NATIONAL REPORT

INTEGRATING MANAGEMENT OF WATERSHEDS

& COASTAL AREAS IN SIDS OF THE CARIBBEAN

THE VINCENTIAN PERSPECTIVE

JUNE 2001

EXECUTIVE SUMMARY

While the issue of watershed management is well understood and reasonably well established in St. Vincent, integrated management of watershed and coastal areas is not a theme on the work programme for any executing agency on the island. Little wonder that the Island Systems Management (ISM) propagated by the Organisation of East Caribbean States Natural Resources Management Unit (OECS-NRMU) has not gained meaningful acceptance. However, cooperation vis-à-vis the shearing of expertise and resources among and between agencies is increasing. Also, initiatives emerging from the UNFCCC, UNCCD and UNCBD are providing vehicles to foster integrated management.

There is a fair amount of data existing as per water resources and management but the absence of a central database on water resource management means that the data lacks harmony, consistency, and format. Such data is of little value to policy makers and is often ignored when forward planning is being done.

There is much concern about the quality of coastal water and its impact on health and tourism. Government is concerned about coastal pollution and erosion and is actively addressing these issues. The establishment of a water quality monitoring programme above and beyond that currently undertaken by the Central Water and Sewage Authority (CWSA) and the Environmental Health Department is necessary. There is need for

- a monitoring programme to include pesticide residue and heavy metals
- institutional strengthening – training on the job for the job
- policy development
- greater public awareness and involvement

to create a truly integrated programme. Both coastal and surface water in St. Vincent is heavily impacted by land use. However, efforts by the CWSA have gone a long way in improving the quality and availability of potable water in St. Vincent.

While there is no scarcity of fresh water in St. Vincent, the Grenadines is devoid of surface water. For this reason, some underground water is used in the Grenadines but not on mainland St. Vincent. The Coastal waters of the Grenadines have similar problems to those of St. Vincent.

INTRODUCTION

Although it is well established that the availability of water and land space holds the key to development in small island states like St. Vincent, the competition for land and water by stakeholder groups coupled with the management arrangement for these resources, create a dynamic mix that has the potential to hasten the destruction of both resource. It is therefore critical that appropriate management systems be put in place to allow all involved to get maximum benefit with as little damage as possible to the resources. This project on Integrating Management of Watersheds and Coastal Areas as proposed by CEHI can be the catalyst for the evolution of an appropriate management system. Implementation of this project in parallel with activities under the UNCCD, UNFCCC, UNCBD and other local initiatives, taking cognizance of the NRMU-ISM and the SIDS POA as reflected in the National Environmental Action Plan (NEAP), considerable progress can be made in the management of land and water resources.

There is, however, a need for the development and implementation of policies to support the various initiatives. There are some very strong pillars that need to be linked and built upon, some acts that need regulation and enforcement and some agencies that lack human resources. The distribution of authorities presented below serves as an illustration.

> The CWSA Act of 1991 puts all fresh water under the control of the CWSA (a statutory body under the Ministry of Health and the Environment) while the Forestry Conservation Act of 1992 puts all forested crown lands and mangrove under the control of the Forestry Department (a division of the Ministry of Agriculture and Labour). The Lands and Survey Department (a division of the Ministry of Agriculture and Labour) manages crown lands not under the control of the Forestry Department. The Central Planning Department (a division of the Ministry of Finance and Planning) gives legitimacy to all development on the island including coastal development and subdivision of lands.

The foregoing scenario speaks of the need for harmonizing legislation among the agencies while fostering interagency cooperation as a possible first step in the development of a truly integrated management plan.

CHAPTER 1

SUPPLY AND DEMAND

It is a common belief that the supply of surface water (rivers and springs) in St. Vincent is more than enough to meet developmental needs well into the future. The CWSA has stated that the current demand for potable water in St. Vincent is just above 1% of the available supply. However, recent climatic and socioeconomic trends call this statement to question. Bishop (1989) and Murray (1993, unpublished) point to scenario that indicates a slow but steady decline in flow volume of many rivers in St. Vincent. More noticeable than the decline in quantity is the deterioration in quality of surface water.

Watershed in St. Vincent is synonymous with forest reserves. Thus, any impact on forest is an impact on watershed. The Forestry Department claims a 29% forest cover while the 1986 National Environmental Profile records a 35% forest cover. This represents a decrease of approximately 17% in 15 years. Such rapid decline in forest cover will reduce rainfall percolation hence soil water retention and stream flow. At the same time, deforestation results in increase soil erosion leading to sedimentation and loss of water quality.

The greatest challenge to watersheds in St. Vincent is the illegal clearing of the land for agriculture. Only a small portion (<1%) of logging is done for charcoal burning. Because modern agriculture is characterized by high-level agrochemical use, farming in watershed areas reduces not only the quantity but also the quality of surface water. Approximately 20% of all chemicals used in agriculture in St. Vincent between the months of July and December ultimately ends up in rivers and streams (Murray 1993).

Eco-tourism is proving to be the latest threat to watersheds in St. Vincent. Since most wildlife reserves are located in watershed areas, the desire to enter these areas is increasing in order to provide the eco-tourism product. To facilitate this activity, footpaths are cleared. After several trips along these paths, the loose volcanic soil erodes resulting in gullies and more erosion.

Forested areas and their products are in great demand in St. Vincent. This demand is driven by the need for firewood, lumber, wild life for recreation and food, and water and land space for housing and agriculture. Without the water, all other activity will cease. Water is therefore the object of much competition. This competition should, however, be understood within the context of natural

partitioning, for while potable water is collected in higher elevations, agricultural supply is taken from the lower elevations where most of the agriculture takes place. Water supply for hydroelectricity is taken from rivers not tapped for potable consumption and normally from the middle course of the river where volume and velocity are sufficiently high to facilitate the generation process.

DOMESTIC DEMAND: Domestic demand for water is increasing with the changes in life style and housing patterns. Large homes with increased numbers of WC, large lawns to be watered, two cars to be washed and frequent showers in hot weather, all add up to force the CWSA to improve its collection, treatment and distribution capability. In response, the CWSA has installed meters on most domestic lines. This added cost to home owners', apart from helped the CWSA meet its financial obligations, has reduced wastage and allow the CWSA to meet current domestic needs for high quality potable water.

TOURISM DEMANDS: Tourism is one of the fastest growing sectors of the Vincentian economy. However, it is well known that the per capita demand for fresh water by the tourism sector is about four times that demanded by local residents. Additionally, coastal resources, including water, are major components of the tourism product. At the same time, the coastal waters of St. Vincent and the Grenadines are negatively impacted by wastewater from hotels and entertainment centers located on the coast.

AGRICULTURAL DEMANDS: The pressures of globalization have forced the agricultural sector in St. Vincent to introduce an irrigation system. The system is being used by the banana industry to main fruit quality and quantity during the dry season, thus maintain a place in the European market. The irrigation system is just emerging, hence, its demand for water is still growing. Currently the system supports 1200 acres with plans to extend to 2000 acres by 2001. This acreage is expected to utilize most of the available dry season river flow in the country. Any expansion of irrigation beyond this point will depend on the results of a hydrological study slated for 2001. While the true impact of this initiative is being determined, there are several traditional irrigation systems (back yard garden and small family plots) in operation on the island. Some of these operations use water collected from rooftops, others depend solely on pipe borne water. Root crop cultivation on the island uses traditional knowledge. Planting is done towards the end of the dry season so that the young plants take full advantage of the rain season during their period of growth and development. Most of the agriculture done in St. Vincent is rain fed (approximately 17,000 acres). There are plans to improve rain

fed agriculture by improving extension services to farmers and emphasizing crop diversification away from bananas. This is an attempt to improve food security without increasing water demand.

The irrigation system being developed in St. Vincent uses mini sprinklers or drippers. This method is reputed to be highly water efficient. There is therefore no drainage associated with the system. This is further obviated by the topography of the land, the porous nature of the volcanic soil and the low water table. The area currently being irrigated has good access roads with proper drainage that will carry away any spill that may occur.

The irrigation scheme in St. Vincent is very new, hence issues like salinity has not been observed. Given the fact that the surface water in St. Vincent is almost devoid of salts and that the water table is low it is doubtful that salinity will be a problem. The major environmental impacts associated with irrigation in St. Vincent is the stress to aquatic life occasioned by the reduction in stream flow, and the change/loss of flora and fauna associated with the change of land use. The competing water demands does not limit irrigation activities in St. Vincent. However, if the observed decline in stream volume should continue or escalate or if climate change should result in decrease precipitation or drought then the irrigation process can be seriously impeded. The current decrease in forest cover and the accompanying soil erosion has reduced soil percolation. This will reduce soil water retention and increase irrigation demands with decreasing water resource.

HYDROELECTRICITY DEMAND: For many years, the St. Vincent Electricity Services (VINLEC) has maintained a hydroelectric plant at South Rivers. With the growing cost of fossil fuel however, the company saw prudence in the installation of a second plant on the Cumberland River. To meet the water needs of the plant, water was diverted from a river on the Richmond side. Consequently, the river on the Richmond side remains dry for most of the year negating any water related activity in that area.

INDUSTRIAL DEMANDS: There are no large industrial operations in St. Vincent. However, Bottlers St. Vincent Ltd. and Hairoun Brewery Ltd. are operations that are water dependent. There are several other operations including the East Caribbean Group of Companies, concrete block makers and a number of cottage industries whose operations are water dependent.

The foregoing summary points to increase demands on water resources and management system. The management agency (CWSA) has responded well by expanding its services at enormous cost. In order to maintain this performance, all services provided by the agency come with a cost. The following tables provide some insights.

Metered Water

Description	Cost in EC $
Basic charge per month- all connections	10
Additional charge based on water consumption	
0 – 5000 gallons	5 per 1000 gallons or part thereof
5,000 – 15,000	8 " " " "
> 15,000	15 " " " "
Industrial or commercial	10 per 1000 gallon or part thereof
Ships	35
Government Buildings and Offices	8

Un-metered Water

Description	Cost Per Month EC $
Domestic	
House with 1 tap	6
House with 2-3 taps	10
4- 5 taps	20
6 – 7 taps	30
>7	35
Commercial based on no. of employees	
1 – 5 employee	50
6 – 15	90
16-29	155
>29	175

Instillation or Relocation of Water Connection

Diameter of Pipe	Cost in EC $
¾ inch	35
1 inch	60
1 ½ inch	70
2 inch	80
2 ½ inches	100
3 inches	150
4 inches	350

The fact that all water used in St. Vincent is surface water should not be seen as indicative of the absence of ground water but of the adequacy of surface water. The adequacy or abundance of surface water has not encouraged reuse and or recycle. Vincentians therefore have an aversion to the concept of reuse or recycle when it relates to water.

Land Use/Land Tenure:

Approximately 29% of St. Vincent is covered by forest. Seventy percent of this is natural forest, 25% "planted forest", and about 5% agro-forest. The "planted" forest reflects reafforestation efforts by the Forestry Department in its fight against deforestation, the fulfillment of it forest conservation mandate and its effort to maintain the watershed areas. The Forestry Department encourages and practices agro-forestry as a means of preventing land degradation on slopes while making the effort economical viable.

The other major land use activities in St. Vincent include agriculture, mining (quarrying) and construction (houses, roads, hard courts etc.). A deciding factor in land use is that of land tenure. Most if not all agriculture lands are privately owned. Owners are allowed to sell, subdivide or change use at will. The problem arises when agriculture lands are converted to housing. Displaced farmers are then forced onto marginal lands or to squat on crown lands – often forest. There are some tracts of forest that are privately owned. Again, these can change use at will even though it is not in the best interest of the nation. Fortunately, most of the watershed areas are in crown lands and are protected by the Conservation Act. In spite of this protection, illegal farming is still a concern for forest conservation especially in the Soufriere Hills. Notwithstanding the aforementioned scenarios, watersheds and water resource management is most effective on crown lands/forest conservation areas. The situation can however be improved by giving more legal protection to watershed areas.

In an effort to address the need for agricultural lands, the government has carried out at least three land reform programmes over the last twenty years. In two cases, government acquired privately owned estates and subdivided them into small plots to meet the needs of peasant farmers. Unfortunately, there was no mechanism in place to stop the more enterprising and less needy members of society from owning these plots.

The Central Planning Department in the Ministry of Finance and Planning maintains a database on land use. GIS mapping is used to record changes in land use as designated by zoning laws. The mapping system is further informed by data obtained from population and agriculture census.

The topography of St. Vincent lends some support to the protection of watershed areas. The steep slopes allow excess water to drain away preventing flooding and flood related damage. Flooding is therefore more likely in the lower elevations. There are no records of serious floods in St. Vincent but current coastal development patterns are creating flood-like conditions in the coastal towns.

GROUND WATER:

The apparent abundance of surface water has lured authorities and the nation at large into complacency. As a result, there are no established procedures or mechanisms to deal with droughts. The only emergency mechanism in place is at the individual or family level. The CWSA has some small reservoirs used in the everyday and distribution of water. These will provide only limited security in an emergency.

Ground water as a resource has not been adequately studied, hence, its true potential is not known. Whatever source exists should be in pristine condition, free of saline intrusion despite the apparent rise in sea level. Because underground sources have not been identified, no extraction has been done and there is no protection mechanism in place. However, saline water contamination should not be a problem since any or all lenses are expected to be fully charged.

There is no reliable data on sea-level rise or land subsidence. Some preliminary data generated by the Sea Grant project (University of Puerto Rico) and the Caribbean Planning for Adaptation to Climate Change (CPACC) exists. Some of this data is treated as personal and not readily accessible. The CPACC data exist electronically but not in a user-friendly format. Some effort is currently being made to convert the data to a more useable form.

PUBLIC PARTICIPATION:
The Forestry Department has an Environmental Education Unit that conducts school outreach programmes, community and farmers' group programmes. These programmes focus on forestry and conservation topics, and watershed management and practices. In addition, all forestry development projects carry a public awareness component designed to involve the community in decision-making and management through information exchange.

The Marriaqua watershed rehabilitation project is a case in point. This project, which is supported by the NRMU, is designed to involve the local community in managing their watershed. The watershed has been negatively impacted by encroachment. Now, through the efforts of the Forestry Department a management team has been put in place. The core group is comprised of farmers, community members, Forestry officers and officers from the CWSA. The group has so far conducted two community consultations and has several other activities planned for 2001. Forestry officers from St. Lucia and Grenada recently visited the area and spoke with the management team. This activity is being seen as a model for community watershed management in the sub-region.

Similar activities have been conducted in the past with varying degrees of success but records of these exist mainly in the minds of participants. A good example is the Zion Hill project in Barrouallie. Here, a denuded hillside overlooking the town was converted to an agro-forest through the effort of the extension officer and some community members. The project encountered resistance in many forms but today the green hillside is testimony of the success, however, there is no data on this project. The point is thus made that public awareness programmes are not sufficiently institutionalized given the contribution they have made to environmental development and sustainability.

The now defunct National Trust of St. Vincent and the Grenadines has contributed significantly to the creation of environmental awareness in this country. Evidence of their once active campaign in favour of environmental sustainability can be seen in documents like the Environmental Profile and some environmental regulations (Acts) of SVG. Radio Jingles about the environment still bears the name of the National Trust. In parallel with the National Trust is the community-based organization called JEMS. This organization was instrumental in preserving the Kings Hill Forest reserve (one of the oldest in the Caribbean) and is credited with being the only organization to challenge the issue of sand mining at the national level. At several points around the country there are trees, plaques and other landmarks that tell the story of community involvement in sustainable

development. It is true to say that the physical evidence does not do justice to the number of initiatives or the effort and resources expended by NGOs, CBOs and the private sector in the management of environmental resource in St. Vincent.

In all of these activities mentioned, gender issues were addressed. It should be noted that the Forestry Department is very gender sensitive. This is due in part to a 1993 study entitled "Enhancing the Involvement of Women in Forestry in St. Vincent & the Grenadines. The study pointed to a lack of female in forestry activities at that time.

Other water related studies conducted includes:

- Land use and agricultural practices (for the Cumberland project)
- Watershed management in the Buccament Valley (NRMU, USAID).
- Land use Conflict in Montreal.
- Colonarie Forest Inventory (USAID).

DATA INFORMATION MANAGEMENT:

The meteorology office at the E.T Joshua airport collects and manages data on wind speed, rainfall, humidity and temperature. This effort is supplemented by data collected from a monitoring station located on the coast guard base at Calliaqua. This data is transmitted and stored in electronic format. This data is also transmitted to CMIH for further processing and storage. Rainfall data is also collected by VINLEC and the Forestry Department in the Ministry of Agriculture. These two agencies store their data in hard copy format.

Water quality monitoring is done by the CWSA and the Environmental Health Department (EHD). Again the data exist only in hardcopy format. There is no monitoring of recreational waters including coastal waters. While the EHD uses hand held kits (supplied by CEHI), the CWSA is moving towards instrumentation. However, the laboratory at the CWSA is still being equipped and does not have a full range of desired instruments.

The Forestry department collects data on stream flow, rainfall and temperature for selected areas. Climate data for Colonarie watershed (rainfall, evaporation and solar radiation) is in the possession of the Forestry Department. There is only spot

data (data for short selected periods) available for the Buccament, Yamboo and Cumberland watershed areas.

While data collection in St. Vincent is done by Met. Office, VINLEC, CWSA, EHD and Forestry, no one agency has a complete set of data. In most cases there is a mixture of electronic and manual recordings. Overall, data collection is disorganized and badly done. The major causes are lack of trained personnel, lack of equipment, and the low priority put on data. In improving water resource data management, there is need for a coordinated management strategy. While the presence of several agencies allow for QA/QC and the filling of gaps, the current fragmented approach allows for more gaps. Alternatively, specific agency can be given specific assignments rather than random project related data collection.

There are several bits and pieces of research carried out by the Forestry Department and the CWSA. However, there is need for some additional research in the area of :

- Ground water resource
- Quality of surface water
- Watershed data collection and analysis to identify trends
- Water resource and climate change issues
- Current status of watershed – use and coverage
- Emergency management strategy for water.

INSTITUTIONAL FRAMEWORK:

The Forestry Department and the CWSA are the key players in water resource management in SVG. Both of these are government agencies guided by legislation approved by the country's judiciary. Provision is made in the legislation for the amendment of Act or regulations as the need arises. Acts referred to here include:

- Forestry Conservation Act 1992
- Wild-life protection Act 1987
- CWSA Act 1991
- Public Health Act 1977.
- Environmental Health Services Act 1991

As a government agency, the Forestry Department is subjected to the civil service ordinances. This means that the current freeze on employment affects staffing in this department and hence the work programme. All monies generated by this

agency goes into the consolidated fund. In a reciprocal manner, the agency receives its funding from the consolidated fund. There have been several bilateral arrangements between this agency and other regional and international agencies (USAID, FAO, DFID and NRMU). These arrangements provide technical and financial support to the local agency in order to elaborate its work plan and improve its capacity for delivery.

Being a statutory body, the CWSA has less financial restrictions than the Department of Forestry, hence, staffing is less of a problem here. Activities of the CWSA are guided by the decisions of its board of directors. Also the CWSA can negotiate loans independent of government – though with their approval.

HEALTH ISSUES:

Human intrusion into water catchment areas poses special problems for managers of water resource. The intrusion comes in the form of agricultural encroachment, pleasure seekers, eco-tourism, and subsistence activities. In the case of agriculture, the land is cleared, tilled and agrochemical applied. During periods of heavy rains, the topsoil and the chemicals both enter the stream flow reducing water quality. This activity also reduces soil water retention hence the quantity of surface water available in dryer periods. It should be noted that the epidemiological surveillance carried out in SVG is intended to tract infectious and life style diseases and that there is no record of health impact due to pesticide use in agriculture. There are some records of pesticide being used with criminal intent and in suicide attempts but these are only in police and hospital files.

Pleasure seekers and eco-tourism share a common impact. They do not always bring back the waste generated while on the hike. Body waste, plastics and unwanted food scraps are left in the forest. Because persons are not screened before entering these “protected” areas, it is possible that they may carry water borne diseases into watershed areas.

Subsistence activities in the watershed include digging for root crops, hunting of animals for food, and harvesting of timber or vines from the forest. These impacts are similar to those discussed earlier. They include deforestation, soil erosion, use of chemicals (to stupefy animals including aquatic ones in order to capture them) and deposition of human waste and solid waste.

The above problems are compounded by the absence of fulltime employees to manage/monitor watersheds. There have been several incidents of persons using

agrochemicals to catch fish/crayfish at points where potable water is collection and treatment. Improved supervision can eliminate this problem.

Apart from some outbreaks of gastrointestinal disease among infants, there is no recent record of waterborne disease problems in St. Vincent. The latest record of such an event is the cholera epidemic of 1935. There have been some recent dengue warnings since the mosquito carrying the disease is known to inhabit the island and a few confirmed cases of the disease recorded.

TRANSBOUNDRY THREATS:

There are no real transboundary threats to fresh water in St. Vincent. The upper basin of the thirteen (13) watershed areas in St. Vincent radiate from the central mountain range which is protected by the Wildlife Protection Act of 1987. The wildlife protection act also gives some protection to waterways by making it an offence to use deleterious substances in the catching of aquatic life in streams and rivers. The national Forest Boundary survey of 1993 (not yet enacted by law) would also give protection to the upper watershed areas that are still forested.

Protection of coastal waters is another matter. While the Basel Convention (to which SVG is a signatory) prohibits the transboundary movement of hazardous waste, it does not, and indeed cannot, prevent the pollution of coastal waters by polluted rivers flowing out of neighbouring countries. For example, waters from the Amazon and Orinoco impacts the entire Caribbean Sea.

POLLUTION:

In St. Vincent, pollution of watershed by land-based source is restricted to agrochemical leaching, direct agrochemical influx from aerial spraying and indiscriminate disposal and improper disposal of solid-waste. However, surface water in the lower coast of the river and coastal waters are severely impacted by industrial and commercial discharge, liquid waste, and storm water runoff from city streets and construction sites.

All of the above cases are compounded by sedimentation occasioned by deforestation and poor agricultural practice. In is not unusual for water to arrive in homes heavily laden with sediments despite having passed through the treatment process (sedimentation, filtration and chlorination).

CLIMATE CHANGE AND NATURAL DISASTERS:
Because the watersheds in St. Vincent are in elevations above 300 m, they are not yet impacted by sea-level rise. While sub-surface water is not used on mainland land St. Vincent and the impact of sea-level rise on this source unknown, sub-surface water is used in the Grenadines and there is unconfirmed report of salt water intrusion in this area.

Predictions are that the frequency and intensity of storms will increase as the phenomenon of climate change intensifies. In the Caribbean, anecdotal evidence has shown that there is some change in climatic conditions occurring.

Severe storms have cause damage to forest, riverbanks and water supply infrastructure on the island. Despite these warnings and setbacks, there is no national programme aimed at addressing climate change related disasters. The country has just presented its National Report to the Conference of Parties. The report indicates plans to develop a national response strategies in the areas of water resources, agriculture and infrastructure development.

CHAPTER 2

CURRENT COASTAL AREA MANAGEMENT ISSUES

COASTAL HABITATS AND ECO-SYSTEMS:

The NRMU concept of Island System Management is very appropriate for island states like St. Vincent where the greatest possible distance (as the crow files) from the water source to its coastal destination is nine miles, and where a single agency has responsibility for management. For this reason, the information presented for watershed management in chapter one is applicable for coastal area management with some modification. The Fisheries Department (a division of the Ministry of Agriculture and Labour) is the only new player, and the major player in coastal area management.

St. Vincent and the Grenadines is a signatory to Marpol and the United Nations Convention on the Law of the Sea (UNCLOS). These conventions make provision for the delineation of marine borders. Accordingly, St. Vincent and the Grenadines has established a 200 mile Exclusive Economic Zone (EEZ). Jurisdiction of this area is more than the country can effectively patrol and manage but the resources of this area is under state control. The national coast guard unit in conjunction with the Fisheries Department oversees the EEZ.

The Fisheries Conservation Act designated some ten (10) conservation areas within the EEZ. One of these, the Tobago Cays, has been legally designated a marine park. The problem with management of this park is the absence of clear policy guidelines for its operation. There is a skeleton staff with no clear mandate, no equipment (patrol boat), and no financial support. In brief, the park remains a "free for all". As a result, over exploitation of the resource is a problem. There are also records of illegal fishing by developed countries in the EEZ managed by SVG. Coral reefs are being destroyed, fish stocks depleted and water quality compromised by waste disposal problems. The government of St. Vincent and the Grenadines is in the process of compiling a Local Area Development and Environmental Management Programme for Union island, Mayreau, and the Tobago Cays (part of the Grenadines) where the most extensive and well-developed coral reef complex in the country is located.

There are several other areas in the Grenadines and mainland St. Vincent where coral reefs are being impacted by land-base sources of pollution (liquid and solid waste, agrochemical leachate, commercial waste and hydrocarbon residues). These reefs are in various stages of decay. All reefs around SVG support fish life

and some are hatcheries for lobsters. Several species of reef fish (pelagic) and bottom feeders inhabit these waters. Several species of migratory fish and mammals share these waters.

There are two mangrove forests (wetlands) on the south east coast of St. Vincent but the major sites are in the Grenadines (Union Island, Canouan). These forests are threatened by coastal development. The need for coastal accommodation to support tourism is hastening the destruction of mangroves.

INSTITUTIONAL FRAMEWORK:

The Fisheries Department is an arm of the Ministry of Agriculture hence it is guided by the civil service ordinances and the dictates of the Minister of Agriculture. There are some Acts and regulations specific to this agency that further guides its operation. This agency has a well-developed database on its resources having benefited from the now defunct CFRAMP and bilateral arrangements with the Japanese.

The Fisheries Department supports the development of a fisherman's cooperative and views this as a line of communication with stakeholders. Frequent consultations are held between both parties to determine some operational policies. The Department also has a PR unit that shares information with schools and other interested resource users.

LAND-BASED POLLUTION:

Land based pollution has severely impacted coastal resources in a negative way. Divers have reported large amounts of polythene (from agriculture) and pampers (from community solid waste) sitting on coral reefs. These objects effectively shield the coral from light causing coral death. This is similar to the problem caused by sedimentation. For some hours following heavy rains, coastal waters for as much as a mile seaward of the shore line, is discoloured by sediment. The sea takes on the appearance of the muddy rivers that flow into it. Such levels of sedimentation destroy habitats and kill juvenile animals. This form of sedimentation is associated with deforestation, poor agricultural practices and landslides.

HEALTH/TOURISM:
Land based pollution makes coastal waters unsafe for recreation. Turbid water is both unsafe and unhealthy for swimming or diving. Additionally, chemicals from agriculture and pathogens from animal or human waste can cause poisoning and/or infection. These concerns run counter to tourism demands and does nothing to help the government's effort to improve tourism.

CLIMATE CHENGE:
If climate change is responsible for the intensity of storms and storm surges experienced over the last five years, then indeed it is responsible for major coastal erosion in St. Vincent. Some areas on the north windward side of the island have had as much as 25 m shoreline recession over the last five years. On the north leeward side of the island, waves from hurricane Lennie destroyed ten (10) meters of coastal forest that stood for over fifty years. The same storm destroyed the coastal access road 15 m inland at Richmond and swept away a small coastal village in Rose Bank. The new cruise ship berth at port Kingstown also received damage from Lennie.

Record exist of storm damage to Port Kingstown and several other areas in SVG over the last five years, yet there are no concrete measures in place to address climate change impacts. There is a disaster preparedness unit in the Ministry of Housing but this is poorly staffed and equipped though the emphasis is on hurricane response. This unit is affiliated to CDERA hence it has some regional links.

MARINE RESOURCE EXPLOITATION:
All marine resources in SVG are over exploited. The active construction industry in St. Vincent vigorously extracts sand and aggregate from coastal stocks. Because of the severe negative impact of sand mining on the coast, government has put initiatives and incentives in place to reduce the impact. The incentives include tax concession to developers using imported sand and the availability of imported sand to other construction personnel.

No replacement has been found for the gravel so its extraction continues unabated. Further, no alternative employment has been found for the peasants who eke out an existence in this way.

Some draft legislation on sand mining exists but there is no political will for its enactment or enforcement. Similarly, the Town and Country Planning Act of 1991 includes setback limits for coastal development but these are often ignored.

Aquaculture is not an established activity in St. Vincent and the Grenadines, hence there are no concerns about its possible impact.

TRANSBOUNDARY THREATS:
It is known that some small ships and pleasure crafts traversing the waters of St. Vincent and the Grenadines dump their solid and liquid waste into the sea. However, this is within the EEZ and may not qualify as transboundary. *[see chapter 1 for related information*]

PUBLIC PARTICIPATION:
In an effort to address coastal pollution and management issues, the Ministries of Health and the Environment and Finance and Planning have teamed with the private sector (hotel owners, dive operators, and entertainers) to put in place a consultative process to address pollution in south east St. Vincent. Several meetings were held and decisions made but little execution was done. The NRMU at one time assisted the process offering technical support but no action resulted.

A similar situation developed between JEMS and the community group operating at the Brighton Salt Pond. This activity resulted in the erection of toilet facilities and a garbage collection in that recreational area. However, lines of authority are still unclear and the adjacent landowner still has some grouse.

CHAPTER 3

INTEGRATED WATERSHED AND COASTAL AREA MANAGEMENT.

There is in St. Vincent and the Grenadines, to some extent, the integrated management of watershed and coastal area. Because in some areas the forest borders with the sea and in other areas wetlands borders the sea, this physical reality gives the Forestry Department total management of the entire system. Notwithstanding, the CWSA Act gives that agency total control of the water resource trapped in the forest. For this reason, if for no other, the two agencies must coordinate their activities. Discussion with both agencies revealed a high level of cooperation and mutual respect. There is some unclear financial arrange between the agencies but this has not hampered their work.

Public participation in the management of the resources in question is of prime importance but is not institutionalized. The fact that neither the CWSA nor the Forestry Department possesses the man-power to police a resource as vital as water, and that the public has almost free access to this water is a major concern. This public access must not be slighted since many persons depend on the forest for their livelihood. The emerging interest in eco-tourism brings private sector involvement and another level of complexity.

The CWSA generates income through the sale of water harvested from the forest. The Forestry Department generates a limited amount of funds from sale of other forest products (timber, hunting permits) but this fund goes into the national purse from which all government departments are funded. Tour operators market the entire forest and get to keep the proceeds.

The foregoing discussion points to the fact that the management of watersheds must take an integrated cooperative approach. The following problems must however be resolved.

1) Which agency takes charge of a particular problem?
2) Which piece of legislation will be enforced when?
3) Who pays for what and at what cost?
4) What will be the structure of the management team?
5) How will conflicts be resolved?
6) Is there a role for community policing?

Whatever the management structure, it is clear that none of the groups can be ignored. It is therefore necessary to strengthen public participation so that

representative of the public can sit in high-level management meetings where policy decisions are made.

A crucial element in the development of such a management system would be the financial implications. Forest resources have for too long been undervalued. In an era of financial stress, the forest will have to generate its own finances and hence an economic instrument will have to be developed to make this possible. Some support may be available from the UNFCCC or the CBD but such support should be seen as developmental, allowing the agency to do needed research and putting in place emergency response mechanisms.

All of these proposals can only work if they pass the political test. Realistically, no one should be dispossessed or marginalized and the resource should no be compromised but this is often impossible when government's agenda is not visionary in outlook and the politician inflexible.

CHAPTER 4
National Action Programme to Improve Integrated Management of Watershed and Coastal Areas

The development of any national action programme must of necessity be participatory, transparent and broad-based. All possible stakeholders should be involved at all stages of development in order to ensure successful implementation. The resulting management structure and policies should be clear and acceptable to all. This is extremely important given the absence of monitoring and the will to enforce in many cases. In the absence of enforcement, morale suasion is deemed a more acceptable means of achieving compliance than legislation, especially when the final arbitrator is someone with the desire to be perceived as a good candidate for public office. In any case, monitoring and evaluation are vital elements in any development process.

In general, monitoring of environmental resources in SVG is poorly done. This is probably because the true economic value of the resource is neither known nor appreciated. In many instances, some instruments for monitoring exist but need to be strengthened. The following examples are illustrative.

- Environmental Services Act no. 15 of 1991 makes provision for the control of emissions and effluent discharge into water bodies but there are no accompanying regulations to support this Act. There is a draft OECS guidelines for effluent discharge but this has not been adopted or incorporated into local laws and/or policies.
- St. Vincent and the Grenadines is signatory to MARPOL but no port facility is in place to accommodate waste generated by small ships and pleasure crafts. Additionally, small yachts with no holding tanks are permitted to spend several days in port with their human cargo on board.
- Being a member of UNCLOS and situated in the part of oil tanker traffic, SVG should have a well developed Oil Spill Response Protocol. However, the only thing that exists is a committee chaired by the commander of the coast guard. Efforts to develop a response mechanism have been hampered by lack of local financial commitment.
- SVG has legislations for the establishment of marine parks but to date only one, the Tobago Cays has been designated and there is no management system in place for this park.

Following studies on recreational waters conducted by Dr. Archer and Dr. Headley, the Environmental Health Department included the monitoring of

recreational waters into their strategic plan for 2000 but lacked the institutional capacity to follow through.

For effective monitoring, a good public awareness programme is necessary. Stakeholders and civil society must know what are their rights and responsibilities. They must also be aware of the penalties for violating laws and their own protection under the law. This is critical if citizen patrol is to be used to supplement agency patrol.

One area where public education is urgently needed is the area of multilateral environmental agreements. The obligations of these agreements are not incorporated into the body of local laws. Consequently, these agreements are not well enunciated in St. Vincent and the Grenadines. Implementation is therefore weak and government centered. For example, despite the very liberal use of agrochemical and the absence of proper disposal mechanism for used engine oils, St. Vincent and the Grenadines has not yet signed on to the Protocol on Land Based Sources of Pollution.
Working these into any integrated management plan will require more public awareness and some legal undertaking. It should be noted, however, that MEAs like the UNCBD, UNFCCC and UNCBD do overlap and can in fact strengthen integration of work programmes. A good example is the database being developed under CPACC (component 3). This database has the capacity to incorporate all environmental data using GIS to display and overlay spatial and temporal data. Recognizing this potential, the focal point has sought to incorporate the efforts of the NRMU in the development of this database.

Institutional arrangements have proven problematic in this situation, for while Ministry of Environment is coordinating the development of the database, the repository is best suited in Central Planning where the GIS capability lies. However, Planning lacks both the interest and manpower. Wherever the repository falls, it will require maintenance. Since the data will have multiple users, who will pay for the maintenance? The Fisheries Department has a small database and GIS capabilities but prefers to remain insulated rather than opening up to national participation for the greater good.

It is quite clear that a detailed database with many users will require an information specialist to update and repair the system and assist users. Again the financial system is in question.

In a Vincentian context, it would be necessary to ensure that there is legislative harmony among the implementing agencies. This would require the harmonization and updating of all relevant legislation related to the protection and sustainable use of watershed resources in SVG. Currently in St. Vincent and the Grenadines, there is a situation of overlapping between two agencies managing a single resource. The result is that attempt at enforcement by one agency called into question legislation from the other agency to the advantage of the perpetrator.

Another requirement of an integrated system is the need for constant review and upgrade. This speaks to research and development. While members of staff may possess the ability to conduct the necessary research the lack the time. Additionally, government has made it clear that research is not a priority where there is shortage of money. Private sector support could be the answer to this problem. If the private sector is willing and/or allowed to take their place in development, they could augment government's contribution to capital projects in a creative way to the benefit of the nation. It should be noted that some schools currently assist the forestry department in monitoring a watershed and that there are plans to expand this programme.

As can be seen from this report, several national activities past and present have public awareness components that begin and end with the initiatives. This is undesirable and counter productive. There is need for a structured public education programme that will support any and all national or regional initiatives. This way, the small budget line allocated to PA can have a multiplied effect. Increase public awareness will give the average citizen a greater sense of involvement and ownership of the activity thus ensuring sustainability.

The development of any action programme to improve integrated management of watershed and coastal areas in St. Vincent and the Grenadines must address the following:

1. Location and ownership of the initiative.
2. Acceptance by all Ministries and Departments to facilitate intersectoral cooperation.
3. Built in local funding through existing or new projects.
4. The development of economic instrument to ascertain the true cost of the resource so freely enjoyed but for which no one pays.
5. Harmonization of legislation and adaptation of regional guidelines and policies where necessary.
6. Human resource development.

7. Development of an electronic database with links to other regional databases.
8. A work programme or agenda that takes into consideration the work of other agencies involved in watershed management.

CHAPTER 5
Recommended Inputs to Regional Action Programme.

While institutional arrangements, developmental levels and bilateral arrangements may support island specific activities, there are some common trends which can foster the advancement of a regional approach to integrated management of watersheds. The topography and general geography of the Caribbean ensures similar rainfall and drainage patterns. The history of the region also puts the islands on the same developmental path. Most countries having no mineral wealth build their economies around agriculture and along the coast. Being coastal communities, exploitation of coastal resources is common. For these reasons, the following suggestions are made:

- The development of a training programme that stresses on the job training and exchange of personnel and information. The training should include aspect of co-management, participatory development and the science of water management and monitoring. This activity will support human resource development and institutional strengthening.
- The establishment of effluent discharge standards appropriate for the region and the ability to monitor these discharges locally.
- Analysis of food and water for pesticide residue, dyes and heavy metals. This can lend support to or draw from the convention on Persistent Organic Pollutant (POPs).
- Support for the harmonization of legislation at the local level to facilitate corporation among and between local agencies. There could be a regional template that can guide the local work.
- Exchange of professionals working in watershed management to facilitate transfer of knowledge and skills.
- Support for the incorporation of data on watershed projects, including recommendations developed from final technical output, into existing regional databases.
- Improve local climate data collection, analysis and storage for watershed area through regional training and technical support.

APPENDIX 1

CASESTUDY

Country Name: Saint Vincent and the Grenadines (SVG)

Project Title: Development of a Management Plan for the Buccament Valley

Background

The Buccament valley is situated on the south west coast of St. Vincent approximately six kilometers north of the capital city of Kingstown. Buccament Bay forms the sheltered seaward boundary of the valley, which stretches up to mountain forest reserve areas above Vermont. Buccament is roughly trapezoidal in shape, being narrowest at the coast and widest, approximately one mile across, in the central range. The Buccament River transects the valley. It is both a source and a sink for a number of activities. The upper area of the valley is a forest reserve and a critical watershed. This watershed provides a large percentage of the nation's potable water and is the main source of drinking water for capital city Kingstown (Fig II).

In 1998, the then parliamentary representative of the area requested the OECS-NRMU to develop a management system for the area. The system was required to protect the resource and increase the benefits derived from the resources through employment creation.

Goal

To provide a framework which facilitates the development of a sustainable and integrated systems of resource use in Buccament Valley.

Objectives

- To establish guiding principles for the development of sustainable resource use and to identify a structure, which will allow for community based identification and prioritisation of current resource management needs.

- To identify a management structure which provides for channels of communication, collaboration and co-operation to facilitate more effective co-management within Buccament Valley.

- To develop a strategy that works towards concensus based decision making for local area management of the multiple resources used within the Buccament area.

Approach

This project establishes a functional plan for the sustainable development and management of resource use in Buccament Valley. In the then situation, there were multiple resource users with the potential for conflict if not managed in an integrated way. (Management and development initiatives to date have tended to be fairly fragmented).

The proposed management provided a coherent structure for long term planning of resource use in the valley and was expected to be a tool to facilitate the development of effective co-management. The management structure therefore enabled key stakeholders to identify and address changing management concerns through its framework. It was therefore consensus based. This management plan was seen as a mode for community driven approach to management.

The management plan provides forums for collaboration and co-ordination and facilitated channels of communication between all stakeholders. The management process was to be community led such that identification of issues and remedial strategies came form stakeholders within the valley.

A major concern was how to establish and sustain the commitment of local groups throughout the process. It was important that the communities of the valley felt committed to and took ownership of this local area management (LAM) process.

Analysis of the issues and patterns of socio-economic organization was used to explain how co-management could operate within the valley. This leads to the development of the management framework that supported community lead management.

The integrated co-management framework proposed for the valley built on existing socio-economic patterns. This flexible structure allowed socio-economic groupings to address specific area and sector needs and yet remain within the overall integrative framework.

The co-management framework essentially provides the mechanism for achieving sustainability and integration. (Fig 1)

Analysis of resource use management issues among the socio-economic sectors of Buccament Valley was conducted through extensive consultation with the communities of Buccament Valley, government agencies and other national stakeholders. A number of studies outlined the then patterns of resource use and the associated resource use issues[i]. This information base was used to develop an action oriented matrix which looked at potential management mechanisms for achieving integrated resource use management and development for Buccament valley. The

matrices provided and initial tool to guide LAM committees in the development of resource management strategies.

The LAM authorities identified the issues as they emerge and their own ability to develop community driven projects to address and monitor such changes.

Conclusion

Despite more than fifty meetings of various sorts and at different levels over a period of one year, the objectives of this management plan were not achieved. Only a few of the specific activities such as training of individuals and identification of potential income generating activities were done. The channels of communication, collaboration and co-operation to facilitate more effective co-management within the Buccament Valley were never established. Therefore, the resources in the valley are still in need of coordinated management and the employment situation unchanged. .

Figure 1

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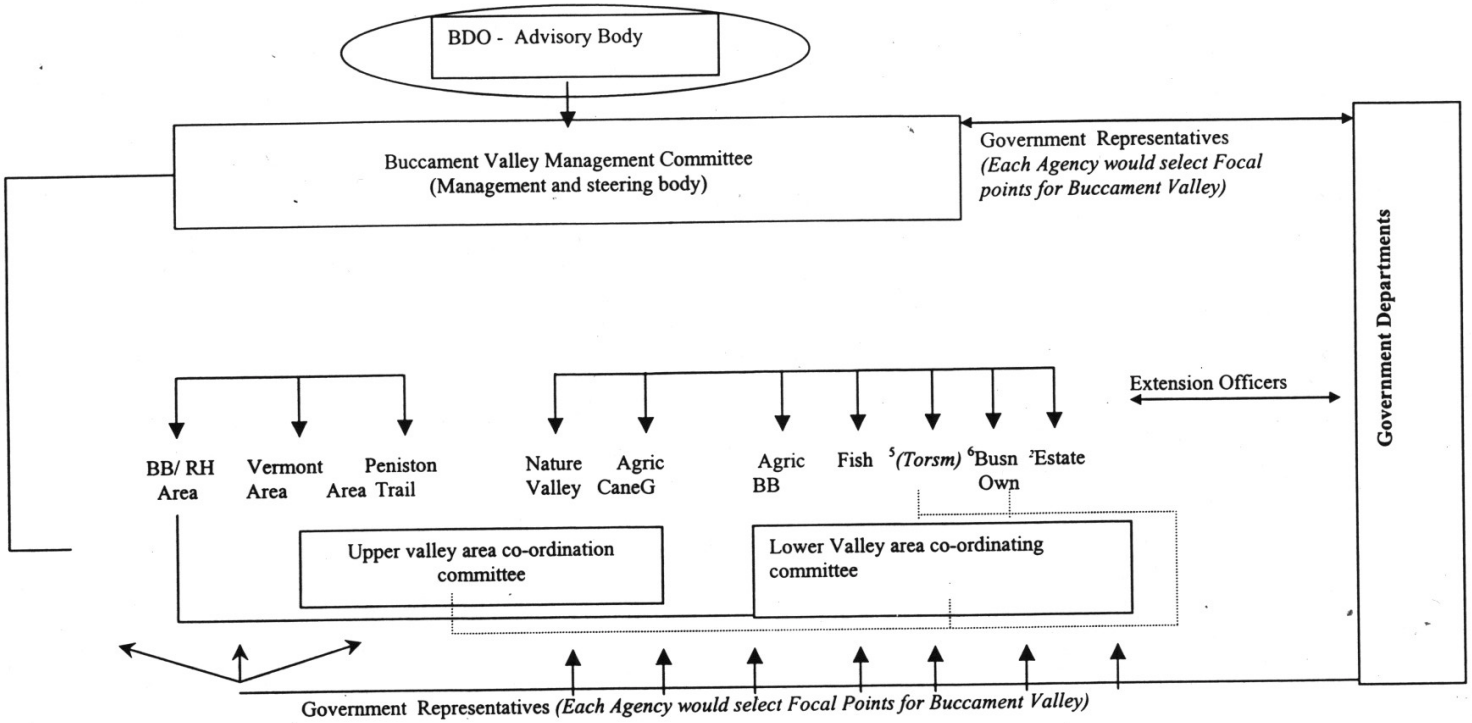

[5] Tourism is likely to develop into a significant economic sector within the valley. Its development will need to be scoped and planned to develop tourism based industries that are integrated into a holistic package for the valley. To date tourism is not a major source of income for the valley communities. As this sector emerges however it will be necessary to establish a management entity, which fits into the overall framework for the valley

[6] The business community and estate owning families need to be represented within the management framework as major stakeholders. However they expressed a desire to form loose collaborative groups whose involvement would be more issue and assistance based than directly involved in day to day management.

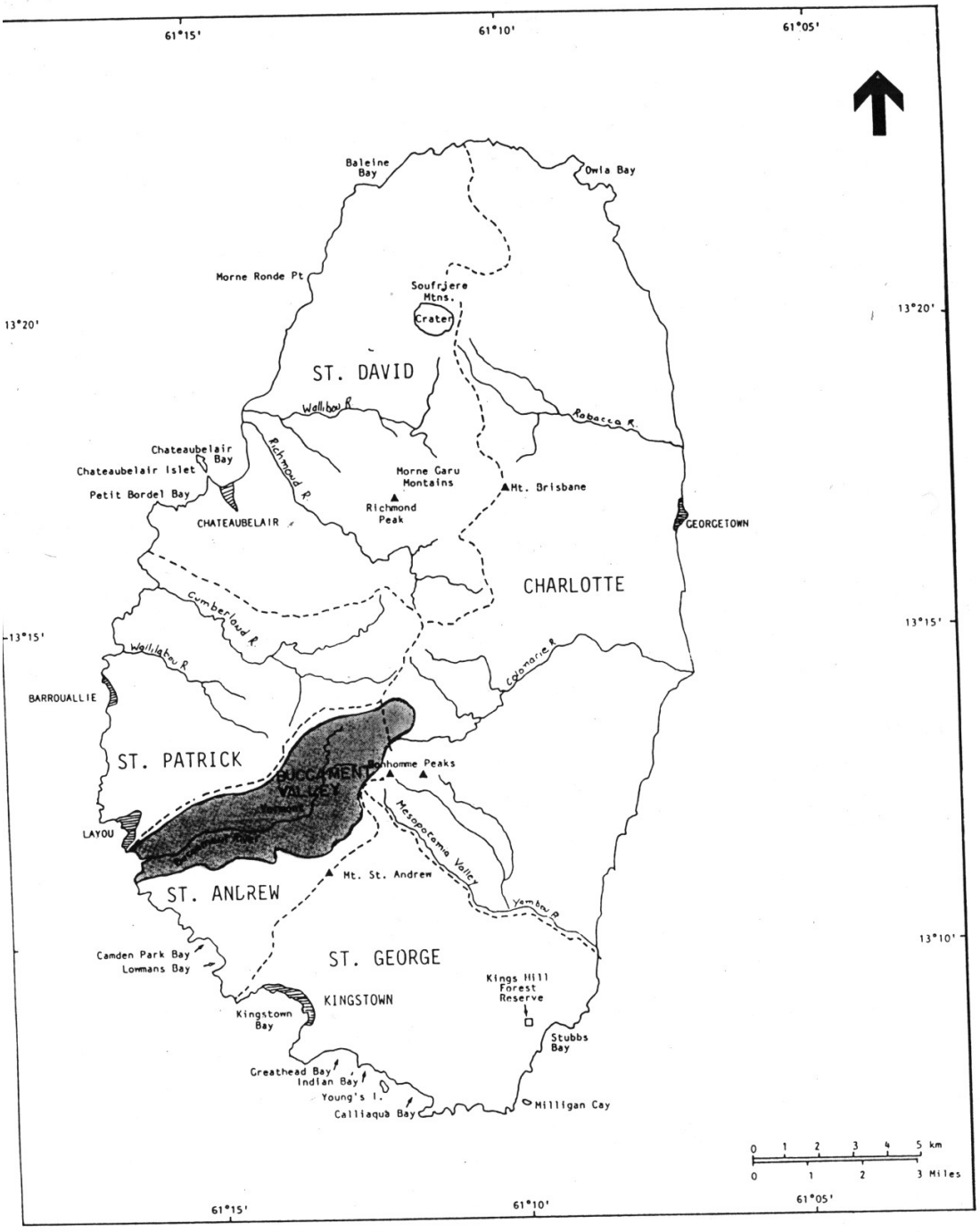

Figure (II) Location Map Buccament Valley

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