NATIONAL WORKSHOP ON LAND-BASED SOURCES OF MARINE POLLUTION

IMPACTS OF POLLUTION FROM WASTE WATER TREATMENT SYSTEMS ON THE COASTAL & MARINE ENVIRONMENT

Terra Nova Hotel
Kingston, Jamaica, W.I.
January 15 - 16, 2008

Presented by:
National Water Commission

OVERVIEW

• Background
• Waste Water Treatment Systems
• Sewage Effluent Quality Standards
• Causative Factors & Impacts
• Challenges
• Recycling Potential

BACKGROUND

• The UN Millennium Development Goal - 2015
  Goal 7 - Ensure Environmental Sustainability
  Target 10 - ‘Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation’

• Progress (2002) - UNICEF-WHO
  - Half of developing world without improved sanitation approximately 2.6M
  - Latin America & Caribbean coverage ~ 75%

SEWAGE

• Major pollutant of coastal/marine Environment

• The amount of sewage reaching the sea/oceans is of great concern, because its content is:
  - Harmful to the ecosystems
  - Public Health Threat

• Contaminates surface & groundwater water supply sources

SOURCES OF SEWAGE

• THREE SOURCES

  ✓ Domestic: Residential
  ✓ Commercial: i.e. Abattoirs, Hotels i.e. FOG
  ✓ Industrial: i.e. Factories, Hospitals - medical waste e.g. human tissue/body parts

WASTE WATER TREATMENT

• Centralized Waste Water Treatment Facility
  - Stabilization Ponds/Lagoons Systems
  - Package Plants e.g. Oxidation Ditch.

  *Treated effluent is typically discharged to receiving surface water bodies*

• Onsite Treatment Facility
  - Septic Tanks, Absorption Pit, Tile Fields.
  *Treated effluent typically discharged Underground*
SEWAGE EFFLUENT QUALITY STANDARDS

Waste water is treated in accordance with NEPA/WHO Environmental Standards

- PH - 7.9
- TSS - 20mg/L
- BOD - 20mg/L
- COD - 100 mg/L
- Residual Cl - 0.5
- Phosphate - 4 mg/L
- Nitrate (Total Nitrogen) - 10 mg/L
- Faecal Coliform - 1000 MPN/100ml

CAUSATIVE FACTORS

- Un-sewered communities
- Aged Wastewater Treatment Facility
- Malfunctioning / Lack of Equipment
- Improperly designed Treatment Facility
- Overpopulation / Exceeded Loading capacity

CAUSATIVE FACTORS

- Improper connection to sewerage system
- Heavy rainfalls that overwhelm combined sewer/storm water systems
- Improper use of the facilities
- Vandalism/ Sabotage

CATEGORIES OF POLLUTANTS

- BIO-SOLIDS/ SLUDGE
  - Semi-solid by-products of the sewage treatment process
  - Historically, sludge in developed nations was disposed in coastal waters:
  - Sewage sludge is still being disposed of at sea in some countries.

- DOMESTIC GREY WATER
  Water from kitchen sinks, washing machines, washtubs and showers which generally undergoes no treatment. Usually flows from households to the closest drain or canal.

Eutrophication

Increased nutrients stimulate algae and other plant growth, light transmission decreases.

Eventually bacterial decay of algae and other plants lowers the dissolved oxygen level in the water.

Manifests as:
- Coastal Eutrophication
- Human-accelerated/ Cultural Eutrophication

Coastal Eutrophication

- Commonly observed in Estuaries, Bays & Marginal Seas.
- In extreme cases, all of the oxygen can be removed.

E.g. Halifax Harbour, Nova Scotia, Canada was still receiving a daily influx of raw sewage, creating serious ecological and public health concerns in 2002.
Human-accelerated/Cultural Eutrophication

Triggered by the inputs of sewage, sludge, fertilizers, or other wastes containing nutrients such as nitrogen and phosphorus.

• If not reversed, the entire coastal ecosystem will be changed.
  E.g. 'New York Bight in 1980's was completely dead'.
  Kingston Harbour, Jamaica*

IMPACTS - Groundwater Sources

• High nitrate content of receiving surface water & ground water
• Blue Baby Syndrome
• Treatment of high nitrate water content is expensive.

Consequently, some water production wells in the Liguanea Plain Area - Kingston retired.

IMPACTS - Fishery

• Seafood contaminated by sewage-related pathogens threaten public & animal health.
• Affects the economic livelihood of fisher folks
• Affects tourism

IMPACTS - Human/Public Health

• High microbe concentrations into the receiving ocean.
• Human diseases can be caused by waterborne pathogens that contact the skin or eyes;
• Or are ingested when water is accidently swallowed;
• Or from food borne pathogens found in fish and shellfish consumed as seafood.
  E.g. Savannahamar, Westmoreland

IMPACTS - Beach pollution

• High levels of disease-causing microbes found in the coastal water.

• Swimming advisories and beach closings are experienced.

• Recreational activities are impacted.
IMPACTS - Coral Reefs

Daily release of large volumes of sewage at specific locations can lead to decline in salinity & subsequent denegation of corals

- Corals are like trees of a forest. Loss of coral cover leads to a decline in marine life - fish and shellfish populations, loss of beach and shoreline protection.

CHALLENGES

- High investment/capital, O&M costs
  - NWC's Action Plan to NEPA - JM$1.5B
  - Soapberry Phase I - US$40.0M

- Tariff not adequate to cover Capital, O&M costs

- Cultural barriers - reuse/recycling of effluent

- Inherited Aged/old systems 75% > 30 years old
  - 'Kingston sewerage system old as the City > 100Yr old'

- Systems are appended to H/S are of varying treatment types.

REUSE POTENTIAL

- Agricultural
  - Irrigation i.e. Sugar Plantations
  - Sludge - Soil conditioning

- Industrial
  - Power generation - JPSco Plant Montego Bay

THANK YOU!!