

Caribbean Regional Conference

Water Loss 2023

**Environmental Concerns associated
with Non-Revenue Water**

Sammy, Arjoon and Gopaul

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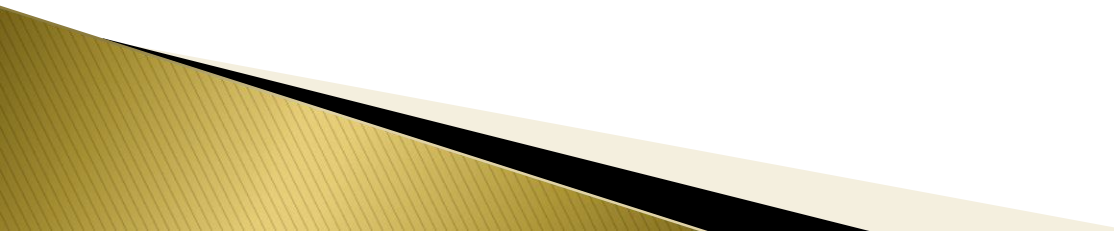
Impact Assessment Concepts

Environmental Impact Assessment (EIA) is a planning tool which seeks to incorporate environmental considerations into decision-making by predicting impacts on a scientific basis and prescribing mitigation measures.

Originally, the scope of Impact Assessment was limited to the Natural Environment (Physical Environment and Ecology), but it now includes the Human Environment.

Impact Assessment Concepts

Nature and Scope of this Paper:

- ✓ Conducted at the level of an Environmental Scoping Study; that is, based on available information without conducting original data-collection or quantification of impact.
 - ✓ Addresses Potential Impacts on the Natural and Human Environments.
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Water Supply in T & T (2019)

- 371 million cubic meters per year,
 - ✓ 56% from Surface Sources,
 - ✓ 25% from Ground Water Sources, and
 - ✓ 19% from Desalination.
- Distribution System,
 - ✓ 7,000 km of Water Mains,
 - ✓ 95 Pump Stations, and
 - ✓ 34 Service Reservoirs.
- WASA estimates its NRW at 53%

Water Sources: Dams and Reservoirs



River Intakes



Wells and Wellfields



Water Rates in T & T

- 431,000 customers, of which <5% of premises were metered (2019).
- Generally, Water Rates are based on Annual Ratable Value of Properties, NOT water use.
- Therefore, a case can be made that wastage of water within customer premises is NRW. This may bring NRW to 67%, requiring three times water production as beneficial use.

Potential Impacts on the Natural Environment

Soil Erosion

- Sizeable pipe breaks can rapidly erode surrounding soil. Smaller leaks can saturate soil thereby increasing its erosion potential.

Impacts of Silt on Streams/Rivers

- Entry of silt and contaminants in streams will also result in negative impacts to aquatic life.

Chemical Sludge Impacts

- Improper storage and disposal of chemical sludge generated from water treatment can impair the use of the receiving environment.
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Potential Impacts on the Natural Environment

Ground Water Depletion

- Over-extraction can result in lowering of the water table.

Alteration of Marine Currents

- Pumping of sea water through intake wells for desalination and the release of brine back into the sea can alter the movement of sediments within the area resulting in accretion or shoreline erosion.

Habitat Alteration in Streams/Rivers

- Abstraction of fresh water from streams reduces water flow downstream. This can negatively impact aquatic flora and fauna.

Potential Impacts on the Natural Environment

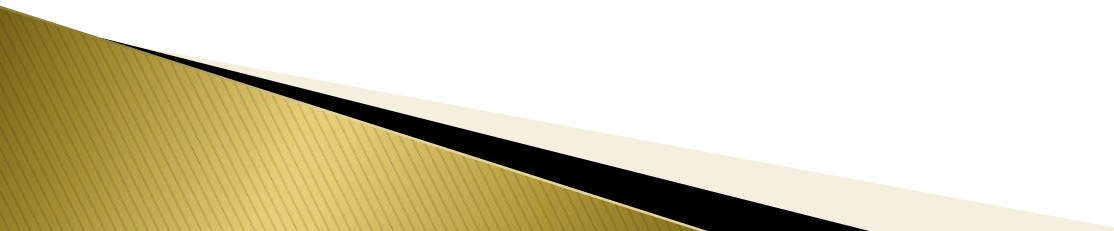
Impacts to Sea Water Quality and Marine Ecosystems

- Brine generated as a by-product of desalination increases water temperature and salinity. This decreases the dissolved oxygen content which negatively affect marine plants and animals.

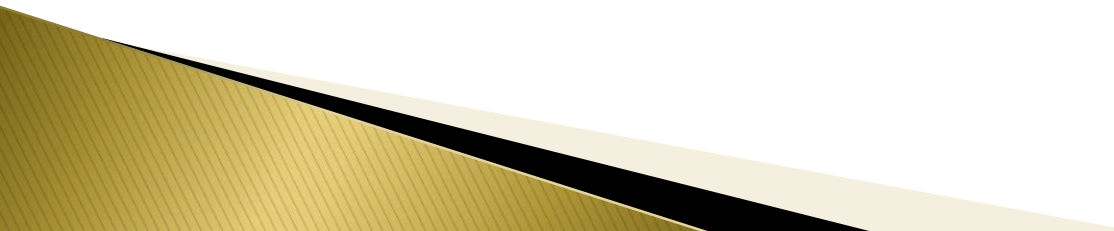
Increased Carbon Footprint

- Increased operation of water treatment equipment and pumps at WTPs and DPs to produce and transmit surplus volumes of treated water due to the high percentage of water loss leads increases the emission of air contaminants including greenhouse gases.

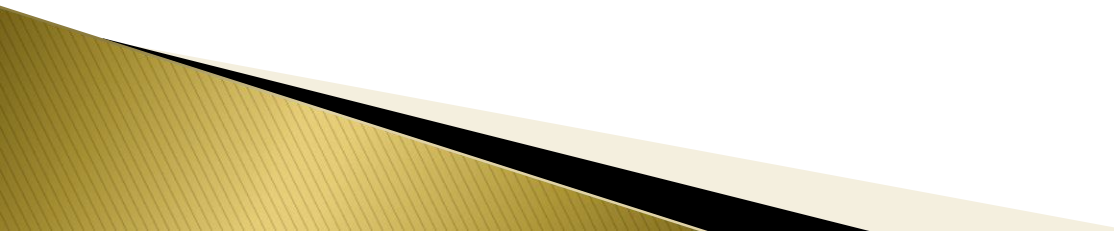
Potential Impacts on the Human Environment

- ✓ Financial Losses by WASA,
 - ✓ Unreliable Water Supply,
 - ✓ Damage to Roads,
 - ✓ Damage to Buildings,
 - ✓ Damage to Vehicles, and
 - ✓ Traffic Congestion / Loss of Access.
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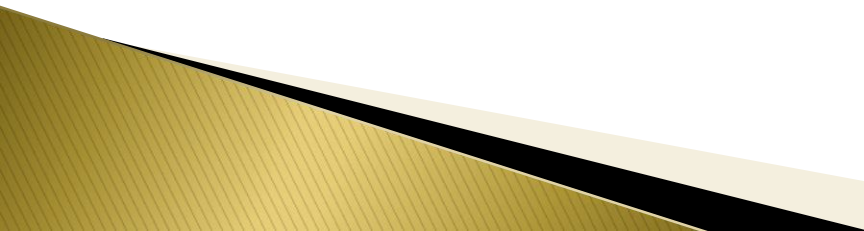
Mitigation Measures: Management Measures

- ✓ Work toward a Water Rate System based on Water Use (Metering);
 - ✓ Establish Causes of Leaks, even as they are repaired; and
 - ✓ Establish a system of Routine Inspections of Right-of-Ways for Larger Pipelines.
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Mitigation Measures: Design Measures

- ✓ Select pipe materials (ductile iron, PVC, etc) and wall thicknesses based on anticipated loads;
 - ✓ Avoid use of Above Ground PVC Pipes; and
 - ✓ Use Energy-efficient Equipment and Solar Power at Water Treatment Plants and Desalination Plants, where practical.
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Mitigation Measures: Operation Measures

- ✓ Set and Adhere to Extraction Limits for Surface Water and Ground Water;
 - ✓ Control Pumping Pressures and Surges at Source;
 - ✓ Study Reports of Pipe Failure Causes and Establish Trends; and
 - ✓ Develop a Schedule for Pipe Replacements based on Age and Frequency of Repairs.
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Conclusions

- 1) The environmental concern related to Non-Revenue Water (NRW) is not limited to the uncompensated cost of wastage. There are other potential adverse impacts to the natural and human environments which increase the importance of reducing NRW, even if it is not practical to eliminate it altogether.

Conclusions

- 2) Potential adverse impacts are sufficiently significant that they should be assessed whenever:
- ✓ Water Supply Projects are being Conceptualized,
 - ✓ New Water Supply Systems must be Installed,
 - ✓ Existing Water Supply Systems must be Replaced or Upgraded, and
 - ✓ Public Education Campaigns are being Planned.
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