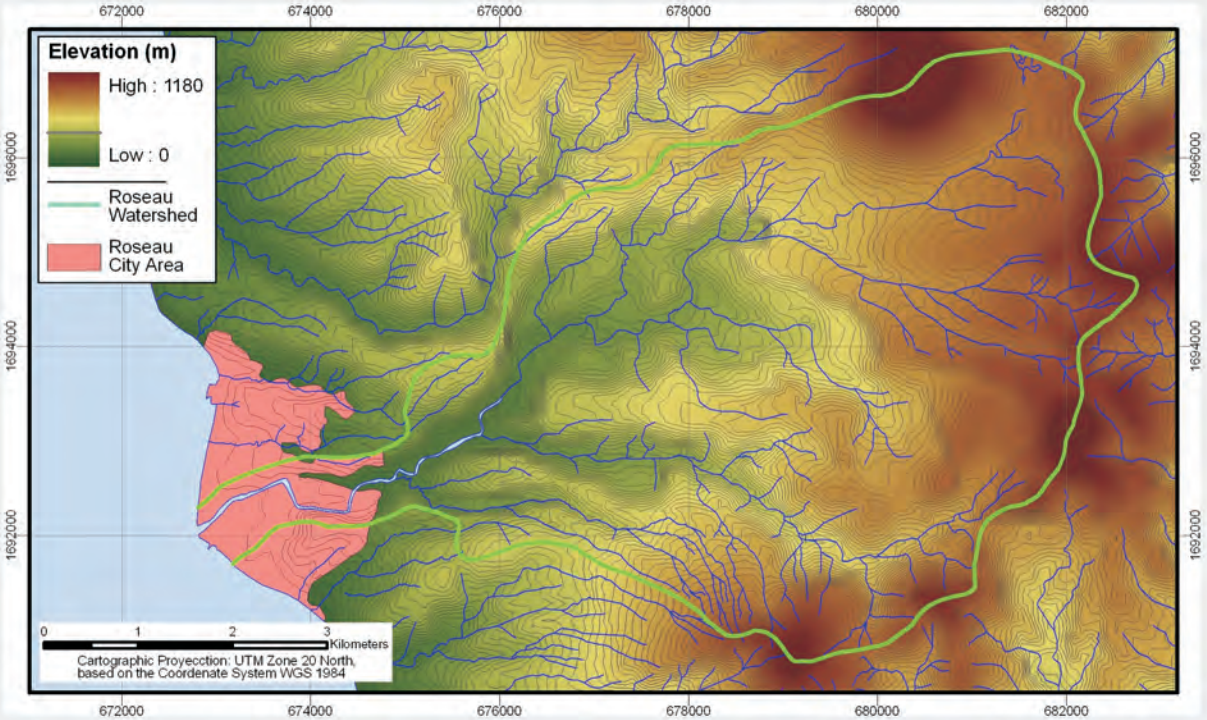
Impacts of Land Degradation in Dominica

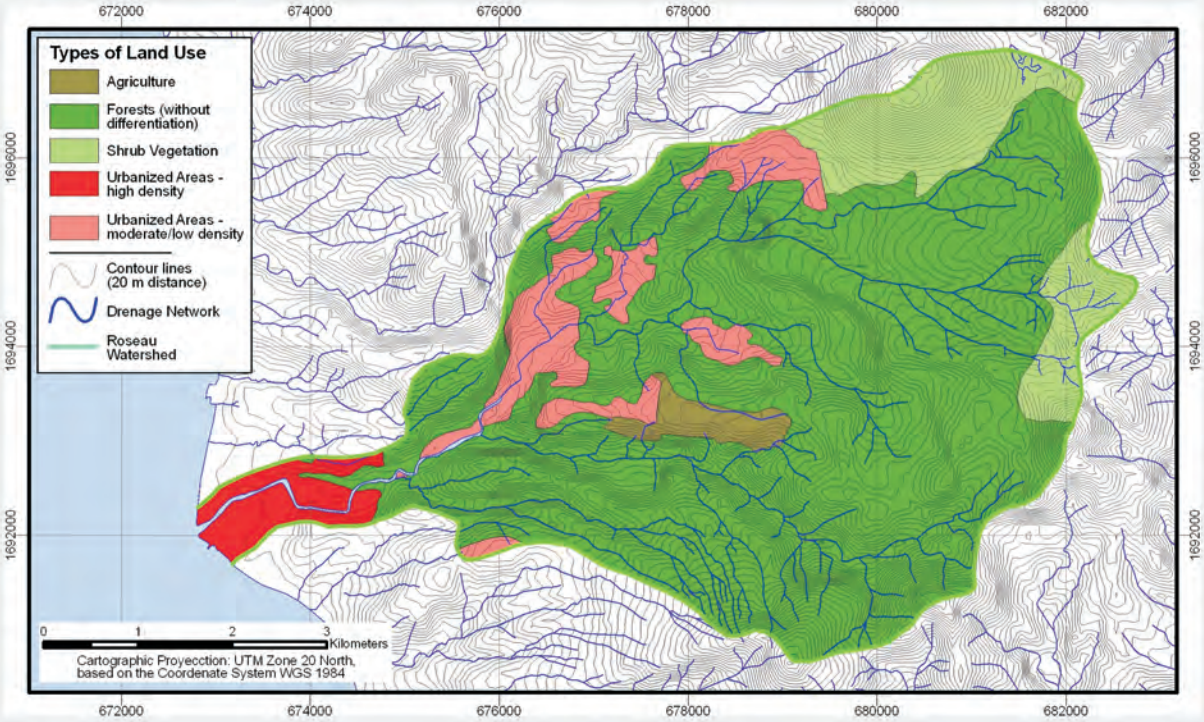
Dominica - Overview Maps





Dominica - Roseau Watershed





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Grenada - Introduction

Saint John's Watershed An integrated watershed management initiative

Saint John's Watershed is located in the South Western part of the island and drains into the bay north of the City & Grand Anse Beach. The topography combined with high rainfall levels renders the soils susceptible to erosion. This Watershed is a major source of domestic water for the capital city of Saint Georges.

St. John's Watershed, Grenada

The objective of the project was to develop a watershed master plan for the St. John's Watershed to guide the design and implementation of appropriate measures such as runoff and erosion control to minimize the risk posed to life, property and the coastal zone as a result of pollution, accelerated land degradation and flooding. The Ministry of Agriculture, Land Use Division was responsible for project implementation.

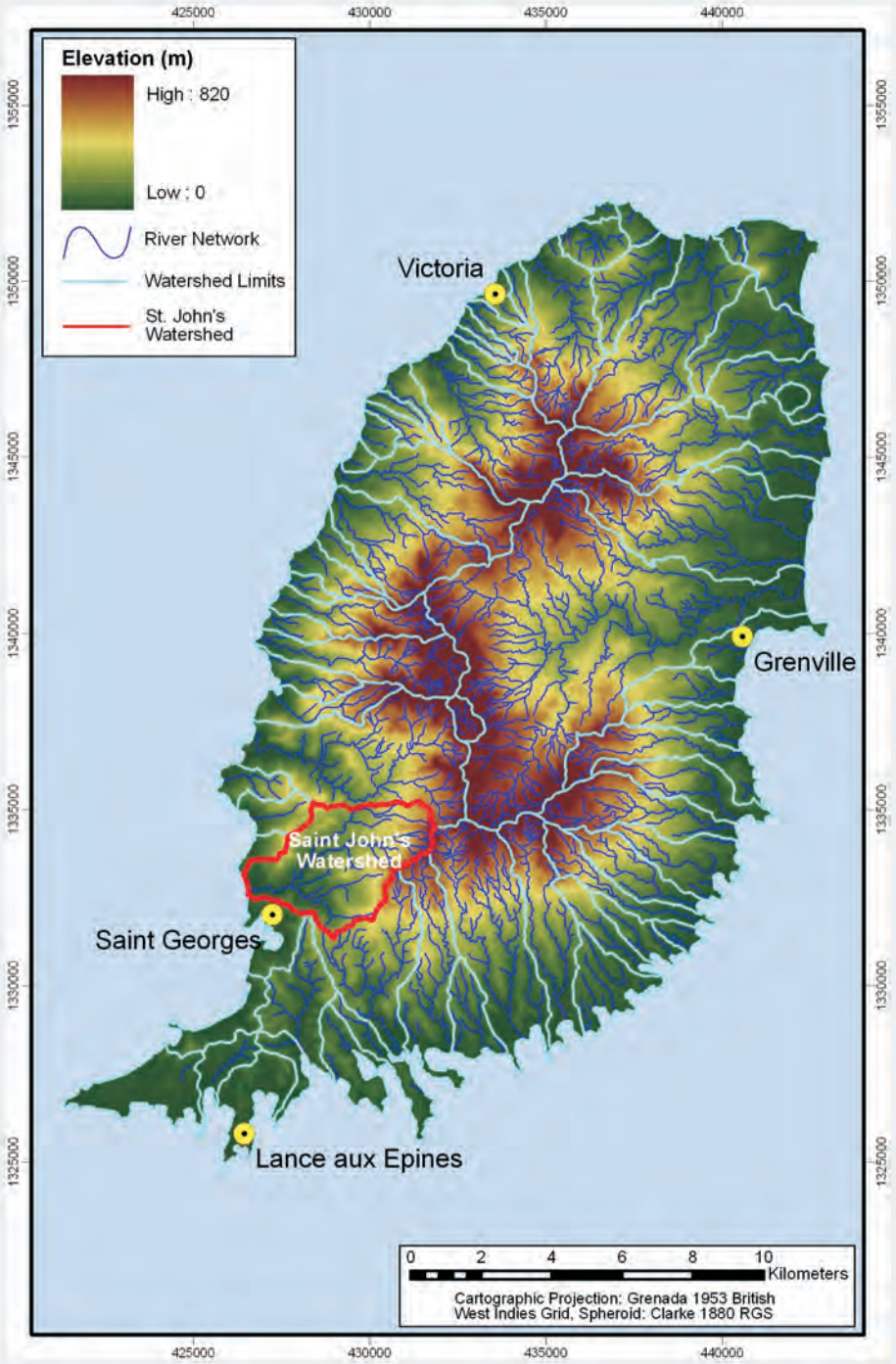
Problems identified included: liquid and solid waste pollution, soil erosion, flooding, siltation of rivers, dams and coastal environments. The root causes were mining, poor agricultural practices, unplanned housing, and manufacturing/other small scale industrial activities. Twenty -two (22) locations within the watershed were identified as major sources of pollution and were classified as “Hot Spots”, because of their close proximity to the river.

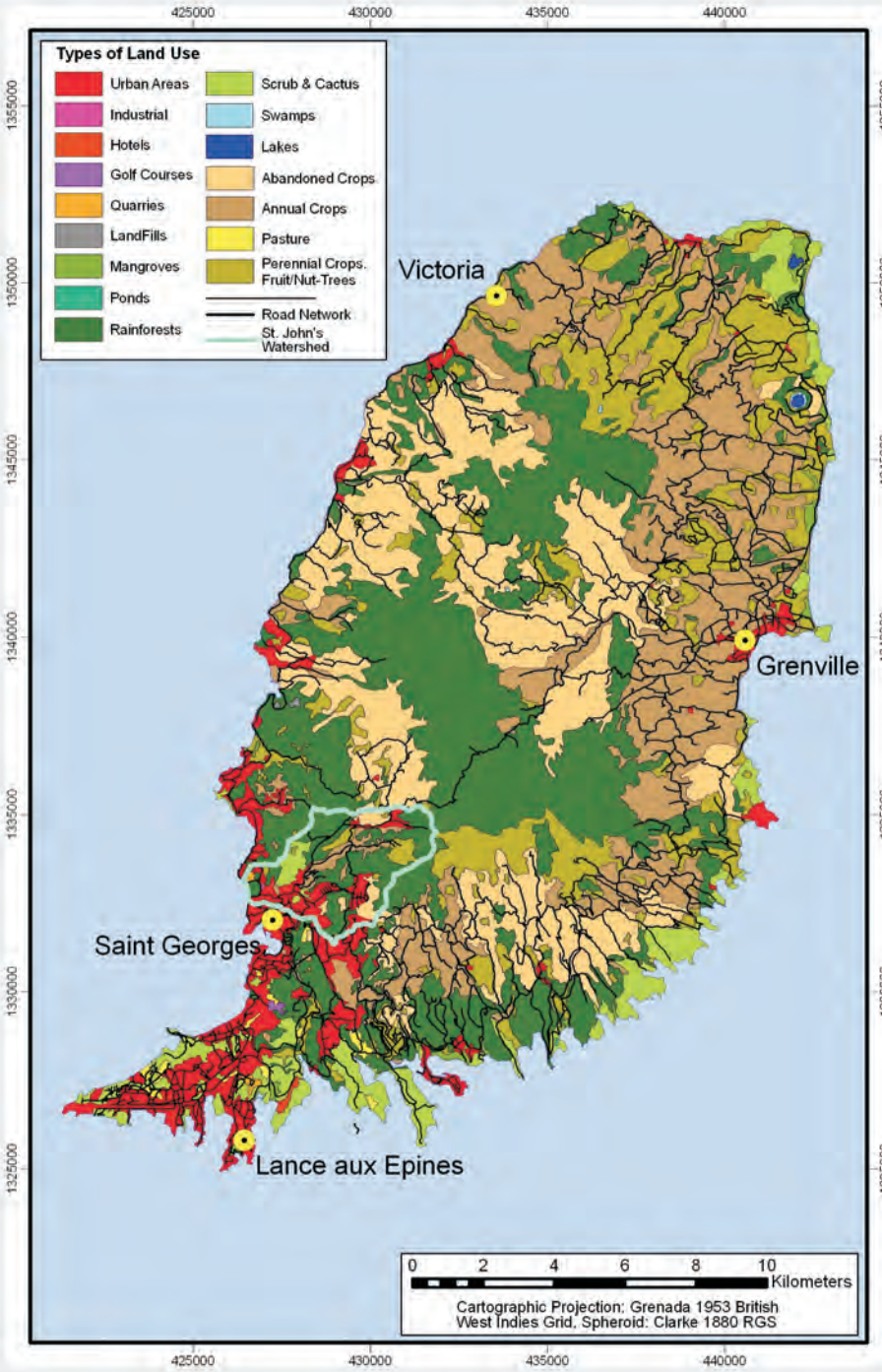
Project activities included: Phase one- Stakeholder consultations; Policy and Legislation review related to Watershed Management; field surveys to identify and characterize the hot spots; mapping of land use and land cover; preparation of press releases; and development of project proposal including budget and work plan. Phase two activities included: GIS mapping of hot spots within the St. John's Watershed; installation of three rainwater harvesting systems and one model development of a Watershed Management Mechanism.

Project outputs included: GIS Maps of St. John's Watershed showing the location, streams, roads, and hot spots; fifty stakeholders were engaged in one-on-one interviews; three rainwater harvesting systems; wetland treatment system; and St. John's Watershed Management Mechanism.

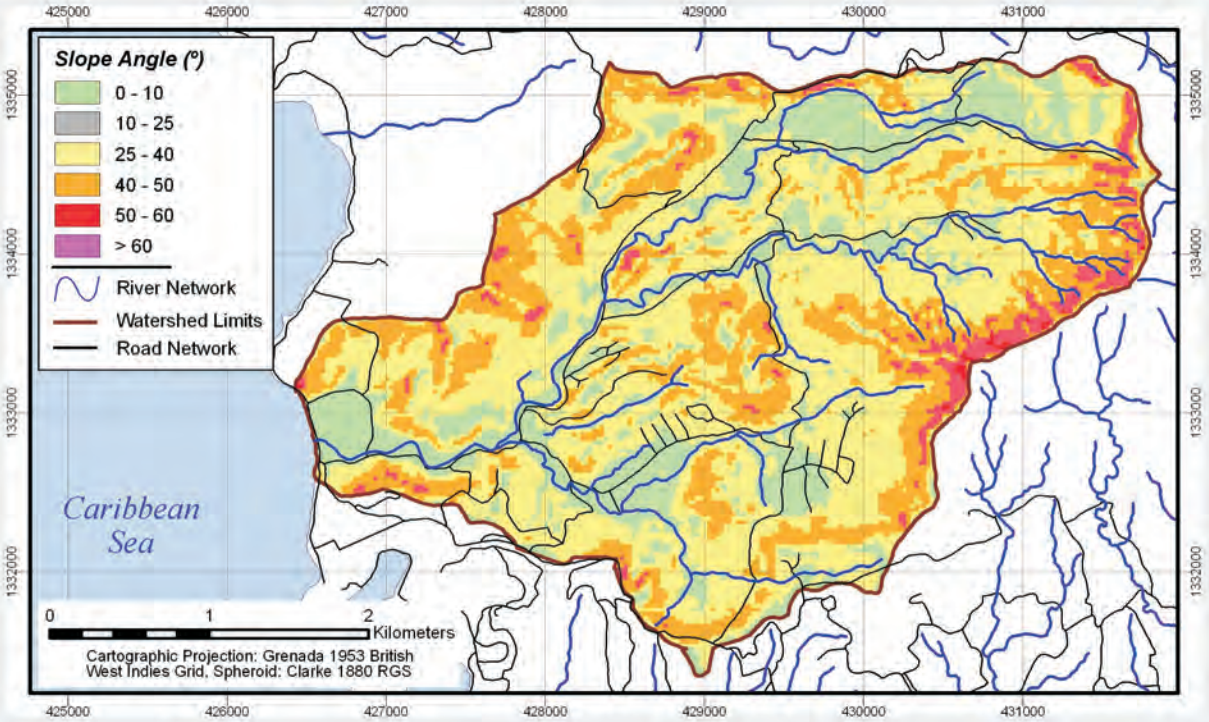
Construction and Sediment Run-Off in Grenada

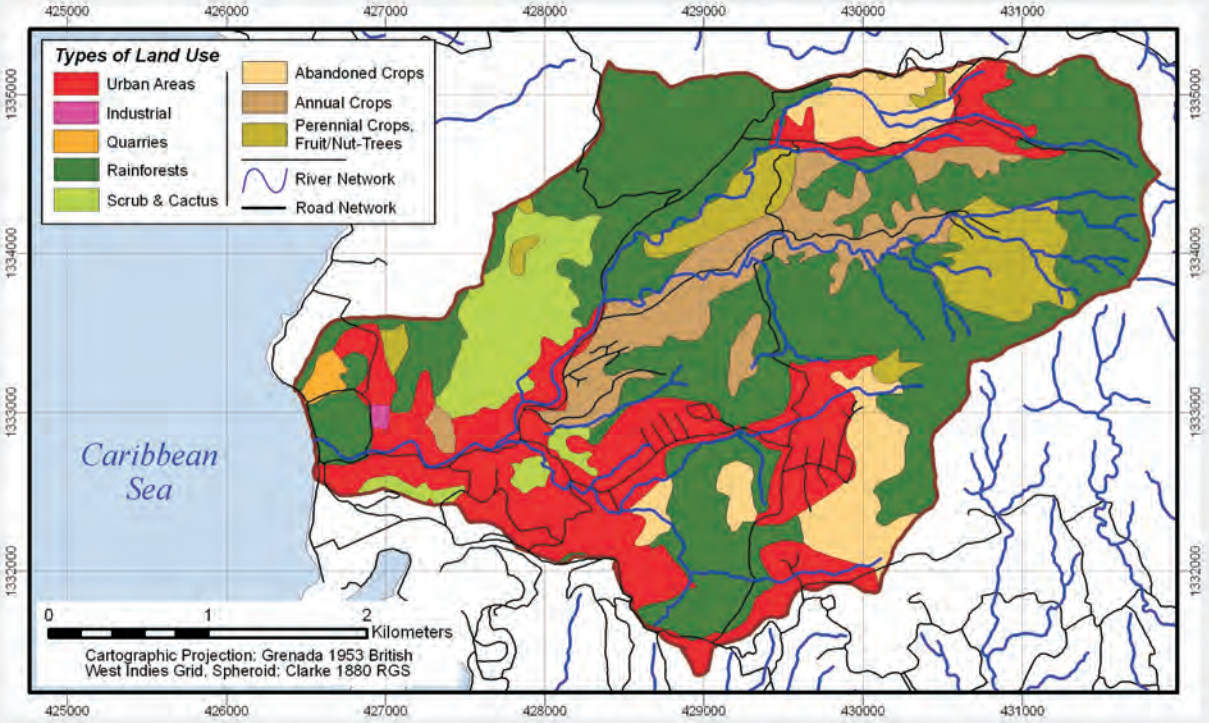
Grenada - Overview



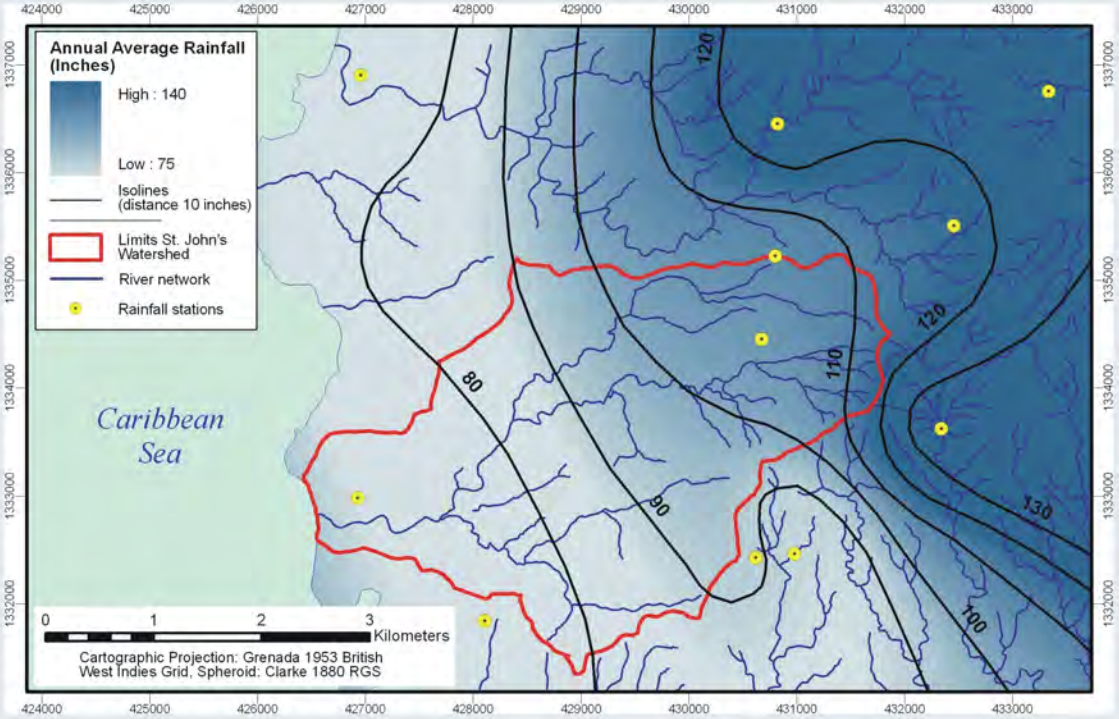


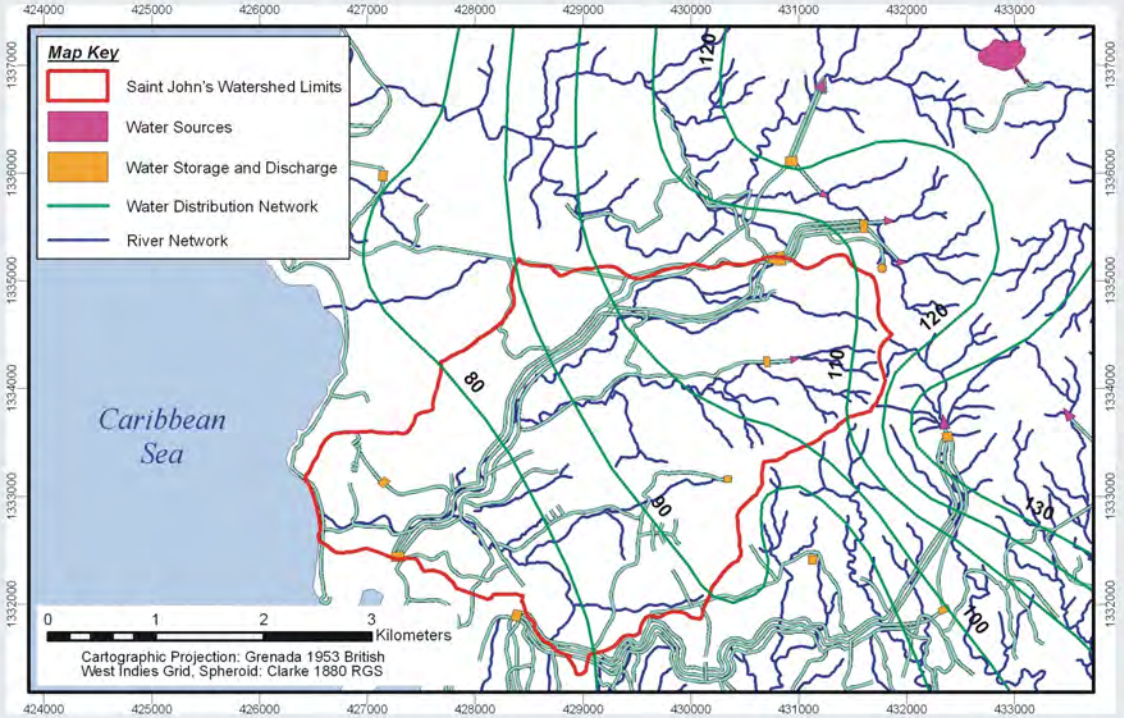
Grenada - St. John's Watershed (1)





Grenada - St. John's Watershed (2)





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Haiti - Introduction

Luly area and along the southern Peninsula - Improving watershed management and sediment control

Environmental Training

UNEP, through the GEF-IWCAM project agreed to co-operate with the Fondation pour la Protection de la Biodiversité Marine (FoProBiM) to develop and improve watershed management and sediment control in two rural areas: (1) Luly/Williamson(north of Port-au-Prince), and (2) Léogane/Fauché (south of Port-au-Prince). The implementing agency was FoProBiM.

Main problems: Diminishing freshwater supplies, degraded freshwater and coastal water quality, inappropriate land use, hygiene and sanitation, no sewage treatment facilities, lack of sanitary facilities, extensive deforestation, sediment/nutrient run-off, drying aquifers, poor solid waste management; inappropriate fisheries, agricultural practices and unsustainable use of wood and mangroves for fuel.

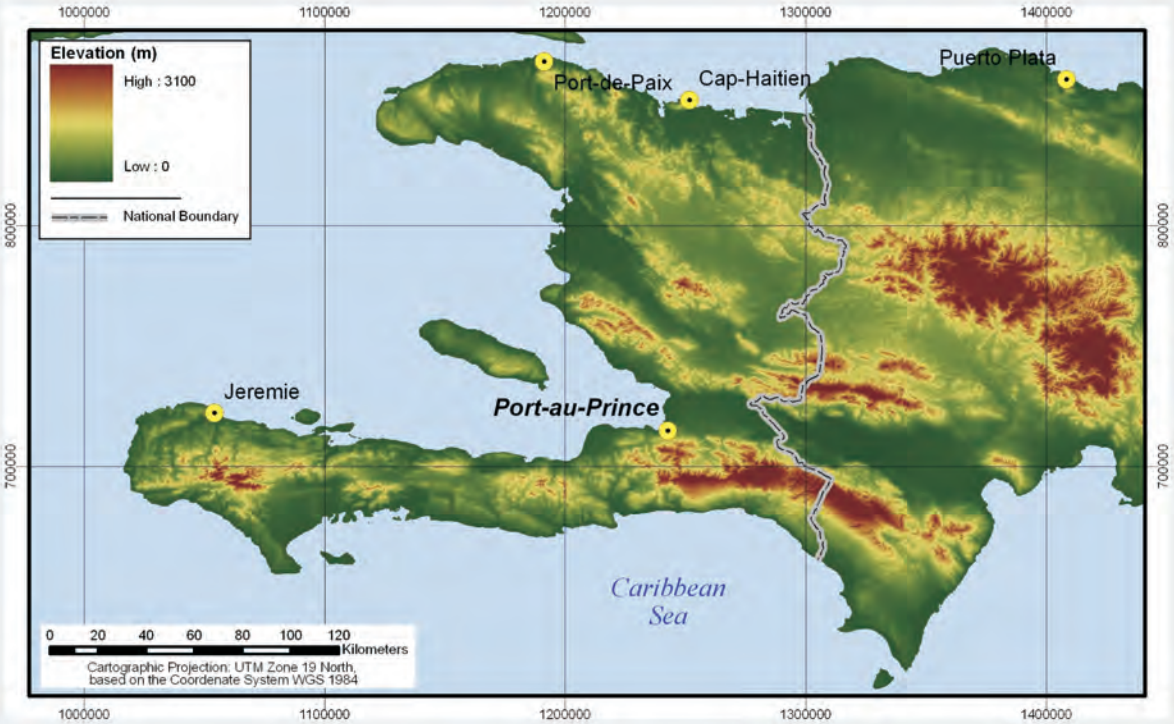
Problems were exacerbated after the earthquake in 2010 with increased pressure on the natural resources.

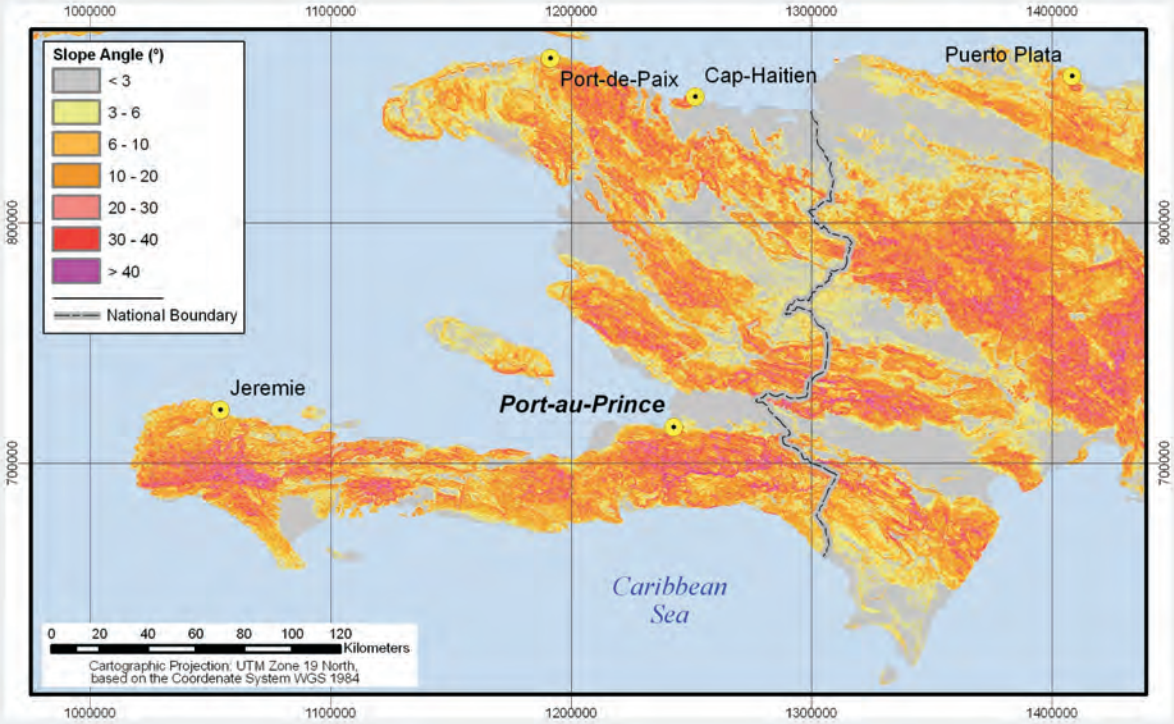
Project activities: Education and training for vulnerable groups, children and women; job creation; converting trash and used discarded containers into plant pots for the nurseries; development of plant nurseries; reforestation; and mapping for the identification of future actions.

Project outputs included: Phase one- Sixteen(16) day-long classes attended by local area stakeholders including four hundred and fifty five(455) youth and two hundred and twenty six (226) adults, as well as four local schools in the Luly area and three schools in the Léogane area. Adult participants included members of various organizations as well as fishers', women, earthquake victims, farmers, and other area stakeholder groups; Approximately 55,000 containers/pots were recovered from watersheds and the marine environment and re-used in plant nurseries; Approximately 45,000 plants were prepared in nurseries for sediment control; 600m/m of employment created. Phase Two - A Google-based map of micro-watershed at Luly-Williamson showing: the path of the stream, springs, types of agriculture, current waste sites, current bathing sites, and current laundry sites; local area stakeholders (with particular targeting of children/youth) participated in 10 environmental education activities; Approximately10,000 new nursery trees added in the continued development and expansion of the mangrove/tree nursery developed in Luly during Phase I.

Reforestation Activity

Haiti - Overview





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Saint Vincent and the Grenadines - Introduction

Implementation of Pilot Projects on Water Resource Management

Integrated Water Resource Management (IWRM) Community Pilot projects were implemented in Chateaubelair, Spring Village, Vermont and Greggs, and were aimed at stregthening community commitment and capacity to implement an integrated appraoch to the mangement of watersheds and coastal areas in these communities. These sub-projects were implemented by groups in each of the four communities under the management of Projects Promotion Limited (PPL).

Stakeholder Training, St. Vincent

Project activities included: (Phase one); Conduction of public awareness and education campaigns; purchase and distribution of garbage bins, waterway clean-up exercise in each of the four communities; construction of the Garifuna Spring, Community Bath and Washing Station in the case of the Greggs pilot sub-project. (Phase two);

Poster and slogan competitions, purchasing and mounting of community information awareness billboards, and educational mini-billboards; design and implementation of environmental monitoring programmes, workshop on proper garbage disposal and sustainable use of community resources, a community health fair in Chateaubelair, establishment of community spaces and the acquisition, distribution and planting of trees in all four communities; production and posting of no dumping signs; community consultation and demonstration exercises, a survey of land preparation and cultivation methods which included meetings with farmers and visits to farms, and the establishment and activation of the Chateaubelair River Water Quality Monitoring Young Brigade.

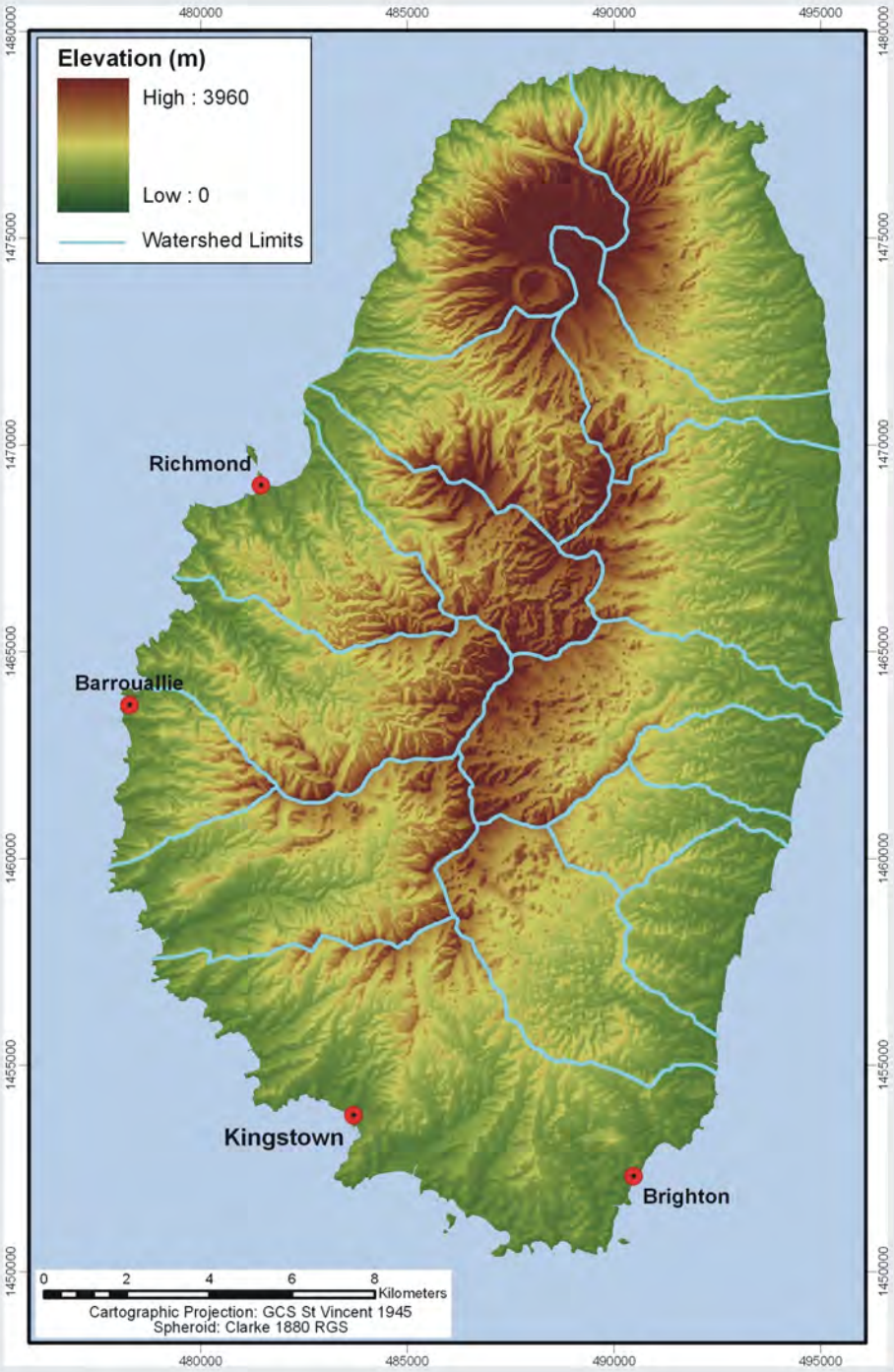
During the execution of project activities members of each community based group assumed the lead role supported by Projects Promotion through regular visits. Technical advice and assistance came from relevant state agencies.

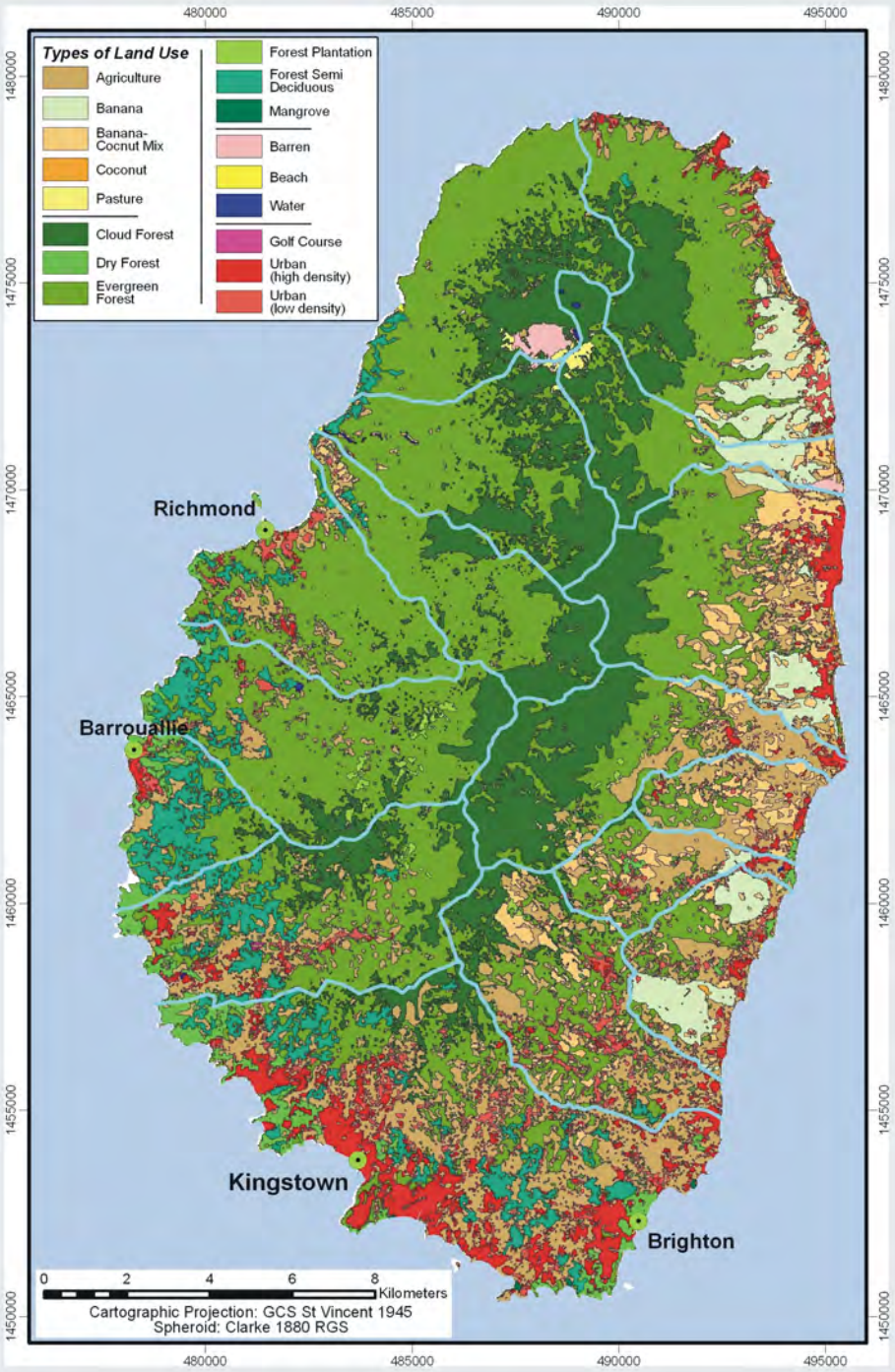
Union Island, St. Vincent

Community based groups included: Keepers of the Environment, Greggs Fair Trade Farmers Group, Greggs Rastafarian Community Organisation, Buccament Development Organisation, Cumberland Valley Eco-tourism Organisation, Friends of the Environment, North Leeward Tourism Organisation.

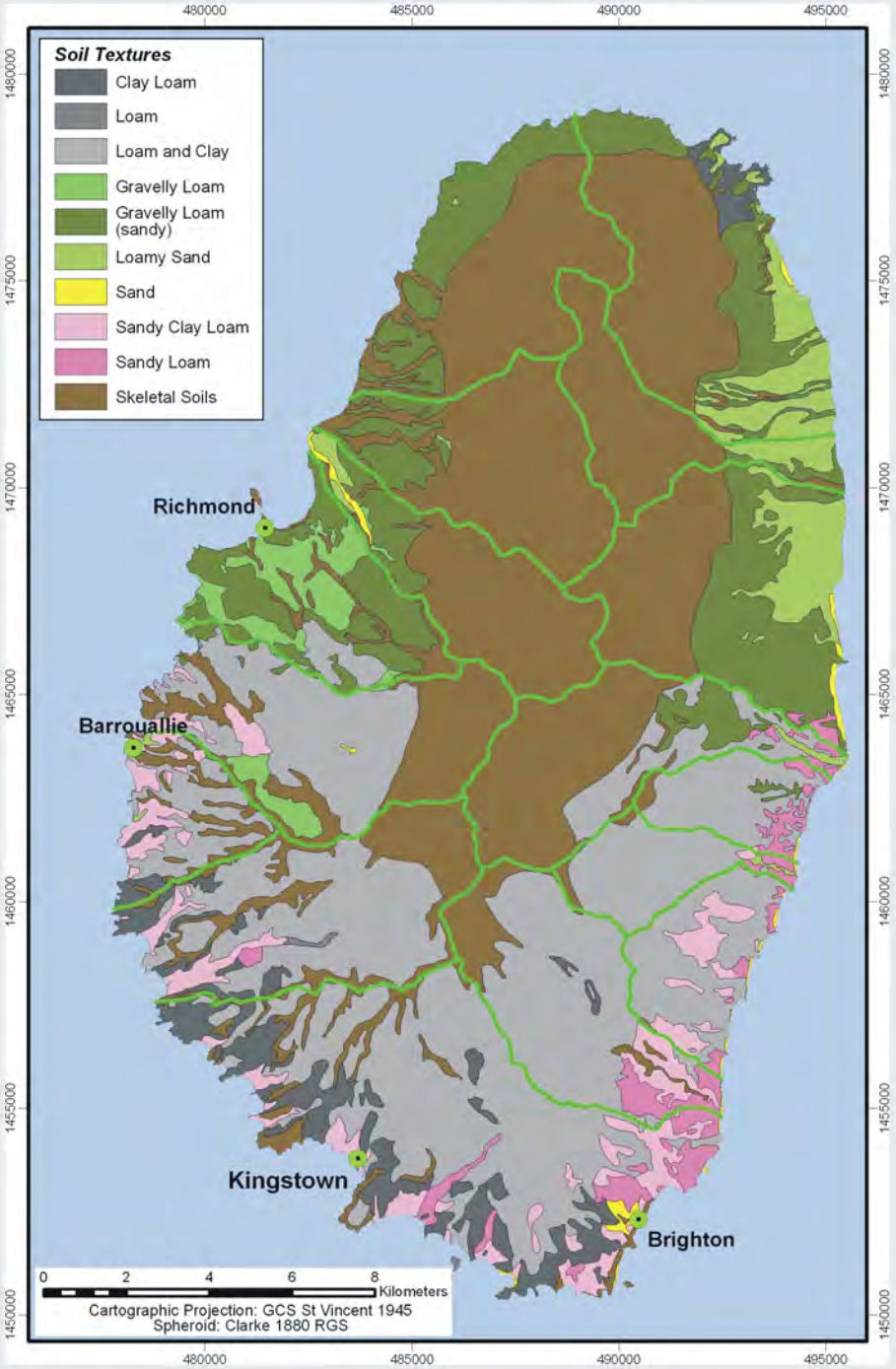
Project outputs included: Reduced quantity of garbage reaching and currently in waterways; increased understanding by residents of the links between sustainable livelihoods and the maintenance of a clean and healthy environment and minimize siltation of the water ways; and strengthened community capacity to monitor water quality.

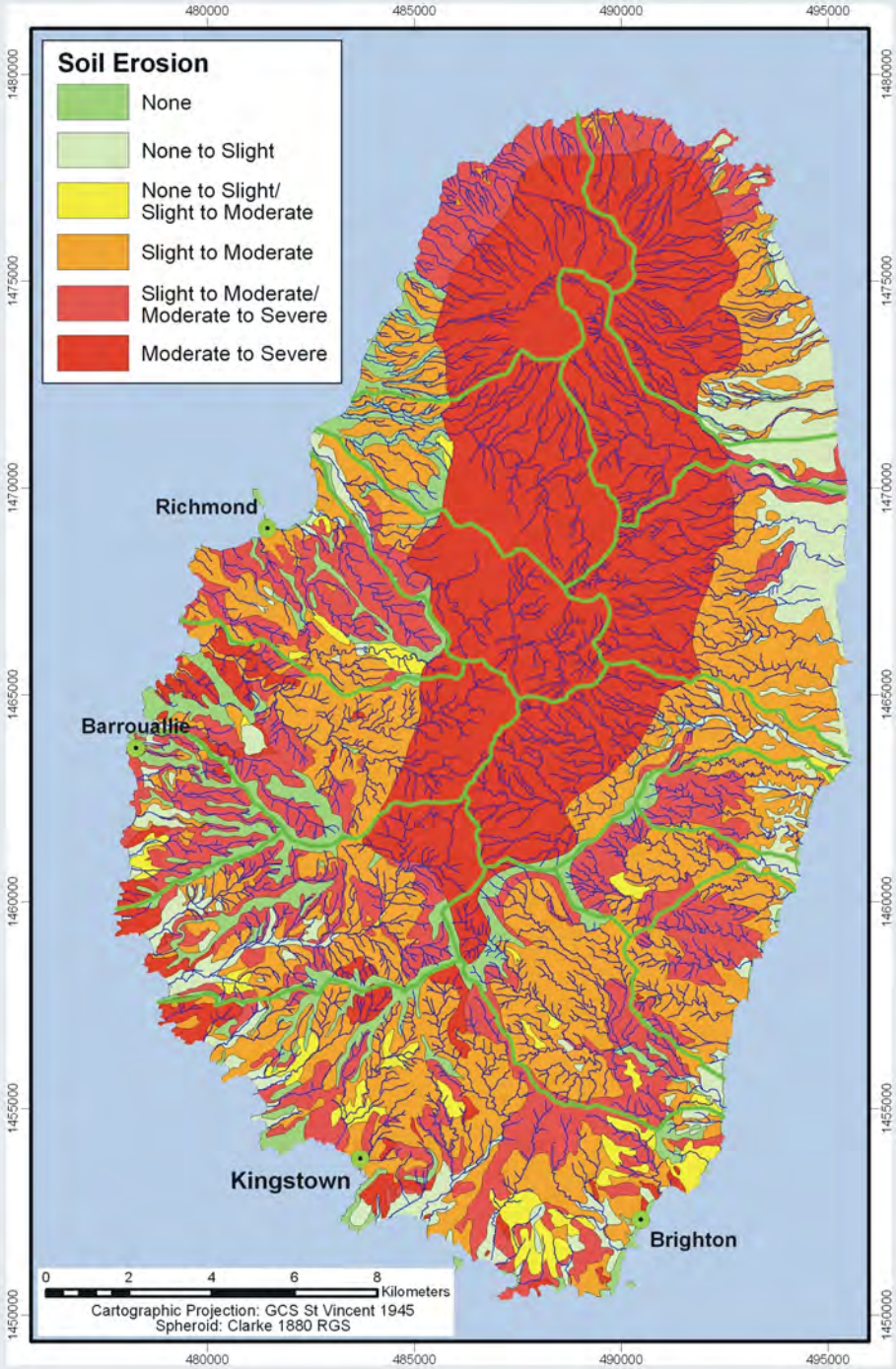
Saint Vincent and the Grenadines - Overview Maps (1)





Saint Vincent and the Grenadines - Overview Maps (2)





Acknowledgements

The development of the GIS Atlas for the GEF funded project: Integrating Watershed and Coastal Areas Management (GEF -IWCAM) was lead by the United Nations Environment Programme-Caribbean Regional Coordinating Unit(UNEP-CAR/RCU) on behalf of the GEF -IWCAM project.

The Spatial Database and Map layouts in this Atlas were done by Dr. Andreas Mende (amende@racsa.co.cr), Specialist in Geographic Information Systems who was contracted by UNEP-CAR/RCU on behalf of the GEF IWCAM project.

The Spatial and Meta Data forming the basis of this Atlas were provided by the GEF-IWCAM participating countries.

UNEP acknowledges the contributions made by the governments of the thirteen participating countries Antigua & Barbuda, the Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, and Trinidad & Tobago. UNEP also acknowledges the significant support provided by the Project Managers for the Demonstration and Pilot Projects and the staff of the Project Management Unit of the GEF-IWCAM project in particular Donna Sue Spencer, Communications Specialist for the GEF-IWCAM Project.

UNEP Team:
Christopher Corbin- AMEP Programme Officer, UNEP CAR/RCU
Sanya Wedemier-Graham- AMEP Programme Assistant, UNEP CAR/RCU

Through the GEF-IWCAM project, and partnerships formed, thirteen SIDS of the Caribbean were able to develop and implement projects and activities that will assist in the protection of the valuable coastal and marine ecosystems and resources of the Wider Caribbean Region.

Integrating Watershed & Coastal Areas Management