

**1<sup>ST</sup> CARIBBEAN  
ENVIRONMENTAL FORUM AND  
11<sup>TH</sup> CARIBBEAN WATER AND  
WASTEWATER ASSOCIATION  
CONFERENCE**

**GROS ISLET  
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# **ENVIRONMENTAL MANAGEMENT AND THE CHOC WATERSHED – COASTALSLED**

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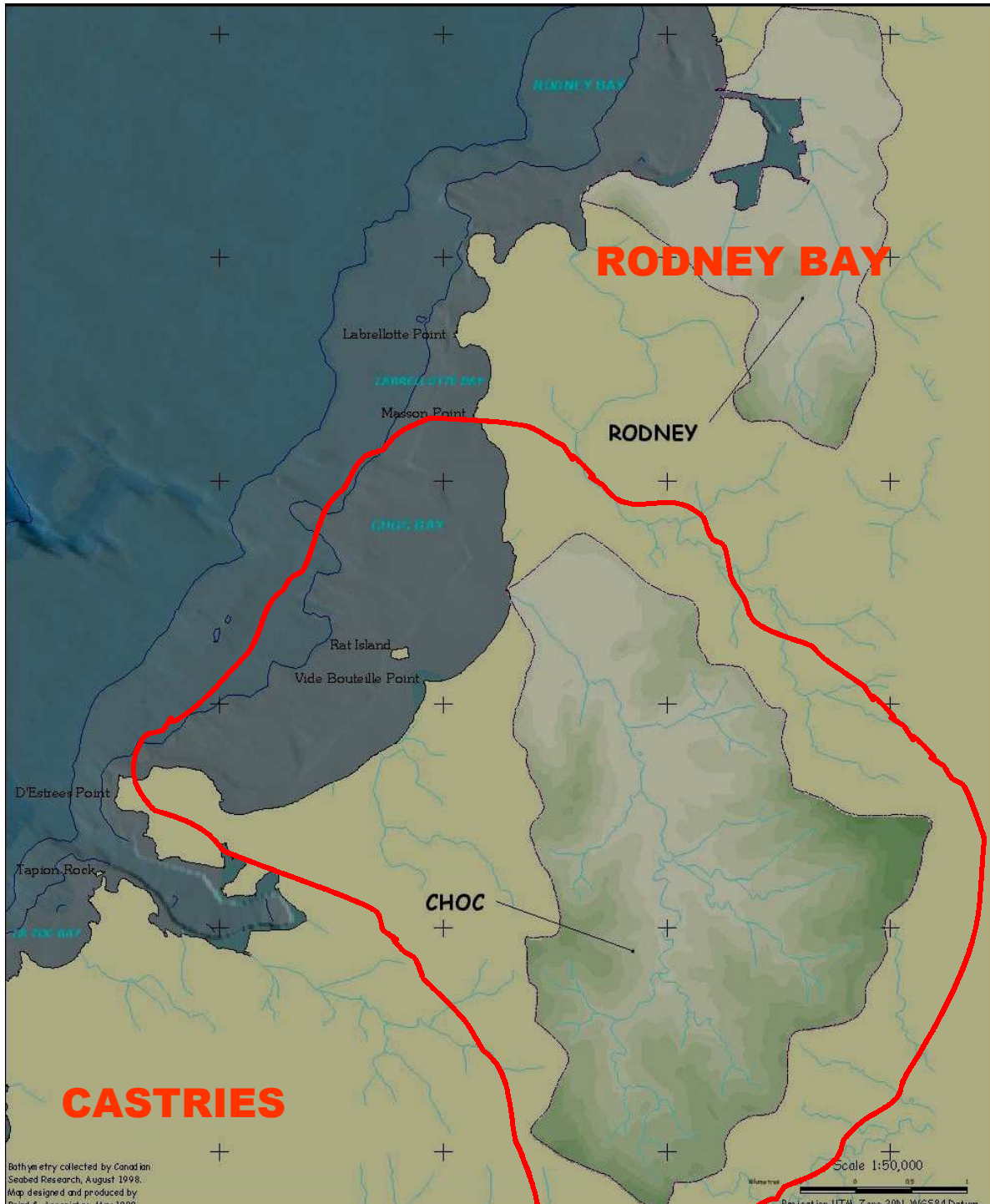
**LAND & SEA ENVIRONMENTAL CONSULTANTS FORMED PART OF THE ATRIA/BAIRD TEAM AND WAS RESPONSIBLE FOR THE ENVIRONMENTAL QUALITY COMPONENT.**

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# **CHOC SYSTEM: ENVIRONMENTAL ISSUE**

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



# THE CHOC SYSTEM

# CHOC SYSTEM COMPONENTS

- **WATERSHED:**

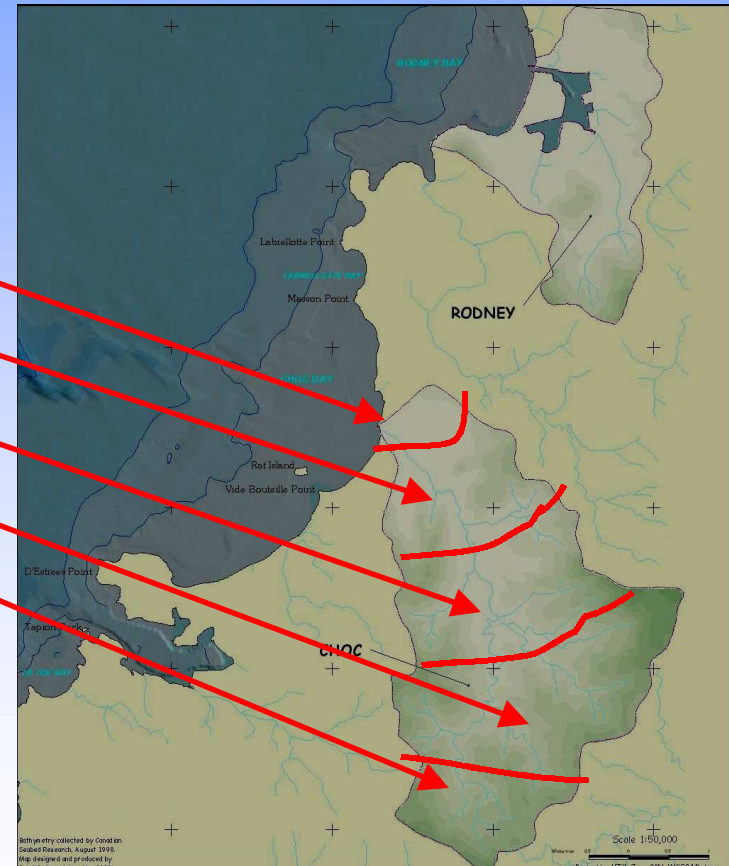
ت **DEFINED BY DRAINAGE TO CHOC RIVER AND THENCE TO OCEAN.**

- **COASTALSHED:**

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

# THE CHOC SYSTEM -1

- **WATERSHED**
- ت **ESTUARY**
- ت **LOWER RIVER**
- ت **MIDDLE RIVER**
- ت **UPPER RIVER**
- ت **UPPER 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

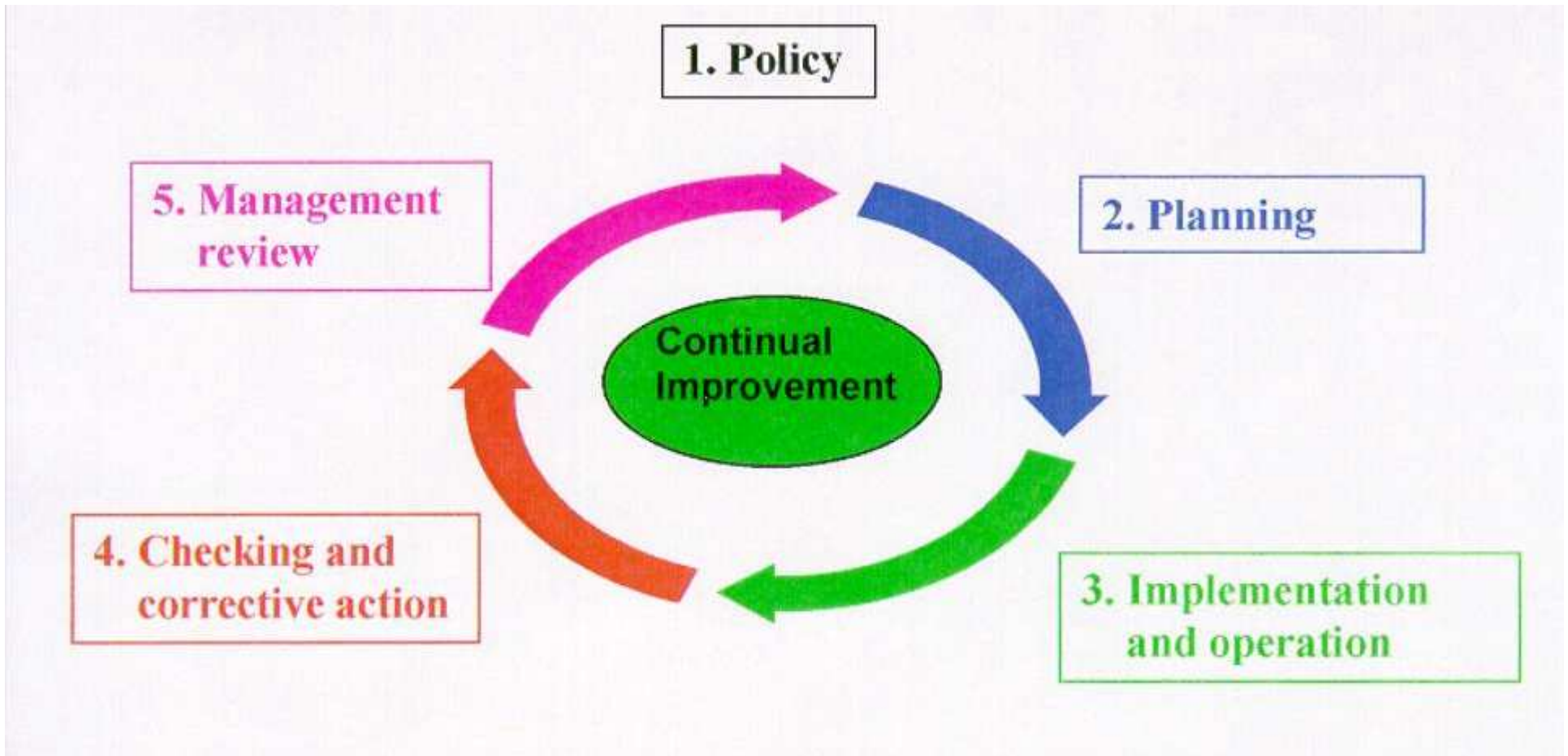




# **HOW TO ACHIEVE ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT?**

# **WHY TAKE AN ENVIRONMENTAL MANAGEMENT APPROACH?**

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



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

# **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**



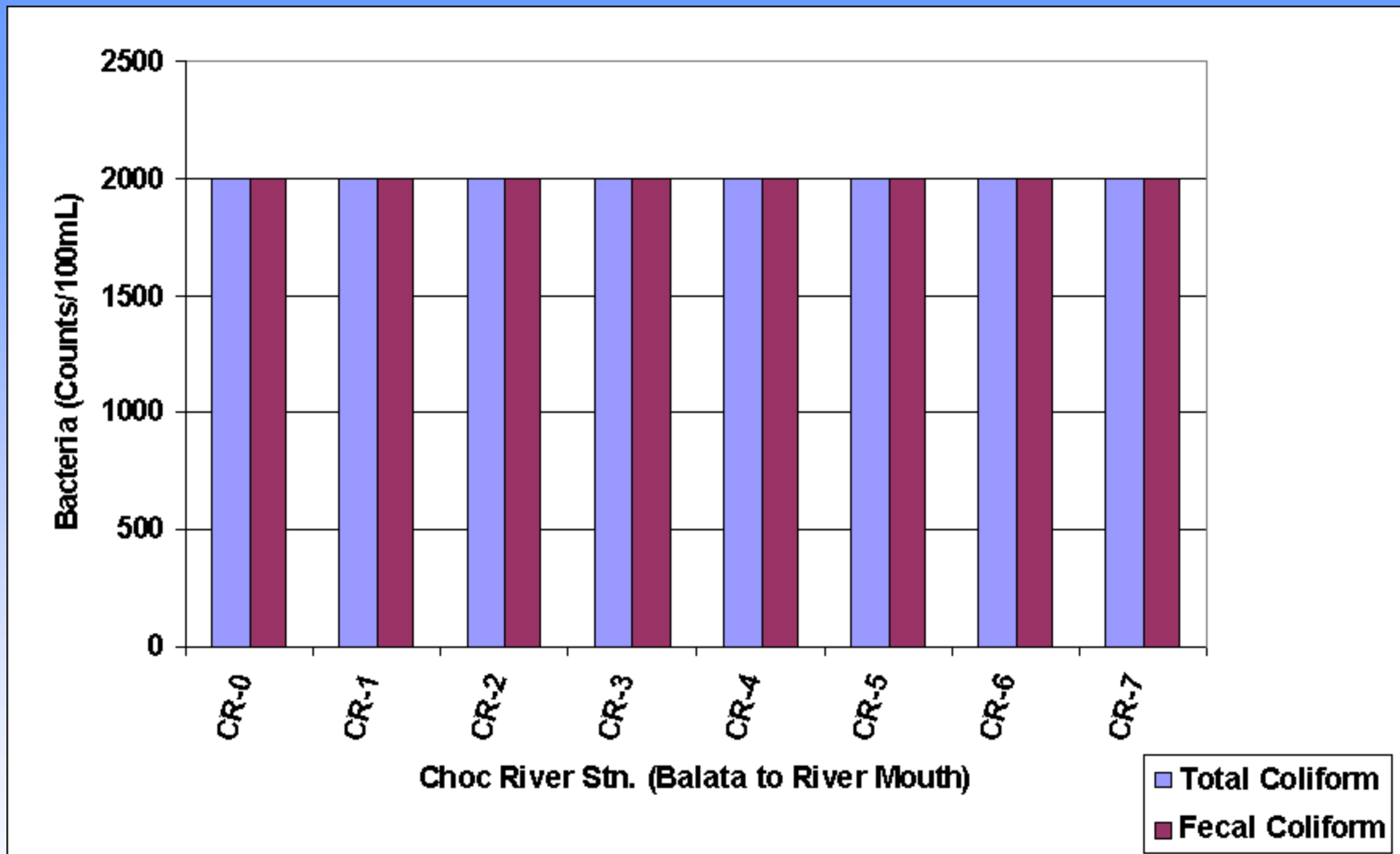
**RESIDENTIAL  
DEVELOPMENT**



**LEACHATE FROM  
OLD LANDFILL**

**EXAMPLE OF IMPACT  
SOURCES:**

**BACTERIA & NUTRIENTS**



## 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.**

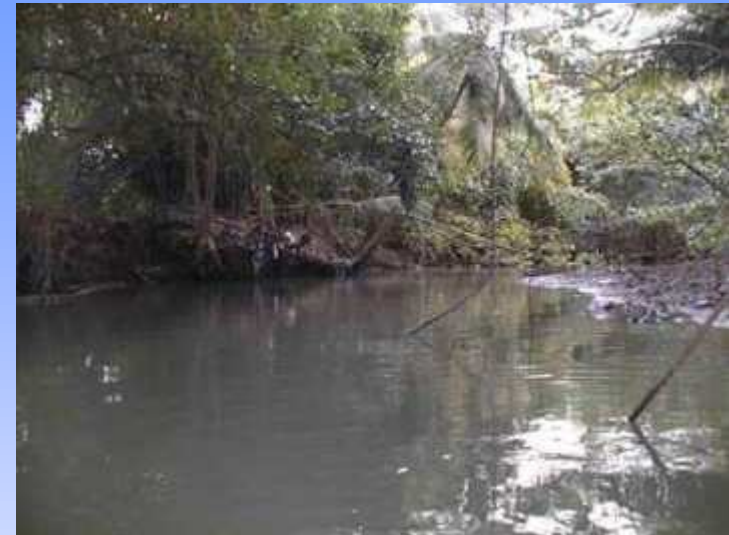
- ت **OPERATION & MAINTENANCE ISSUES.**

- **“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**