The Regional Training Workshop on Methodologies for Coastal Inventories & Information Management

Appendix XVIII

COUNTRY : **St. Kitts And Nevis**

PRESENTER : **E. Daniel & J. Hughes**

SUBJECT : **Inventory Of Coastal Resources In St. Kitts And Nevis**

INTRODUCTION

The coastal and marine ecosystems of St. Kitts and Nevis, like most other islands, are diverse and complex. Coastal and marine ecosystems in St. Kitts and Nevis include a combination of cliffed and rocky shores, sandy beaches (associated dune communities), seagrass beds, coral reefs and coastal wetland (associated with pond/mangrove communities). Development activities on land impact upon the coastal and marine ecosystems, often dramatically. In addition, the threat of global warming and sea level rise is ever becoming a serious concern. As most development activities in St. Kitts take place very close to the coastal zone, there is an urgent need to protect and manage our coastal and marine ecosystems.

The first step in protecting and managing these ecosystems is to record baseline information on their physical and biological conditions. With this baseline data, we would be in a better position to detect any natural or manmade alterations and respond with mitigative measures that could minimise any potential threats and impacts. Therefore, it is necessary to establish long-term monitoring and inventory programs to achieve this goal.

INVENTORY OF COASTAL RESOURCES IN ST. KITTS AND NEVIS

In St. Kitts there are six (6) coastal resource inventory programs which are carried out by five (5) government agencies. These agencies include: The Fisheries Division (St. Kitts and Nevis), The Health Department, The South-east Peninsula Board Office and The Department of Environment. In the near future, The Meteorological Office and The Coast Guard will be implementing CPACC's Sea Level/Climate Monitoring program. A brief overview of the existing programs is provided below (See Appendix I for summary).

1. Fish stock Assessment

Agencies Responsible: St. Kitts- Fisheries Management Unit, Ministry of Agriculture; Nevis- Fisheries Division.

Objective: The Objective of this program is to monitor changes in fishing activity and to evaluate changes in the biological and economic status of the fisheries resource.

Issues considered in planning and design phase: It was determined that the major boat landing sites will be selected for data collection and other landing sites will be surveyed for fishing activity. Five (5) major landing sites were identified in St. Kitts and two (2) in Nevis.

Data requirements: Fish catch, Effort.

Source of Data: Data collectors sample landings sites six (6) days per weeks (Sundays not included). At each major site, effort is allocated by the number of boats landing, fishing gear used and crew numbers. Fishermen are interviewed for additional data.

Data Collected: Data has been collected at all landing sites in St. Kitts and Nevis. An annual report is produced with analysis and results.

Current and potential use: The data is currently being used to estimate total fish landed and trends (eg. Peak seasons). The could also be used to identify areas for fisheries development

Resources used/needed to collect data: Personnel (Data Collectors), Transportation, Data sheet/pencil.

Constraints: This program experiences two major constraints:

a) Data on fishing gear is difficult as fishermen are not always willing to release this information;
b) Data gaps are created for two reasons:
    1) Data is not collected when boats land on Sundays;
    2) Some boats land at sites where data is not collect.

2. Coral Reef Monitoring

Agencies Responsible: ***St. Kitts- Fisheries Management Unit, Ministry of Agriculture and South-east Peninsula Board Office, Ministry of Planning;***

Nevis- None.

Objective of Inventory: ***The general objective of the coral reef monitoring program is to collect base line data on coral reefs so that any changes in reef health can be detected.***

Issues considered in planning and design phase***: During the planning phase of this program, it was decided that the coral reefs located in areas of future proposed development and heavy recreational (eg boating) activities be the would selected sites. Coral reef sites selected are located at Old Road Bay, Guana Point and Sandy Point. More sites will be identified in the near future.***

Data requirements: Mortality/growth rates of hard coral, Indicator species, Algal growth, Physical changes (eg. anchor damage)

Sources of data***: Under water Photo Quadrats, Water temperature, Turbidity, Fish count, Visual survey. Data is collected on bi-annual basis. All data is stored and analyzed using Quatro Pro and Sigma Graph software packages.***

Data Collected: ***So far data has been collected for sites at Guana Point and Sandy Point. An annual report with analysis and results are produced.***

Current and potential use: The data collected will be used to determine the general health of the reef and determine the ecological balance of the reef. Data collected at the Sandy Point site will be used to assist with design of a national marine park.

Resources used/needed to collect data: ***Underwater camera, Digitizer, SCUBA gear, PVC pipe, Boat, Tape measure, Software (eg. sigma scan), Personnel (divers).***

Constraints: ***This program is subjected to two major constraints: a) There is limited personnel (divers) available to assist with the collection of underwater photos. b) Limited financial resources are available for purchasing equipment (eg. gasoline for boat, film, digitizers).***

3. Tar Ball Monitoring

Agency Responsible: **St. Kitts: Health Department, Ministry of Health.**

Nevis: None.

Objective:

The general objectives of this program are to:

a. Determine the suitability of beaches for recreational purposes;
b. Detect and Monitor oil spills;
c. Identify sources of oil spills.

Issues considered in planning and design phase***: When this program was planned, it was***

determined that the selected sites would be beaches that are likely to be affected by open sea sources of oil contamination such as tanker cleaning and ballast discharge. Most of the tanker traffic takes place on the Atlantic side. Therefore, the monitoring is carried out once monthly on five selected Atlantic beaches. These are Conaree Bay, Half Moon Bay, North Friars Bay, Sand Bank bay and Mosquito Bay.

Data requirements: Amount of petroleum deposits/tar balls per unit area (oil deposits per unit area)

Sources of Data: At each beach, three random transects (one (1)- two (2) meters in width between the water line and the vegetation line) are established. The transects are sampled for petroleum residue/tar balls which are weighed and recorded (mass/area).

Types of Data actually collected: Data is collected on a monthly basis since the establishment of the program in 1991. An annual report is also produced with results and analysis.

Current and potential use of collected data: The data is currently being used to detect the occurrence of an oil spill. The data could be used for contingency planning purposes and to identify the source of oil during an actual oil spill.

Resources used/needed to collect data: Personnel (data collectors), Tape rule, Vehicular transport, Balance scale.

Constraints and challenges experienced/foreseen: No major constraints

4. Beach Profile

Agencies Responsible: ***St. Kitts- Department of Environment, Ministry of Environment and Fisheries Unit, Ministry of Agriculture; Nevis-Planning Unit, Ministry of Planning.***

Issues considered in planning and design phase: ***During the planning stage, it was felt that the beaches used for recreational purposes and those which are expected to attract development in the near future, would be selected for the program. Twenty (20) beaches were selected in St. Kitts while eighteen (18) beaches were selected in Nevis.***

Objective: The general objective of the Beach Profile Program is to gather valuable information that quantifies how beaches change and subsequently understanding coastal dynamics.

Data requirements: Erosion Rates, Beach cross-sectional area, Beach Width, Seasonal Variations.

Sources of Data: Approximately 2-3 transects are established on the beach from the water line to the vegetation line along which the slope is determined. This information is then entered into a lotus 123 programme to determine the necessary data requirements.

Types of Data actually collected: This program started in 1988 and experienced a two-year break. It was restarted in 1991. Data is stored and analysed using lotus 123. An annual report with results is produced.

Current and potential use of collected data: The data is used to determine seasonal changes in the beaches and erosion rates. It can also be used to determine building set backs at beaches.

Resources used/needed to collect data: Data Sheets, Spray Paint, Pencils, Abney Level, Camera, Ranging Poles, Tape Measure, ClipBoard, Human Resource, and Transportation.

Constraints and challenges experienced/foreseen: The major limiting factor for this program is the availability of personnel for data collection.

5. Coastal Water Quality Monitoring

Agency Responsible: St. Kitts- Health Department, Ministry of Health; Nevis- None.

Objective:

The objectives of this program are to:
a. Define the sanitary water quality of the coastal zone of St. Kitts; and
b. Determine the suitability of beaches for recreational purposes.

General issues considered in the planning and design stage: **When this program was initiated, a decision was made to select areas that were frequently used for recreational purposes and/or where household and industrial wastewater enters the sea. Three bays (Frigate Bay, Basseterre Bay Front and Limekiln Bay) were selected.**

Data requirements: Coliform count, BOD, Turbidity, Temperature, Salinity.

Sources of Data: Water samples are collected at all three bays (Number of sampling station: Basseterre Bay- 8, Frigate Bay- 5, and Limekiln- 2). These samples are analyse to determine data requirements.

Types of Data actually collected: **Data has been collected at the above-mentioned sites since this the program was initiated in 1991. An annual report is produce with analyses and results.**

Current and potential use of collected data: Data is used to determine sanitary quality of coastal waters.

Resources used/needed to collect data: Boat, Lab equipment, Personnel (Data collectors)

***Constraints and challenges experienced/foreseen*: This program experiences two major constraints. a) There is limited availability of chemicals to conduct necessary tests. At present, the Health Department has been unable to secure chemical supplies for the past two months. This has hindered the program severely.**

b) The Health Department relies heavily on the use of the Coast Guard boats at to collect samples. Occasionally, regular sample collection is difficult as the boat might be in use for urgent Coast Guards matters pertaining to their work schedule.

6. Sediment rate Monitoring

Responsible Agency: St. Kitts- Department of Environment, Ministry of Environment; Nevis- ***None.***

Objective: ***The objective of this program is to measure coastal sedimentation rates at bays so as to determine baseline sedimentation rates and to detect possible increases in sediment rates due to natural and human activities.***

Issues considered in planning and design phase: ***This monitoring program was established only at the Southeast Peninsula area (SEP) where major hotel development is expected. The SEP is an area rich in marine and coastal resources vital to fishermen. It is important that any sedimentation caused by development activities should be monitored and mitigated. It was determined that the monitoring of sediment loads on seagrass beds and corals reefs was important to track critical sediment load levels. The bays where major hotel developments were expected were targeted. These include Majors Bay, Cockleshell Bay, Ballast Bay, and Banana.***

Data requirements: ***Sediment Rates (mg/cm2/day). In order to determine the sediment rates, samples of sediment must be collected over a fixed period of time.***

Sources of data*: Four sediment traps are place in 10-15 feet of water at each bay for approximately 21 days. They are then collected and the contents filtered, dried and weighed. Using this information and the cross-sectional area of the sediment traps, the sediment rate is calculated using a spreadsheet programme- Lotus 123.*

Data Collected: ***Sediment Rates data were collected from 1991-1995 for all four bays. An annual report was prepared which presented these results and analysis.***

Current and potential use: Currently, this information is not being utilised. However, as hotel development is expected on the SEP in the near future, this data can be used as base line information to compare sediment rates before during and after the construction

phases of hotels. It can also be used as a standard which can be incorporated in EIA legislation, which would require developers to mitigate coastal siltation caused by earth movement during heavy construction.

Resources used/needed to collect data*: Sediment traps, Filter Paper, 1 ½" PVC pipe, Balance Scale, Wire mesh (fish excluding device), Rubber strips, 1 ½" PVC couplings, Steel Rebar ,Boat, Oven, Personnel.*

Constraints: The main constraint for this program is limited personnel available to set-up and collect sediment traps. The SEP Board Office from 1991-1995 conducted the program. At present, limited personnel at the SEP Office and Department of Environment prevent the continuation of this program.

CLOSING REMARKS

It is clear that efforts are being made to establish coastal inventory programs in St. Kitts. However, there are some key constraints that continue to limit their effectiveness. These include limited human and financial resources. One issue noteworthy of mentioning is that the coordination of these programs across agencies is limited. This can lead to duplication of resources and effort. The sharing of responsibilities for some of these programs should be considered. For example, some components of the reef monitoring and coastal water quality programs could be done in tandem, as well as the beach profile and tar ball monitoring.

It is hoped that this workshop can provide an opportunity to discuss these and other issues with the view to developing new techniques for planning and implementing a comprehensive coastal resource inventory program. We look forward to taking part in these discussions and sharing our experiences.

Appendix I: Summary of Coastal Inventory conducted in St. Kitts and Nevis

Type of Coastal Resource Inventory	Agencies Responsible	Data	Funding	Commencement Date	Frequency
1. Fisheries Resource Stock Assessment	Fisheries management Unit(FMU),St. Kitts/Nevis	Fish catch Effort	CFRAM, Government	1993	Daily
2. Coral Reef Monitoring	Fisheries Division &SEP Board Office, St. Kitts	Reef growth and damage	French Government, Government	1993	Bi-annually
3. Tar Ball Monitoring	Health Department (HD), St. Kitts	Tar Ball per area on the beach	Government	1991	Monthly
4. Beach Profile	FMU and Dept. of Env. (DoE), St. Kitts. Planning Unit, Nevis	Beach-profile (crossectional area and width) Erosion rates	UNESCO	1988	Monthly
5. Coastal Water Quality	HD, St. Kitts	BOD,turbidity, temperature, coliform,	Government	1991	Monthly
6. Sediment Rate Monitoring	DoE	Sediment rates	Government	1991	Monthly
7. Sea Level Monitoring	Meteorological Office	Sea Level, vertical land motion, air and sea temperature, wind velocity, precipitation	Government, CPACC Project	NA	NA

INVENTORY OF COASTAL RESOURCES IN ST. KITTS AND NEVIS

- 6 COASTAL RESOURCE INVENTORY PROGRAMS
- 6 GOVERNMENT AGENCIES
    - ST. KITTS:
- FISHERIES MANAGEMENT UNIT
- HEALTH DEPARTMENT
- DEPARTMENT OF ENVIRONMENT
- PLANNING UNIT
    - NEVIS:
- THE FISHERIES MANAGEMENT UNIT
- PLANNING UNIT

PLANNED PROGRAM:
METEOROLOGICAL OFFICE
COAST GUARD → CPACC'S SEA LEVEL/CLIMATE. MONITORING PROGRAM

1. FISH STOCK ASSESSMENT

AGENCIES RESPONSIBLE:
- ST. KITTS ANDNEVIS: FISHERIES MANAGEMENT UNIT(FMU)

OBJECTIVE:
- MONITOR CHANGES IN FISHING ACTIVITY
- EVALUATE CHANGES IN THE BIOLOGICAL/ECONOMIC STATUS OF THE FISHERIES RESOURCE.

PLANNING/DESIGN ISSUES:
- MAJOR BOAT LANDING SITES SELECTED
- MAJOR SITES: 5- ST. KITTS ;2-IN NEVIS
- SURVEY OTHER SITES FOR FISHING ACTIVITY.

DATA REQUIREMENTS: FISH CATCH, EFFORT.

SOURCE OF DATA:
- MAJOR LANDING SITES VISITED 6 DAYS PER WEEKS:
    - EFFORT- NUMBER OF BOATS LANDING, FISHING GEAR USED AND CREW NUMBERS.
    - FISHERMEN INTERVIEWED FOR ADDITIONAL DATA.

DATA COLLECTED:
- ANNUAL REPORT IS PRODUCED WITH ANALYSIS AND RESULTS.

CURRENT/POTENTIAL USE:

- ESTIMATE TOTAL FISH LANDED AND TRENDS (EG. PEAK SEASONS).
- IDENTIFY AREAS FOR FISHERIES DEVELOPMENT.

RESOURCES NEEDED: PERSONNEL, TRANSPORTATION, DATA, SHEET/PENCIL.

CONSTRAINTS:
- FISHERMEN NOT WILLING TO GIVE INFO. ON FISHING GEAR
- DATA GAPS: 1) DATA NOT COLLECTED ON SUNDAYS
  2) BOATS LANDING AT OTHER SITES

2. CORAL REEF MONITORING

AGENCIES RESPONSIBLE:
- ***ST.KITTS-FMU AND PLANNING UNIT, NEVIS- NONE.***

OBJECTIVE OF INVENTORY:
- ***COLLECT BASE LINE DATA ON CORAL REEFS SO THAT ANY CHANGES IN REEF HEALTH CAN BE DETECTED.***

PLANNING/DESIGN ISSUES:
- ***CORAL REEFS LOCATED IN AREAS OF PROPOSED DEVELOPMENT AND HEAVY RECREATIONAL ACTIVITIES***
- ***CORAL REEF SITES: OLD ROAD BAY, GUANA POINT AND SANDY POINT***

DATA REQUIREMENTS:
- MORTALITY/GROWTH RATES OF HARD CORAL, INDICATOR SPECIES, ALGAL GROWTH AND PHYSICAL CHANGES (EG. ANCHOR DAMAGE)

SOURCES OF DATA:
- ***UNDER WATER PHOTO QUADRATS, WATER TEMPERATURE, TURBIDITY, FISH COUNT, VISUAL SURVEY.***

DATA COLLECTED:
- ***GUANA POINT AND SANDY POINT. ANNUAL REPORT PRODUCED.***

CURRENT/POTENTIAL USE:
- REEF HEALTH
- ECOLOGICAL BALANCE

RESOURCES NEEDED:
- ***UNDERWATER CAMERA, DIGITIZER, SCUBA GEAR, PVC PIPE, BOAT, TAPE MEASURE, SOFTWARE, PERSONNEL (DIVERS).***

CONSTRAINTS:

- ***LIMITED PERSONNEL***
- ***LIMITED FINANCIAL RESOURCES.***

3. TAR BALL MONITORING

AGENCY RESPONSIBLE:

- ST. KITTS: HEALTH DEPARTMENT, NEVIS: NONE.

OBJECTIVE:

- **BEACH SUITABILITY FOR RECREATIONAL PURPOSES**
- DETECT/MONITOR OIL SPILLS
- **IDENTIFY SOURCES OF OIL SPILLS**

PLANNING/DESIGN ISSUES:

- ***BEACHES LIKELY TO BE AFFECTED BY OPEN SEA SOURCES OF OIL CONTAMINATION (CONAREE BAY, HALF MOON BAY, NORTH FRIARS BAY, SAND BANK BAY AND MOSQUITO BAY)***

DATA REQUIREMENTS:

- PETROLEUM DEPOSITS(TAR BALLS)/ UNIT AREA

SOURCES OF DATA:

- SAMPLE 3 RANDOM TRANSECTS (1-2M) IN WIDTH
- RECORD WEIGHT OF TAR BALL THEN DETERMINE (MASS/AREA).

TYPES OF DATA ACTUALLY COLLECTED:

- DATA IS COLLECTED REGULARLY SINCE 1991. ANNUAL REPORT.

CURRENT/POTENTIAL USE OF DATA:

- DETECT OIL SPILLS
- CONTINGENCY PLANNING
- IDENTIFY SOURCE OF OIL SPILL.

RESOURCES USED/NEEDED:

- PERSONNEL, TAPE RULE, VEHICULAR TRANSPORT, BALANCE SCALE.

CONSTRAINTS: NO MAJOR CONSTRAINTS

4. BEACH PROFILE

AGENCIES RESPONSIBLE:

- ST. KITTS-DEPT. of ENV.(DoE)/FMU, NEVIS-PLANNING UNIT,

PLANNING/DESIGN ISSUSES:

- ***BEACHES USED FOR RECREATIONAL PURPOSES***
- ***" EXPECTED TO ATTRACT DEVELOPMENT(20-ST. KITTS,18-NEVIS)***

OBJECTIVE:

- GATHER INFORMATION THAT QUANTIFIES HOW BEACHES CHANGE AND SUBSEQUENTLY UNDERSTANDING COASTAL DYNAMICS.

DATA REQUIREMENTS:

- EROSION RATES, BEACH CROSS-SECTIONAL AREA, BEACH WIDTH, SEASONAL VARIATIONS.

SOURCES OF DATA:

- 2-3 TRANSECTS (WATER LINE- VEGETATION LINE)
- SLOPE DETERMINED ALONG TRANSECTS

TYPES OF DATA ACTUALLY COLLECTED:

- DATA COLLECTED AND ANALYSED FROM 1991. ANNUAL REPORT.

CURRENT/POTENTIAL USE:

- DETERMINE SEASONAL CHANGES
- EROSION RATES
- BUILDING SETBACKS AT BEACHES.

RESOURCES USED/NEEDED:

- DATA SHEETS, SPRAY PAINT, PENCILS, ABNEY LEVEL, CAMERA, RANGING POLES, TAPE MEASURE, CLIPBOARD, HUMAN RESOURCE, AND TRANSPORTATION.

CONSTRAINTS:

- LIMITED PERSONNEL FOR DATA COLLECTION.

5. COASTAL WATER QUALITY MONITORING

AGENCY RESPONSIBLE:

- **ST. KITTS- HEALTH DEPARTMENT, NEVIS- NONE.**

OBJECTIVE:

- SANITARY WATER QUALITY OF THE COASTAL ZONE
- SUITABILITY OF BEACHES FOR RECREATIONAL PURPOSES

PLANNING/DESIGN ISSUES:

- **BEACHES FREQUENTLY USED FOR RECREATIONAL PURPOSES**

- **AREAS WHERE HOUSEHOLD AND INDUSTRIAL WASTEWATER ENTER THE SEA. 3 BAYS (FRIGATE, BASSETERRE AND LIMEKILN)**

DATA REQUIREMENTS:
- COLIFORM COUNTS, BOD, TURBIDITY, TEMPERATURE, SALINITY.

SOURCES OF DATA:
- WATER SAMPLES ARE COLLECTED AT ALL 3 BAYS (SAMPLING STATIONS: BASSETERRE BAY- 8, FRIGATE BAY- 5, AND LIMEKILN- 2).

TYPES OF DATA ACTUALLY COLLECTED:

- **DATA COLLECTED SINCE 1991. ANNUAL REPORT.**

CURRENT/POTENTIAL USE:
- DETERMINE SANITARY QUALITY OF COASTAL WATERS.

RESOURCES USED/NEEDED:
- BOAT, LAB EQUIPMENT, PERSONNEL.

CONSTRAINTS:

- **LIMITED AVAILABILITY OF CHEMICALS**
- UNRELIABLE BOAT ACCESS

6. SEDIMENT RATE MONITORING

RESPONSIBLE AGENCY:
- ***ST. KITTS-DoE, NEVIS- NONE.***

OBJECTIVE:
- ***MEASURE COASTAL SEDIMENTATION RATES AT BAYS***
- ***DETECT POSSIBLE INCREASES IN SEDIMENT RATES DUE TO NATURAL AND/OR HUMAN ACTIVITIES***

PLANNING/DESIGN ISSUES:
- ***BAYS WHERE MAJOR HOTEL DEVELOPMENT IS EXPECTED.***
- ***SEP BAYS: MAJORS, COCKLESHELL, BALLAST BAY, BANANA***

DATA REQUIREMENTS:

- ***SEDIMENT RATES (MG/CM^2/DAY)***

SOURCES OF DATA:

- ***SEDIMENT TRAPS (10-15 FEET OF WATER FOR APPROX. 21 DAYS)***
- ***SEDIMENT SAMPLE FILTERED, DRIED AND WEIGHED.***

DATA COLLECTED:

- ***DATA COLLECTED (1991-1995). ANNUAL REPORT.***

CURRENT/POTENTIAL USE:

- NOT UTILISED CURRENTLY
- DEVELOP STANDARDS FOR EIA REGULATIONS

RESOURCES USED/NEEDED:

- ***FILTER PAPER, 1 ½" PVC PIPE, BALANCE SCALE, WIRE MESH (FISH EXCLUDING DEVICE), RUBBER STRIPS, 1 ½" PVC COUPLINGS, STEEL REBAR , BOAT, OVEN, PERSONNEL.***

CONSTRAINTS:

- LIMITED PERSONNEL