CARIBBEAN ENVIRONMENTAL HEALTH INSTITUTE

WHY TREAT WASTEWATER?

ENVIRONMENTAL, HEALTH AND LEGAL CONSIDERATIONS

The Importance of Effective Wastewater Treatment & Disposal – Benefits to Hotels

FORWARD

In September of 1997 the Caribbean Environmental health Institute (CEHI) signed a Memorandum of Understanding with the Regional Coordinating Unit of the Caribbean Environment Programme (CEP) of the United Nations Environment Programme (UNEP-CAR/RCU), to conduct a pilot project entitled "Demonstration of the Impact of Efficient Sewage Treatment Plant Operation on Nearshore Water Quality".

The objective of the project is twofold:

1. To promote efficient sewage treatment plant operation for hotels.

2. To improve/maintain recreational water quality in the hotel vicinity as it pertains to human health.

PROJECT ACTIVITIES

Three hotels on the West Coast of St. Lucia are working with CEHI in implementing the activities under the project which include:

1. Establishing the operational status of the sewage treatment plant at each hotel to include treatment efficiency and effectiveness, mechanical status, appropriateness of plant design, level of skill of plant operators, and assessment of operational/maintenance programme, if any.

2. Establishing the coastal water quality of the discharge area and recreational beaches in the vicinity of the hotels.

3. Recommending and implementing improvements to the treatment plants, including training of plant operators.

4. Monitoring the coastal water quality after implementation of improvements.

This booklet represents the proceedings of a seminar, which was held in St. Lucia to achieve one of the Project's Outputs.

INTRODUCTION TO CEHI

- Regional organization governed by the Ministers of Health of CARICOM
- Provides Technical/Advisory Services to 16 Member States in Environmental Health
- Collaborates with other regional agencies
- Provides consulting services to the private sector

INTRODUCTION TO WASTEWATER TREATMENT

TYPES OF WASTEWATER

- **Domestic Wastewater** (from homes, offices, hotels, institutions) comprises sewage (human waste)) and greywater from bathrooms, kitchens, laundries).
- **Industrial Wastewater** is the liquid discharge from manufacturing processes; for example soft drink and beer companies; sugar processing; metal processing; photo finishing.

WASTEWATER MANAGEMENT

- Generation
- Collection
- Treatment
- Disposal

WHY TREAT WASTEWATER??

- To remove organic and inorganic matter which would otherwise cause pollution
- To remove pathogenic (disease causing) organisms
- In order to protect:
  - ➔ The Environment
  - ➔ Human Health

IMPACTS OF ORGANIC AND INORGANIC MATTER ON MARINE ENVIRONMENT

- SEDIMENT
  - increases turbidity and blocks out sunlight
  - reduces the rate of photosynthesis
  - can smother nearshore habitats
- OXYGEN DEMANDING SUBSTANCES
  - high levels result in a reduction in the amount of available dissolved oxygen
- NUTRIENTS (Nitrogen & Phosphorus)
  - excessive algal growth leading to oxygen depletion and **eutrophication**

PATHOGENIC ORGANISMS

- Human Exposure through direct and indirect contact

- Some of the more common diseases associated with bathing in contaminated recreational waters or through consumption of contaminated sea food are swimmer's itch, gastro-enteritis, dermatitis, viral hepatitis, wound infections, cholera, typhoid fever, and dysentery.

THE CARIBBEAN PERSPECTIVE

- INCREASED GENERATION OF WASTEWATER
- MOSTLY ON-SITE SEPTIC TANK, SOAK-AWAY AND PACKAGE TREATMENT SYSTEMS USED
- 50% OF PACKAGE TREATMENT PLANTS ARE OPERATED BY THE TOURISM SECTOR
- SOME SEWERAGE SYSTEMS EXIST
- VERY MINIMAL STANDARDS
- LACK OF MONITORING AND REGULATION
- POOR OPERATIONAL STATUS OF TREATMENT PLANTS

POOR OPERATIONAL STATUS OF SEWAGE TREATMENT PLANTS
(BASED ON PAHO/CEHI 1991 STUDY OF 13 CARICOM COUNTRIES)

➔ 75% did not meet minimum standards

➔ Only 16 % of plants had certified operator, and 12% no operator at all

➔ 20% had full-time operators present

➔ 41% of plants had monitoring data available (5 countries)

➔ 33% of treated wastewater from hotels was discharged to marine environment

CAUSES OF POOR STATUS

- Use of technologies from the developed world which are installed without adaptation for the Caribbean
- Limited understanding of treatment processes and insufficient process monitoring
- Insufficient time and budget allocation for operation and maintenance
- Insufficient operational support

THE ST. LUCIAN SITUATION

a) Reflects regional situation

b) 1995 update indicated minimal change in status of treatment plants

c) Ongoing study of three hotels in St. Lucia confirms poor operational status of the treatment plant

BASELINE MONITORING IN THREE ST. LUCIAN HOTELS

FEB-APRIL 1998

- Coastal Water quality generally acceptable:
  - ➔ at all three beaches faecal contamination at high levels was detected in one sampling point.
- Plant effluent exceeding guideline values in all three cases

PLANT ASSESSMENTS IN THREE ST. LUCIAN HOTELS

- Plants were in need of design and/or operational improvement.
- For the most part the operators and their supervisors were untrained, or lacked understanding of the treatment processes.
- Information was mostly unknown or unavailable.
- Regular plant monitoring was not conducted.

LEGISLATIVE REQUIREMENTS AND GUIDELINES

- Most countries in the Caribbean have regulations relating to Sewage Treatment under their Public Health Act. Few, notably Jamaica and Trinidad & Tobago have sewage treatment and disposal standards.

- CEHI has developed Guidelines for the Region:
  - BOD[1] 20 mg/l
  - SS[2] 35 mg/l
  - Res. Cl_2 [3] 0.2 mg/l; FC 400/100 ml
  - FC[4]200/100 ml; Ent [5] <35/100ml

- Coastal Water Quality

1 Bio-chemical Oxygen Demand – measure of the strength of wastewater
2 Suspended Solids
3 Residual Chlorine
4 Faecal Coliforms – indicate the presence of disease causing bacteria
5 Enterococci – indicate the presence of disease causing bacteria

THE BENEFITS TO HOTEL MANAGEMENT OF WASTE WATER TREATMENT

SAVING THE ENVIRONMENT
OR
SAVING BUSINESS?

PROTECTING LONG TERM INVESTMENTS

- Protecting Natural & Cultural Resources
  - reefs
  - beaches
  - water supplies

- Full Cost Analysis:
  - Economic
  - Environmental
  - Social

BENEFITS OF GOOD ENVIRONMENTAL MANAGEMENT

- ➔ Protection of Long Term Investment
- ➔ Lower Operating Costs
- ➔ Added Value for Customers
- ➔ Compliance with Legislation

THE CARIBBEAN TRAVEL & TOURISM INDUSTRY...

➔ Employs 1 in every 4 jobs

➔ Generates 25.5% of the GDP of the region

➔ Earns US$13.2 Billion in export of services and merchandise

➔ Pays US$6.5 Billion in taxes

➔ Spends US$15.1 Billion in infrastructure

➔ Is dependent on a pristine attractions such as beaches, coral reefs, tropical forest, rare and exotic flora and fauna, warm climate, friendly people and quality hotels

➔ Represent 57% of the dive sites worldwide, 1.2 billion annually

ENVIRONMENTAL IMPACTS OF TRAVEL & TOURISM...

- Large draw on public infrastructure and utilities (electricity, water, sewage) which must be shared with local communities
- Discharge of untreated effluents into the environment in large quantities
- Massive import of goods to service the industry- excess packaging and waste
- Improper land use planning and poor designs of infrastructure systems

IMPACT ON THE COMMUNITY...

- Shortages in public utilities - (water rationing, brown outs)
- Ineffective hotel wastewater treatment plant, causing human health impacts.
- Rise in disposal costs for waste removal.

EFFICIENT SEWAGE TREATMENT PLANTS LOWER OPERATING COSTS

Environmental Effort = Reduced Consumption = Lower Operating Costs

ACTUAL SAVINGS

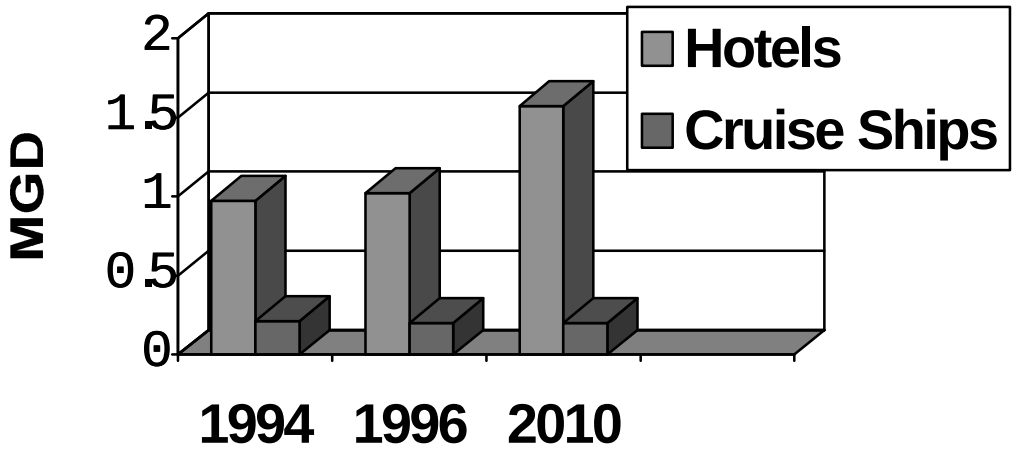
- InterContinental: Optional Towel Re-use Program instituted by Vienna Hilton & Vienna Plaza:
  - saved 164,000 kg of laundry each year

- Hilton Vienna: Reduced water consumption by 6.6%:
  - 610,866 cubic meters of water
  - US $855,000 dollars

INDUSTRY WATER CONSUMPTION PATTERNS

- There is an excessive use and demand for potable water in Caribbean nations.
- Loss in the infrastructure may be as high as 50%.
- Estimates show that consumption in the hotel sector is 3 to 4 times higher than that of domestic consumers.
- Average per capita per day consumption for hotels in Barbados is 678-liters/ capita/ day.

DAILY WATER DEMANDS



OPPORTUNITIES TO SAVE

➔ Linens & Towels Reuse Program

➔ Low Flow Showerheads, Faucets

➔ Low Flush Toilets and Dams

➔ Water Reclamation Systems

➔ Operational Procedures

LINENS & TOWELS PROGRAM

a) Easy to Implement

b) Reduces water, detergents, energy

c) Varying Approaches

d) Payback in less than one month

e) Cost: varies, less than US$2.00 per room

LOW FLOW SHOWERHEADS, FAUCETS AERATORS

1) Easy to install

2) Showerheads reduce water flow from 5 to 7 gallons per minute

3) Aerators reduce water from 2 or 3 gallons per minute to 1.5

COSTS & PAYBACK PERIOD

♦ Costs

Showerheads: $10 to $20 US each
Faucet Aerators: less than $1 US each

♦ Payback

Showerheads: 3 to 6 months
Faucet Aerators: 1 month

ADDED VALUE FOR VISITORS

- Guests expect companies to do what they can to help the environment
- Guests feel better when they are at hotels with environmental initiatives
- 78% of American travellers say that they are concerned about the environment
- 54% would stay at a hotel because of the hotel's efforts

TOUR OPERATORS

■ British Airway Holidays

- ✦ 12 out of 100 hotels audited “passed”
- ✦ La Source, Half Moon Golf & Tennis Club, Sans Souci Lido, Biras Creek, Sandals Resort, Le Sport, Casurina Beach Club, Galley Bay, Rex Grenadian, Club St. Lucia, Comfort Suites, Cambridge Beaches
- ✦ Recognized in 1998 catalog with “Tourism for Tomorrow” logo

■ TUI

- ✦ Waste water treatment, Waste Disposal, Water Conservation Measures, Energy Savings Measures, Environmental Information
- ✦ Year 2000 Recommended Destinations List

MARKETING FACTORS SUPPORTING WASTEWATER MANAGEMENT

➔ Customer Concern about health and quality

➔ EC Directive on Package Tours – Liability for vacation's stay rests with retailer

➔ Tour Operators Involved

➔ Ease of communication through Internet sites (CDC, Traveller's Advisory)

GENERAL TO DO'S

- ***Monitor production & consumption patterns, compare against benchmarks***
- ***Test technology before implementing throughout***
- ***Calculate costs and payback periods***
- ***Promote your efforts***

RECOMMENDATIONS TO HOTELS FOR ACHIEVING BEST PRACTICES IN WASTEWATER TREATMENT

➔ Have a specific budget designated for wastewater treatment.

➔ Consider your generation and collection needs:

a) Determine quantity and types of wastewater being generated.

b) Consider reducing the amount of water being used on the property, which would need to be treated.

c) Determine where waste streams originate.

d) Decide which waste streams will be treated and how untreated water will be reused or disposed of.

➔ Consider options for treatment:

- Get professional assistance in deciding on best method of treatment.
- Be familiar with all the necessary information and available technologies.
- Use as much as possible locally available material and equipment.
- Use appropriate technology.

➔ For Disposal:

- CEHI recommends that effluent should not be discharged to the aquatic environment.
- Re-use effluent for irrigation on grounds, golf-courses etc., or as water for flushing of toilets.
- Have a Sludge Disposal Programme
- Be familiar with legal and other guidelines for effluent quality

OPERATION AND MAINTENANCE OF A SEWAGE TREATMENT PLANT

A. Develop and implement a Preventative Maintenance Programme

B. Hire an external maintenance contractor

C. Train treatment plant and other maintenance personnel at ALL levels. In fact all staff should be aware of how their daily activities can affect the functioning of the treatment plant.

D. Make Operation & Maintenance Manuals available, or develop them if necessary.

MONITORING

- Ensure that daily, weekly and monthly monitoring programmes are in place.
- Staff should be familiar with them and trained to carry out monitoring.
- Have external monitoring done for verification.
- Develop a collaborative working relationship with regulatory officials.