

**1ST CARIBBEAN
ENVIRONMENTAL FORUM AND
11TH CARIBBEAN WATER AND
WASTEWATER ASSOCIATION
CONFERENCE**

**GROS ISLET
SAINT LUCIA
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ENVIRONMENTAL MANAGEMENT AND THE CHOC WATERSHED – COASTALSHED

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ACKNOWLEDGEMENTS

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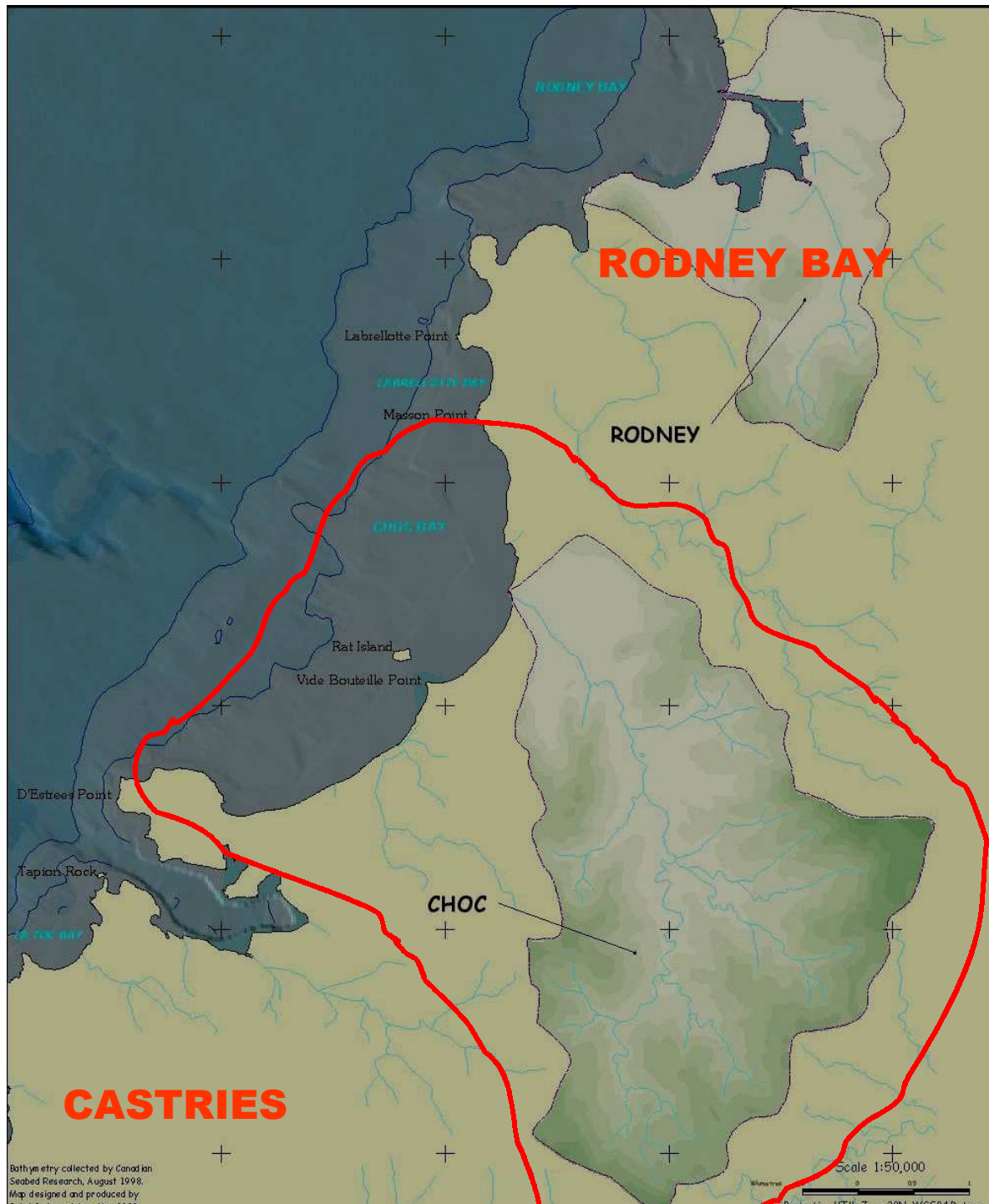
LAND & SEA ENVIRONMENTAL CONSULTANTS FORMED PART OF THE ATRIA/BAIRD TEAM AND WAS RESPONSIBLE FOR THE ENVIRONMENTAL QUALITY COMPONENT.

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CONSERVATION
PROJECT.**



CHOC SYSTEM: ENVIRONMENTAL ISSUE

**CONTINUED PRESSURE FROM
RESIDENTIAL, COMMERCIAL AND
INDUSTRIAL DEVELOPMENT AND
THEIR IMPACT ON THE
ENVIRONMENT OF THE CHOC
WATERSHED AND COASTALSHED.**



THE CHOC SYSTEM

CHOC SYSTEM COMPONENTS

- **WATERSHED:**

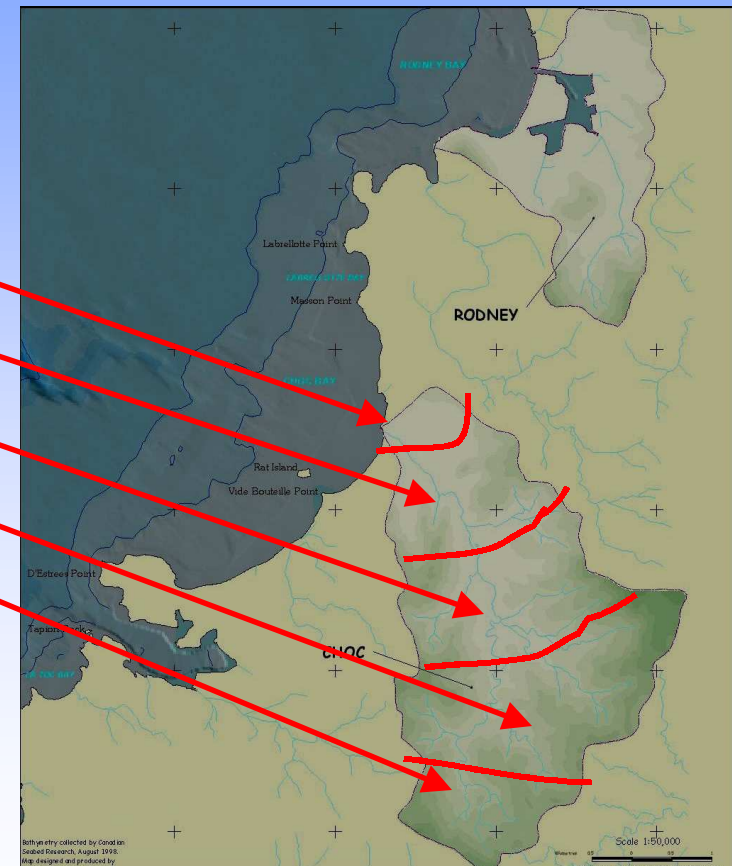
ت**DEFINED BY DRAINAGE TO CHOC RIVER AND THENCE TO OCEAN.**

- **COASTALSHED:**

ت**DEFINED AS A DISCRETE MARINE RECEIVING ENVIRONMENT AND WHICH IS AFFECTED BY ONE OR MORE WATERSHEDS.**

THE CHOC SYSTEM -1

- **WATERSHED**
- تESTUARY**
- تLOWER RIVER**
- تMIDDLE RIVER**
- تUPPER RIVER**
- تUPPER REACHES**





UPPER REACHES



UPPER RIVER



MIDDLE RIVER



LOWER RIVER



ESTUARY

THE CHOC SYSTEM -2

- **COASTALSHED**

ت **WYNDHAM**

**MORGAN BAY
RESORT BEACH**

ت **WAVES BEACH**

ت **RAT ISLAND**

ت **HALCYON BEACH**





HOW TO ACHIEVE ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT?

WHY TAKE AN ENVIRONMENTAL MANAGEMENT APPROACH?

**AN ENVIRONMENTAL MANAGEMENT
SYSTEM (EMS) PROVIDES AN
EFFECTIVE, EFFICIENT AND
ECONOMICAL MEANS TO
IMPLEMENT SOUND POLLUTION
PREVENTION PRACTICES.**

1. Policy

2. Planning

3. Implementation
and operation

4. Checking and
corrective action

5. Management
review

Continual
Improvement

**BASIC ELEMENTS OF AN ENVIRONMENTAL MANAGEMENT
SYSTEM WITH A FEEDBACK MECHANISM PROVIDING FOR
CONTINUAL IMPROVEMENT**

LAND & SEA



ENVIRONMENTAL CONSULTANTS LTD.

ADVANTAGES OF THE EMS APPROACH

- **PROVIDES A CONSISTENT AND INTERNATIONALLY RECOGNIZED FRAMEWORK FOR IDENTIFYING PROJECT ASPECTS AND ENVIRONMENTAL IMPACTS.**
- **IDENTIFIES NEED FOR POLICIES, LAWS, DIRECTIVES AND OTHER SUPPORTING MANAGEMENT COMPONENTS.**
- **SETS UP A SYSTEM OF OBJECTIVES, TARGETS AND ENVIRONMENTAL PERFORMANCE INDICATORS TO ENSURE LONG-TERM GOAL IS ACHIEVED.**
- **PROVIDES A “FEEDBACK” MECHANISM BETWEEN IMPLEMENTATION AND MANAGEMENT DECISION-MAKING.**

CHOC SYSTEM ASPECTS & IMPACTS

ASPECTS

- **SANITARY SEWAGE**
- **SOLID WASTE**
- **STORM DRAINAGE**
- **SEDIMENT LOAD**
- **PESTICIDES & FERTILIZERS**
- **SHORELINE ALTERATION**

IMPACTS

- **HEALTH & SAFETY OF RIVER WATER USE**
- **HEALTH & SAFETY OF BEACH WATER USE**
- **AESTHETIC & AQUATIC LIFE**
- **CONTAMINANT ENTRY**
- **HABITAT LOSS**
- **MANGROVE LOSS**
- **REEF & FISHERY DAMAGE**

OBJECTIVES & TARGETS

OBJECTIVES

- **CLEAN RIVER WATER**
- **CLEAN BEACH WATER**
- **GARBAGE REMOVAL**
- **PROTECTION OF AQUATIC LIFE**
- **GENERAL AESTHETICS**

TARGETS

- **REDUCTION IN RIVER BACTERIA LOADINGS BY X% IN 5 YEARS.**
- **REDUCTION IN BACTERIA LOADINGS BY Y% IN 10 YEARS**
- **PROVISION OF GARBAGE REMOVAL BY 200x.**
- **NEW CONTROLS ON STORM DRAINAGE BY 200x.**
- **NEW CONTROLS ON PESTICIDE USE BY 200Y.**

ENVIRONMENTAL PERFORMANCE INDICATORS

- **CONCENTRATIONS OF BACTERIA IN RIVER AND BEACH WATER.**
- **CONCENTRATIONS OF SUSPENDED SOLIDS IN RIVER AND BAY WATER.**
- **CONCENTRATIONS OF NUTRIENTS IN RIVER AND BAY WATER.**
- **QUANTITIES OF LITTER AND DEBRIS.**
- **LOSS OF RIVER BANK .**
- **BAY WATER TURBIDITY AND GENERAL IMPRESSION OF USABILITY.**



**INCOMPLETE TREATMENT
OF SEWAGE**



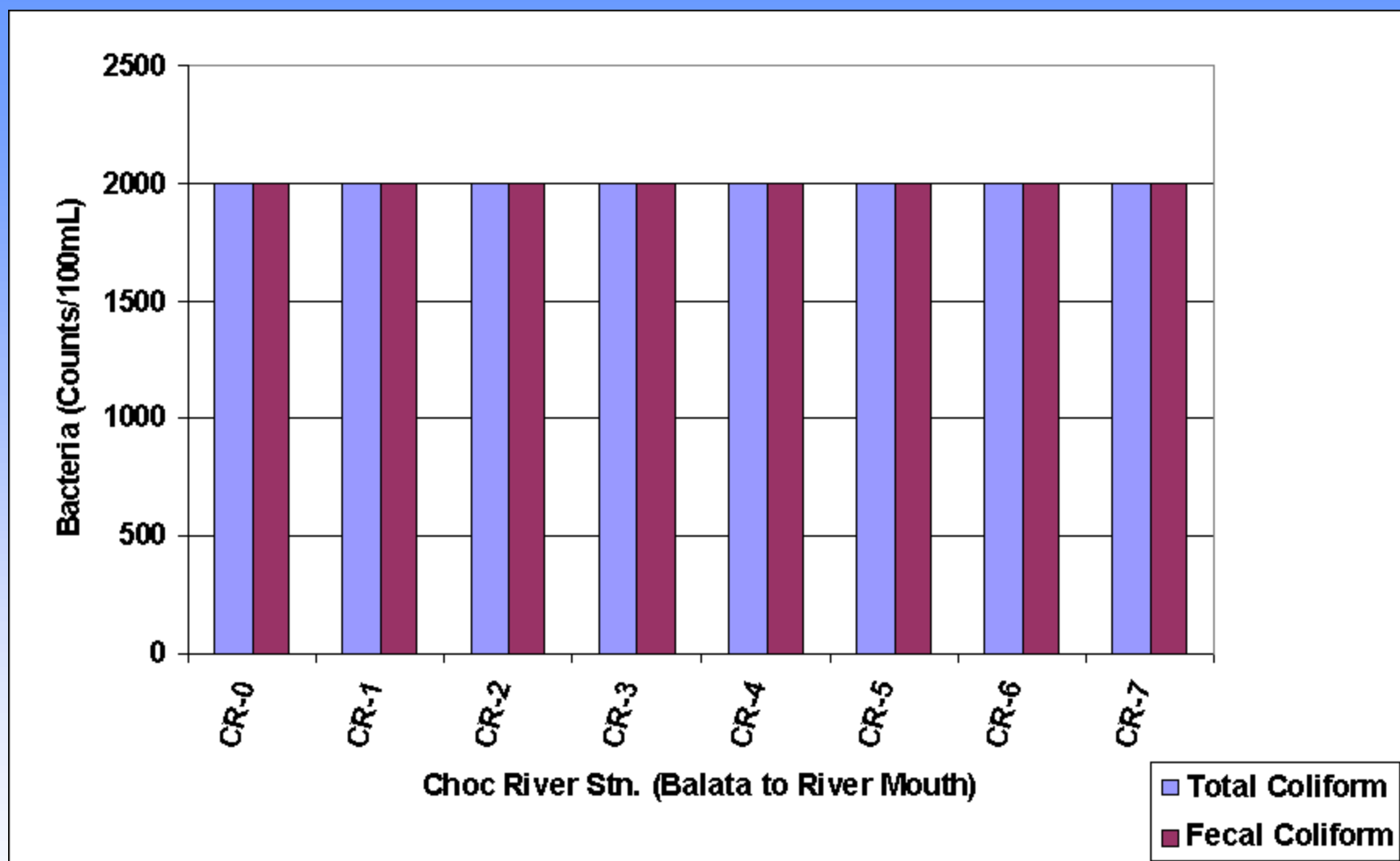
**RESIDENTIAL
DEVELOPMENT**



**EXAMPLE OF IMPACT
SOURCES:

BACTERIA & NUTRIENTS**

**LEACHATE FROM
OLD LANDFILL**



PROFILE OF BACTERIA IN RIVER WATER

OBJECTIVE: HOW TO ADDRESS BACTERIA & NUTRIENTS?

- **TECHNOLOGIES:**

- ت **UPGRADE ON-SITE SERVICES.**

- ت **MANAGE AGRICULTURAL ACTIVITIES, PARTICULARLY ANIMALS AND SOIL EROSION.**

- ت **USE “MINI TREATMENT SYSTEMS” FOR LARGER DEVELOPMENTS.**

- ت **OPERATION & MAINTENANCE ISSUES.**

- **“TREATMENT” WETLANDS:**

- ت **ADDRESSES MULTI-IMPACT ISSUES**

- ت **LESS EXPENSIVE TO MAINTAIN & OPERATE**

- ت **AUGMENTS NATURAL ENVIRONMENT**



**EXAMPLE OF IMPACTS:
SUSPENDED SOLIDS,
EROSION AND LOADING**

OBJECTIVE: HOW TO ADDRESS SUSPENDED SOLIDS, EROSION AND LOADING

- **USE OF BUFFER ZONES ALONG THE RIVER BANKS TO REDUCE AREAS OF EXPOSED SOILS.**
- **CONTROLS ON AMOUNT OF EXPOSED SOILS.**
- **WORK WITH BANANA FARMERS TO CONTROL SOIL EROSION.**
- **STORM DRAINAGE CONTROL PONDS.**
- **USE OF “TREATMENT” WETLANDS TO ASSIST IN REMOVING SUSPENDED SOLIDS.**

HOW TO REDUCE IMPACTS TO CHOC COASTALSHED?

- **ENSURE WATERSHED DRAINAGE PROVIDES GOOD WATER QUALITY TO THE BAY.**
- **CONTROL POTENTIAL FOR SHORELINE EROSION DUE TO DEVELOPMENT.**
- **ENSURE COASTAL PROJECTS PROVIDE ADEQUATE SEWAGE CONTROL.**
- **PLACE EFFLUENT DISCHARGE POINTS AT SITES WITH ADEQUATE ASSIMILATIVE CAPACITY.**

APPLICATION OF EMS TO CHOC SYSTEM

- **IDENTIFIED ASPECTS AND ASSOCIATED IMPACTS.**
- **USED MONITORING TO PROVIDE QUANTITATIVE PRIORITY TO IMPACTS.**
- **IDENTIFIED POTENTIAL METHODS OF ADDRESSING IMPACTS.**
- **IDENTIFIED METHODS FOR BOTH WATERSHED AND COASTALSHED IMPACTS.**
- **SET OBJECTIVES AND TARGETS.**

EMS FRAMEWORK

RECOMMENDED POLICY AND LEGISLATION FOR:

- **WATERSHED AND EFFLUENT MANAGEMENT ACT**
- **COASTAL ZONE MANAGEMENT ACT.**
- **MARINE POLLUTION MANAGEMENT ACT (FROM OECS WASTE MANAGEMENT PROJECT).**
- **COMBINED WITH REGULATION CHANGES WITHIN THE LAND PLANNING AND DEVELOPMENT REGULATIONS.**

“PUBLIC INVESTMENT”

- **KEY TO SUCCESSFUL IMPLEMENTATION OF AN EMS IS ADOPTION OF THE GUIDING PRINCIPLES BY ALL STAKEHOLDERS, INCLUDING WATERSHED AND COASTALSHED RESIDENTS AND LANDOWNERS.**
- **RECOMMEND:**
 - ت **FORMATION OF A WATERSHED-COASTALSHED ENVIRONMENTAL MANAGEMENT ROUNDTABLE.**
- **BASED ON GENERAL PRINCIPLES ESTABLISHED FOR THE MARINE MANAGEMENT AREAS; e.g., SOUFRIERE MMA**
- **PROMOTE VOLUNTARY COMPLIANCE AND INVESTMENTS TO LEVERAGE GOVERNMENT INVESTMENTS.**

NEXT STEPS

**CHOC SYSTEM SELECTED TO BE
MODEL FOR IMPLEMENTATION OF
GEF-SUPPORTED UNEP PROJECT
ON WATERSHEDS AND
COASTALSHEDS IN SMALL
ISLAND STATES. THIS WILL
PERMIT FULL IMPLEMENTATION
OF STUDY FINDINGS AND
RECOMMENDATIONS.**



- **THE EMS APPROACH PROVIDES THE NECESSARY GUIDE AND FRAMEWORK TO ACHIEVE ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT, A “BENEFIT” FOR BOTH RESIDENTS AND TOURISTS.**



THANK YOU