



# ANNUAL REPORT 2015







## VISION

**(Strategic Plan 2010-2014)**

*“To lead Trinidad and Tobago in attaining and managing environmentally healthy and sustainable communities and ecosystems”*

## MISSION

The Environmental Management Authority is committed to protecting, restoring and conserving the environment to improve the quality of life by promoting:

- ✓ Environmentally responsible development
- ✓ A culture of care for the environment
- ✓ Development and enforcement of environmental legislation
- ✓ Use of economic, financial and other incentives

This is to be achieved in an atmosphere of mutual respect, professionalism, accountability, transparency, collaboration and social responsibility.



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Environmental Management Authority

2015 Annual Report

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Water Quality in Trinidad and Tobago

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## MESSAGE FROM THE CHAIRMAN

This year's **ASOER (Assessment of the State of the Environment Report)** focuses on water quality in T&T (Trinidad & Tobago). We acknowledge the detrimental impacts water pollution can have on human health and the environment. Therefore, T&T should have management strategies tailored for the protection of all freshwater and marine environments. In addition to its regulatory programme, the EMA (Environmental Management Authority) has identified other water pollution management plans. The overall objectives of these plans are to control, reduce and prevent water pollution from point and non-point sources discharges. This goal is a target defined in the 2030 Agenda for Sustainable Development adopted by the UN (United Nations) General Assembly in September 2015.

However, water quality remains under threat from non-point sources of pollution such as, seepage from landfills and land surface runoff from industrial and agricultural activities. The EMA commenced the **Development of the Ambient Water Quality Standards Project** to protect water bodies through the identification of the usage of the waters and any designated use. The goals of the project are to identify water quality indicators to measure the health of the watersheds, through the identification of changes and trends in the water parameters.

In 2015, T&T's marine environment experienced several threats. Beaches experienced an influx of massive amounts of brown seaweed (macroalgae) known as *Sargassum*. Additionally, there were recorded a number of fish kills throughout the year. Both occurrences were attributed to the effects of climate change, fluctuation in oxygen levels and an indication of the presence of heavy metal pollution of the marine environment.

The EMA also celebrated its 20<sup>th</sup> Anniversary and with it, came a renewed perspective that the ASOER will reflect societal conditions through environmental indicators. This report pioneers a more concise and standardised format on the environmental aspect of water quality. It is hoped that successive reports will present standardised indicators across all environmental aspects (water, air, biodiversity, natural resources) which will allow for a better inter-annual comparison and assessment of environmental trends, over time.

**Nadra Nathai-Gyan**  
**Chairman of the Board**  
**August 2017<sup>1</sup>**

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<sup>1</sup> Please Note: This 2015 Annual Report was reviewed by the Chairman and the Board of Directors, who were appointed in July, 2016.

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### QUICK FACTS ON THE EMA

- ✓ The EMA was established by Parliament in 1995 through the enactment of the Environmental Management Act, 1995. It was later repealed and re-enacted in 2000 by the Environmental Management Act, Chap. 35:05.
  - ✓ Major functions of the EMA include:
    - ❖ Promoting a better understanding and appreciation of the environment;
    - ❖ Encouraging the integration of environmental concerns into private and public decision-making;
    - ❖ Coordinating efforts among the various institutions with responsibility for the environment to establish an integrated environmental management system designed to protect, enhance and conserve the environment;
    - ❖ Developing and implementing laws, policies and programmes to promote sustainable development, achieve economic growth and meet international obligations;
    - ❖ Enhancing the legal, regulatory and institutional framework for environmental management.
  - ✓ The EMA prepares an annual report containing an assessment of the state of the environment, which is intended to:
    - ❖ Provide a foundation for improved decision-making at all levels;
    - ❖ Increase awareness and understanding of environmental trends and conditions;
    - ❖ Facilitate the measurement of key indicators that monitor progress of the pace and direction towards enhancing positive, or mitigating negative, observed conditions and trends and show progress made in achieving targets of the Sustainable Development Goals.
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This 2015 ASOER is prepared in fulfilment of Section 14(1)(a) of the EM Act (Environmental Management Act, Chap. 35:05) and forms part of the EMA's Annual Report.

### **ACKNOWLEDGEMENTS**

The 2015 ASOER was written and edited by the following team: Elizabeth Sumadh, Ryan Assiu, Christiana Newling, Hayden Romano, Xiomara Chin, Wayne Rajkumar, Vidjaya Ramkhalawan, Lorraine Maharaj, Anita Ramdial and Nisha Ramsahai.

The EMA is also grateful for the support and guidance of its technical staff and the contributions made by the IMA (Institute of Marine Affairs) to this report.

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## Contents

PART A: ASSESSMENT OF THE STATE OF THE ENVIRONMENT REPORT (ASOER) .....	5
1.0 MAJOR THREATS TO WATER QUALITY IN TRINIDAD AND TOBAGO .....	7
Activities Impacting Water Quality .....	7
Impacts of Anthropogenic Activities to the Environment .....	11
2.0 AGREEMENTS AND LEGISLATION .....	18
International Agreement - United Nations Sustainable Development Goals .....	18
Regional Agreement - Land-Based Sources and Activities Protocol.....	18
Local Policy – National Environmental Policy.....	19
Local Legislation - The Water Pollution Rules (WPR), 2001 (as amended) .....	20
3.0 WATER QUALITY DATA ANALYSIS .....	25
Analysis of Source Registration Data.....	26
Analysis of Water Pollution Permit Data .....	35
Analysis of Coastal and Nearshore Water Quality .....	38
Addressing the Limitations of the Water Pollution Rules .....	39
4.0 ASOE 2015 SPOTLIGHT: Development of Ambient Water Quality Standards (AWQS) for T&T .....	41
5.0 THE WAY FORWARD .....	47
National Water Quality Indicators .....	47
Water Pollution Management Solutions.....	51
PART B: ACTIVITIES, ACCOMPLISHMENTS AND GOALS OF THE EMA .....	53
PART C: ENVIRONMENTAL TRUST FUND AUDITED FINANCIAL REPORT FOR THE YEAR ENDED 30 SEPTEMBER 2015	69
PART D: FINANCIAL ASSISTANCE OR OTHER REPORT .....	99

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## LIST OF FIGURES

Figure 1: Oil Spills on the Southwest Coast of Trinidad .....	9
Figure 2: Sargassum Seaweed in Lovers Bay, Speyside, Tobago .....	12
Figure 3. Fish Kills on the Southwest Coast of Trinidad .....	14
Figure 4. Map Showing the Locations of Facilities with a Source Registration Certificate According to Facility Type for the Period 2007 – 2015 .....	22

Figure 5. Map Showing the Locations of All Watersheds in Trinidad and the Five Watersheds Highlighted for Analysis .....	25
Figure 6. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POCs Based on Facility Type within the Guapo Watershed .....	28
Figure 7. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POC Based on Facility Type within the Point Lisas Watershed .....	29
Figure 8. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POCs Based on Facility Type within the Port of Spain Watershed .....	30
Figure 9. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POC Based on Facility Type within the South Oropouche Watershed .....	31
Figure 10. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POC Based on Facility Type within the Arima Watershed .....	32
Figure 11. Locations of 35 Offshore Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Graph of the POC .....	33
Figure 12. Map of Tobago Showing the Facility Locations with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POC Based on Facility Type .....	34
Figure 13. Locations of Facilities with a Permit and those with a Pending Status between 2009 and 2015 .....	35
Figure 14. Graphs of the Average Daily Loads (kg/m <sup>3</sup> /day) of Five (5) Parameters Discharged by Seven (7) Facilities in the East Port of Spain Area with WPPs Issued between 2011 and 2015 .....	36
Figure 15: Quality of Coastal & Nearshore Waters Around T&T .....	38
Figure 16. Maps Showing Locations of Source Registered and Potential Water Pollutant Sources for Trinidad and Tobago between 2007 and 2014 .....	40
Figure 17. Map Showing Current Water Uses in the 54 Watersheds in Trinidad. ....	42
Figure 18. Map Showing Current Water Uses in the 15 Watersheds in Tobago .....	43
Figure 19. Map Showing the Location of the Arima Watershed in Trinidad and Sampling Points for Phase II of the Project .....	45
Figure 20. Map Showing the Location of the Courland Watershed in Tobago and Sampling Points for Phase II of the Project .....	46
Figure 21: Environmental Indicator Case Study for the Caroni Swamp .....	48
Figure 22. Diagram Showing the Factors Affecting the Biological Conditions of Aquatic Resources. ....	51
Figure 23: CEC Unit's Key Statistics 2014 vs 2015 .....	54

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## LIST OF TABLES

Table 1: Oil Spills Occurring in T&T in 2015 .....	13
Table 2. Fish Kill incidents reported in Trinidad and Tobago in 2015 .....	14

Table 3. Table Listing All Pollutants in the Water Pollution Rules, 2001 (as amended) and its Impacts. ....	15
Table 4. The Register of Water Pollutants as Listed in the First Schedule of the WPR .....	21
Table 5. The Permissible Levels of Parameters as Listed in the Second Schedule of the WPR .....	24
Table 6: Applications & Permits under the WPR for 2015.....	53

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## LIST OF ACRONYMS

APR (Air Pollution Rules)  
 ASOER (Assessment of the State of the Environment Report)  
 AWQS (Ambient Water Quality Standards)  
 BCB (Beverage Container Bill)  
 BCCP (Beverage Container Clean-up Project)  
 BOD (Biological Oxygen Demand)  
 BTEX (benzene, toluene, ethylbenzene, xylene)  
 Cartagena Convention (Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Area)  
 CCPU (Climate Change Program Unit)  
 CEC (Certificate of Environmental Clearance)  
 CEPA (Communications Education Public Awareness)  
 COD (Chemical Oxygen Demand)  
 DOC (Dissolved Oxygen Content)  
 EAPC (Environmental Audit Programme Certificate)  
 EIAs (Environmental Impact Assessments)  
 EM Act (Environmental Management Act, Chap. 35:05)  
 EMA (Environmental Management Authority)  
 EPU (Environmental Police Unit)  
 ERI (Emergency Response & Investigations)  
 ESAs (Environmentally Sensitive Areas)  
 ESS (Environmentally Sensitive Species)  
 FAO (Food & Agriculture Organization)  
 FEE (Foundation for Environmental Education)  
 FFOS (Fishermen and Friends of the Sea)  
 GCF (Green Climate Fund)  
 GFEU (Green Fund Executing Unit)  
 GIS (Geographic Information System)  
 GOP (Gulf of Paria)  
 GORTT (Government of the Republic of T&T)  
 ICS (Incident Command System)  
 IDB (Inter-American Development Bank)  
 IMA (Institute of Marine Affairs)  
 IMS (Information Management System)  
 INDC (Intended Nationally Determined Contributions)  
 IWRM (Integrated Water Resource Management)  
 LBSAP (Land-Based Sources and Activities Protocol)  
 LBSs (Land-based Sources)  
 MALF (Ministry of Agriculture, Land and Fisheries)

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MEEI (Ministry of Energy & Energy Industries)  
MNS (Ministry of National Security)  
MOU (Memoranda of Understanding)  
MOW (Ministry of Works)  
MPHE (Ministry of Planning, Housing & the Environment)  
MTBE (methyl tert-butyl ether)  
NCCC (National Climate Change Committee)  
NCCP (National Climate Change Policy)  
NCCTF (National Climate Change Trust Fund)  
NEP (National Environmental Policy)  
NORs (Notice of Refusals)  
NOVs (Notices of Violation)  
NPCR (Noise Pollution Control Rules, 2001)  
NPS (Non-Point Sources)  
NRCSWLP (National Restoration Carbon Sequestration Wildlife and Livelihoods Project)  
PAHs (Polycyclic Aromatic Hydrocarbons)  
PMCHSE (Permit Monitoring, Complaints & HSE) Unit  
PMU (Project Management Unit)  
POCs (Pollutants of Concern)  
POPs (Persistent Organic Pollutants)  
PSB (Police Surveillance Bays)  
PSIP (Public Sector Investment Programme)  
Public Education Unit (PEU)  
RAMP (Regional Aquatic Monitoring Program)  
RFEs (Requests for Enforcement)  
RSWCP (Recyclable Solid Waste Collection Programme)  
SDGs (Sustainable Development Goals)  
SHH (Sir Solomon Hochoy Highway)  
SPE (Society of Petroleum Engineers)  
SR (Source Registration)  
SRL (Synergy Resources Limited)  
STRAR (Strategy & Research Unit)  
T&T (Trinidad & Tobago)  
TPHs (Total Petroleum Hydrocarbons)  
TSS (Total Suspended Solids)  
TTBS (Trinidad & Tobago Bureau of Standards)  
TTPS (Trinidad & Tobago Police Service)  
TTS (Trinidad & Tobago Standard)  
UAA (Use Attainability Analysis)  
UBH (Uriah Butler Highway)  
UN (United Nations)  
UNFCCC (United Nations Framework Convention on Climate Change)  
USEPA (United States Environmental Protection Agency)  
UTT (University of Trinidad & Tobago)  
UWI (University of the West Indies)  
WASA (Water & Sewerage Authority)  
WGIS (Water & GIS Unit)  
WPP (Water Pollution Permitting)  
WPR (Water Pollution Rules, 2001 (as amended))  
WRA (Water Resources Agency)

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## PART A: ASSESSMENT OF THE STATE OF THE ENVIRONMENT REPORT (ASOER)

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### EXECUTIVE SUMMARY

The 2015 ASOER focuses on water quality in T&T. The WPR (*Water Pollution Rules, 2001 (as amended)*) was enacted by the EMA as a means of managing water pollution from point sources. The ultimate goal of the WPR is for the reduction in the volume and concentration of pollutants discharged by industries in their wastewater, thereby improving the overall quality of water in the nation's rivers, estuaries, ground water and seas. The Source Registration and Water Pollution Permitting processes require all facilities with point source effluent discharges to comply with the WPR. This report discusses major threats to water quality in T&T and its possible solutions; analyses data collected from the implementation of the WPR processes and provides information on point sources of pollution; as well as highlights work being done to develop AWQS (Ambient Water Quality Standards) for T&T.

Based on an analysis of Source Registration data for the period 2007–2015, the parameters of concern discharged by facilities are as follows: oil and grease and dissolved hexavalent chromium in the Guapo watershed; petroleum hydrocarbons and total suspended solids in the Point Lisas watershed; phosphorus in the Port of Spain watershed; chloride in the South Oropouche watershed; ammoniacal nitrogen in the Arima watershed; total residual chlorine and faecal coliforms from offshore facilities and lead and ammoniacal nitrogen from facilities in Tobago. Data analysis of Water Pollution Permit applications was conducted for seven (7) facilities in the East Port of Spain area. The pollutants in the discharges in this area between 2011 and 2015 mostly show a general decrease as they achieve compliance with the WPR.

Acknowledging the detrimental impacts water pollution can have on human health and the environment, T&T must have management strategies tailored to the protection of all fresh water and marine environments. In addition to the regulatory programme, the EMA has identified other water pollution management plans with the overall objective to control, reduce and prevent water pollution from point and non-point sources discharges into the waters of T&T. The benefit to be derived for meeting this medium to long-term objective would be the improvement and maintenance of good quality water that would support present and future generations. This goal is a target defined in the 2030 Agenda for Sustainable Development adopted by the UN General Assembly in September 2015. The Agenda defines 17 SDGs (Sustainable Development Goals) and 169 targets to stimulate action in areas of critical importance for humanity and the planet. The targets for water are stated in Goals 6 and 14 of the Agenda. The EMA has commenced a project to develop ambient water quality standards with the goal of protecting a water body depending on the uses that it supports and to identify water quality indicators to measure the health of the watersheds through the identification of changes and trends in water parameters.

June 2015 marked the 20<sup>th</sup> anniversary of the EMA and with it, a renewed perspective of the ASOER that will reflect societal conditions through environmental indicators. This report pioneers a more concise and standardized format on the environmental aspect of water quality. It is hoped that successive reports will present standardized indicators across all environmental aspects (water, air, biodiversity, etc.) allowing better inter-annual comparability and assessment of trends over time.



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## INTRODUCTION

The topic of water presents quite the environmental paradox. It is the most abundant natural resource on earth, covering 71 percent of the earth's surface, yet water scarcity poses a significant threat to over two-thirds of the human population for at least one (1) month per year<sup>2</sup>. The crux of the dilemma lies not in the absolute volume of water; but rather in its quality. Some 97 percent of the earth's water is saline and unsuitable for direct human consumption or agricultural use and of the remaining three (3) percent that constitutes 'fresh water', two-thirds is stored in glaciers and the other is accessible in ground and surface waters<sup>3</sup>. This final one (1) percent of accessible fresh water is then subjected to an array of natural and anthropogenic activities that introduce a number of biological, physical and chemical pollutants. In this context, the importance of water quality management, particularly of fresh water, is evident if we are to safeguard human health and the environment for future generations.

The quality of water refers to its suitability for a particular use based on its biological, physical and chemical characteristics. For instance, high levels of suspended particulate solids may merit the distinction of water being of 'poor quality' for recreational use but may be regarded as 'suitable' for irrigation purposes. The suitability of water for any designated use is determined by the measurement of its parameters and its acceptable levels according to water quality standards. Through the enactment of the WPR, T&T has set end of pipe standards for point source discharges. However, water quality remains under threat from non-point sources of pollution such as seepage from landfills and land surface runoff from industrial and agricultural activities. As such, the EMA is in the process of developing ambient water quality standards.

In September 2015, the UN introduced the 2030 Agenda for Sustainable Development which comprised of 17 SDGs. The objective of this concept is "to produce a set of universally applicable goals that balances the three dimensions of sustainable development: environmental, social, and economic"<sup>4</sup>. Of particular relevance to water pollution is SDG 6 – "*Ensure available and sustainable management of water and sanitation for all*", and in particular for this report, target 6.3 – "*By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated waste water and substantially increasing recycling and safe reuse globally.*" This ASOER serves as an indicator of T&T's progress towards this SDG by featuring information gathered from the implementation of the WPR to date, including the challenges faced; presenting current work by the EMA to establish ambient water quality standards; and introducing the future step of creating water quality indicators for the country.

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<sup>2</sup> United States Geological Survey. (2015). How much water is there? Retrieved from <http://water.usgs.gov/edu/earthhowmuch.html>

<sup>3</sup> Ibid.

<sup>4</sup> United Nations Development Programme. (2015). A New Sustainable Development Agenda. Retrieved from <http://www.undp.org/content/undp/en/home/sdgooverview/>

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## MAJOR THREATS TO WATER QUALITY IN TRINIDAD AND TOBAGO

Water systems can be broadly categorized into two distinct groups: 1) fresh water systems that include both ground water and a variety of surface waters (rivers, streams and lakes) or 2) marine systems that include the nearshore coastal and deep water environments. The primary distinction between the two is that fresh water tends to naturally have lower concentrations of dissolved salts. Human activities that impact fresh water systems invariably contribute to the decline of marine systems since fresh water systems, for the most part, drain into the marine environment. Nevertheless, each can still be subject to distinct activities that introduce unique threats to the biological and socio-economical sustainability of the system.

### Activities Impacting Water Quality

#### Agricultural Activities

Roughly 10.5% of the land in T&T is dedicated to agriculture<sup>5</sup>. The clearing of land, especially via slash and burn, threatens water quality in two ways. Firstly, by removing natural vegetation and damaging the integrity of the soil, thereby reducing its ability to effectively filter water before it percolates into ground water. Secondly, denuded lands are more prone to erosion, adding to increased suspended sediments in surface waters. Agricultural practices on the slopes of the Northern Range are prime examples of this<sup>6</sup>. Agri-chemicals used on crops and livestock or in agro-processing can contribute to elevated levels of phosphorus, nitrogen, pathogens, metals and pesticide chemicals in surface and ground waters<sup>7</sup>. Agricultural activities occur throughout the country including adjacent to, and within, coastal wetlands.

#### Commercial Activities

For commercial facilities in T&T, the extent of contamination emanating from it varies with its type. For instance, gas stations may introduce petroleum compounds into surface waters due to run-off or leaks in underground storage tanks<sup>8</sup>. Leachate from sawmills has significant impact on five-day BOD (Biological Oxygen Demand), phosphates, nitrates, turbidity and pH as well as introduces resin acids, lignins and tannins to surface waters<sup>9</sup>.

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<sup>5</sup> The World Bank. (2015). Agricultural Land. Retrieved from <http://data.worldbank.org/indicator/AG.LND.AGRI.ZS>

<sup>6</sup> Wesley, F. (2009). Water Pollution in the Republic of Trinidad and Tobago. Retrieved from <https://www.scribd.com/doc/18541816/Water-Pollution-in-the-Republic-of-Trinidad-and-Tobago>

<sup>7</sup> Food and Agricultural Organization of the United Nations. (1996). Control of water pollution from agriculture - FAO irrigation and drainage paper 55. Retrieved from <http://www.fao.org/docrep/w2598e/w2598e04.html>

<sup>8</sup> Wesley, F. (2009). Water Pollution in the Republic of Trinidad and Tobago. Retrieved from <https://www.scribd.com/doc/18541816/Water-Pollution-in-the-Republic-of-Trinidad-and-Tobago>

<sup>9</sup> Arimoro, F.O., Ikomi, R.B. & Osalor, E.C. (2006). The Impact of Sawmill Wood Waste on the Water Quality and Fish Communities of Benin River, Niger Delta Area, Nigeria. *World Journal of Zoology* 1(2): 94-102.

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### Manufacturing Activities

There are over 200 manufacturing facilities operating in T&T which contributed approximately TT\$7.63 billion to the economy in 2015<sup>10</sup>. T&T produces a wide range of locally manufactured goods including products for the food and beverage sector, tobacco products, chemicals, printing and packaging, wood, aggregates and cement<sup>11</sup>. As such, a variety of pollutants can be expected depending on the product being made. For example, some pollutants of concern discharged from food facilities include nitrogen, BOD, chlorine and an increase in TSS (Total Suspended Solids)<sup>12</sup>. Furthermore, effluent from beverage manufacturing facilities may alter water temperature, pH, calcium, magnesium and dissolved oxygen<sup>13</sup>.

### Mining Activities

In T&T, minerals are predominantly extracted for construction and infrastructural development. In 2013, an estimated six (6) million cubic yards of material was removed in T&T<sup>14</sup> – in context, is enough to fill the Hasely Crawford Stadium approximately six (6) times. Throughout quarry operations, physical and chemical pollutants may be introduced into surface and ground waters reducing their water quality. Material washing and erosion of stockpiles contribute to elevated levels of suspended sediment concentrations and metallic ions such as iron, manganese and chromium<sup>15</sup> in surrounding surface waters. Chemical additives, such as acrylamide which is used to remove fine particles from aggregate may also enter the environment<sup>16</sup>. Where mining pits go beneath the watertable there is an increased risk of nitrate and faecal coliform contamination of ground water<sup>17</sup>. In southwest Trinidad where oil sands are quarried as an asphaltic concrete substitute, PAHs (Polycyclic Aromatic Hydrocarbons) may also be found in surface waters<sup>18</sup>. Thus, the level of contributions of PAHs from mining activities and those that are naturally occurring is uncertain.

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<sup>10</sup> Trinidad and Tobago Manufacturers' Association. (2015). Brief on Manufacturing 2015. Retrieved from <http://www.ttma.com/business-development/facts-about-manufacturing/>

<sup>11</sup> The National Export Facilitation Organization of Trinidad and Tobago. (2013). Manufacturing in Trinidad and Tobago. Retrieved from <http://www.exportt.co.tt/node/77>

<sup>12</sup> [United Nations Industrial Development Organization](http://www.unido.org/fileadmin/import/32129_25PollutionfromFoodProcessing.7.pdf). (n.d.). Pollution from Food Processing Factories and Environmental Protection. Retrieved from [http://www.unido.org/fileadmin/import/32129\\_25PollutionfromFoodProcessing.7.pdf](http://www.unido.org/fileadmin/import/32129_25PollutionfromFoodProcessing.7.pdf)

<sup>13</sup> Imoobe, T.O.T. & Koye, P.I.O. (2011). Assessment of the Impact of Effluent from a soft drink processing factory on the physio-chemical parameters of the Eruvbi Stream Benin City, Nigeria. *Bayero Journal of Pure and Applied Sciences* 49(1): 126-134.

<sup>14</sup> Government of the Republic of Trinidad and Tobago. (2016). "Quarrying" Ministry of Energy and Energy Industries. Retrieved from <http://www.energy.gov.tt/our-business/aggregates/quarrying/>

<sup>15</sup> Corches, M.T., Lato A & Lato K. (2013). Impact of open pit gravel extraction from Sebes, Alba County, on soil Fertility. *Research Journal of Agricultural Science* 45(4).

<sup>16</sup> Guezennec, A.G., Michel, C., Ozturk, S., Togola, A., Guzzo, J. & Desroche, N. (2015). Microbial aerobic and anaerobic degradation of acrylamide in sludge and water under environmental conditions – case study in a sand and gravel quarry. *Environmental Science Pollution Research* 22: 6440-6451.

<sup>17</sup> Bayram, A. & Onsoy, H. (2015). Sand and gravel mining impact on the surface water quality: a case study from the city of Tirebolu (Giresun Procence, NE Turkey). *Environmental Earth Science* 73: 1997-2911.

<sup>18</sup> Kelly, E.N., Short, J.W., Schindler, D.W., Hodson, P.V., Ma, M., Kwan, A.K. & Fortin, B.L. (2009). Oil sands development contributes to polycyclic aromatic compounds to the Athabasca River and its tributaries. *Proceedings of the National Academy of Sciences* 52: 22346-22351.

## Industrial Activities

T&T first began the commercial production of oil in 1908 – making it one of the oldest oil producers in the world. Since then, little has been done to retrofit its aging infrastructure<sup>19</sup>. Further as it is an extractive industry, there are significant risks of crude oil spills where the industry is currently active<sup>20</sup> (Figure 1). Some POCs (Pollutants of Concern) from industrial facilities include TPHs (Total Petroleum Hydrocarbons), chlorine, ammonium, mercury, cadmium and copper<sup>21</sup>.

*Figure 1: Oil Spills on the Southwest Coast of Trinidad*



Source: *Environmental Management Authority, (2015)*

The country is also a hub for downstream oil and gas activities, with plants for: gas processing, as well as urea, ammonia and methanol production among others. These activities are predominantly located at the Point Lisas Industrial Estate that sits on the west coast along the GOP (Gulf of Paria); introducing effluents into terrestrial streams and the coastal nearshore. It is estimated that 94% of the ammonia loaded into the Couva River comes from industrial effluents<sup>22</sup>. Similarly, effluents contributes significantly to the amount of BOD, nitrates, nitrites, phosphorous, cadmium, copper, nickel, iron and lead found in the Couva River and subsequently the GOP<sup>23</sup>. Marine sediments have been shown to have significantly elevated levels of zinc in both dry and wet seasons<sup>24</sup>.

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<sup>19</sup> Wu, K., & Obadía, C. (1995). *Energy in Latin America: Production, Consumption, and Future Growth*. USA: Praeger. Page 155.

<sup>20</sup> Baccus, S.J. (2008). *Mitigating the Environmental Impacts of Oil Discharges in a Crude Oil Storage Facility*. Master's Thesis. University of the West Indies. Retrieved from <http://hdl.handle.net/2139/894>

<sup>21</sup> United States Environmental Protection Agency. (2015). *Guide for Industrial Waste Management; Chapter 6: Protecting Surface Water*. Retrieved from <https://www3.epa.gov/wastes/nonhaz/industrial/guide/pdf/chap6.pdf>

<sup>22</sup> Rajkumar, W. et al. (1998). *Planning and environmental management of heavily contaminated bays and coastal areas in the Wider Caribbean: Case Study – Point Lisas, Trinidad and Tobago*. Final Report to the UNEP/IPID Regional Project.

<sup>23</sup> Rajkumar, W. et al. (1998). *Planning and environmental management of heavily contaminated bays and coastal areas in the Wider Caribbean: Case Study – Point Lisas, Trinidad and Tobago*. Final Report to the UNEP/IPID Regional Project.

<sup>24</sup> Ibid.

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### Institutional Activities

Institutions in T&T include schools/universities with laboratories as well as standalone laboratories. Laboratories conduct experiments using chemical reactions and other techniques to analyze various products or substances (e.g., chemicals, drugs, and environmental media)<sup>25</sup>. As such, pollutants can be introduced into waterways through the wastewater generated from the conduct of analysis and washing of equipment and/or glassware. Possible pollutants discharged from labs include cyanide, lead, mercury and arsenic<sup>26</sup>.

### Wastewater Treatment Plants

One of the most efficient and effective methods for collecting and treating wastewater is through centralized wastewater systems<sup>27</sup>. In T&T, 30% of the population has access to these systems<sup>28</sup>. The infrastructure for the treating of wastewater and human waste in T&T also faces several deficiencies where approximately 200 private packaged wastewater treatment plants or 'orphan plants' are malfunctioning or abandoned<sup>29</sup>. Compromised wastewater treatment facilities, pipelines and cesspits contribute to elevated levels of faecal coliform and other biological contaminants into ground water. As such, surface and ground waters around these waste management sites are loaded with nutrients, heavy metals, toxic compounds and biological contaminants<sup>30</sup>.

### Water Treatment Plants

Water from surface or ground water sources is treated at Water Treatment Plants across the country to remove impurities. The pollutants discharged by these plants vary based on the pollutants from the source water as well as chemicals used for its treatment<sup>31</sup>. If the plant is located within a predominantly industrial area, the water will contain higher amounts of TPHs, oil and grease and metals. A number of chemicals are used to treat the water, such as chlorine,

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<sup>25</sup> Massachusetts Department of Environmental Protection. (2015). Environmental Compliance for Laboratories. Retrieved from <http://www.mass.gov/eea/docs/dep/recycle/laws/labfs15.pdf>

<sup>26</sup> United States Environmental Protection Agency (USEPA). (2015). Laboratory Environmental Sample Disposal Information Document. Retrieved from <https://www.epa.gov/sites/production/files/2015-06/documents/lesdid.pdf>

<sup>27</sup> Janson, N. (2014). Review of the Access to, Availability of, and Organizational Readiness for Uptake of Funding for the Wastewater Sector in Selected Participating Countries Final Report. Retrieved from <http://iwllearn.net/iw-projects/3766/technical-reports/review-of-access-to-availability-of-and-organizational-readiness-for-uptake-of-funding-for-the-wastewater-sector-2014>

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Singh, K., Kelly, S. & Sastry M. (2009). Municipal Solid Waste to Energy: An Economic and Environmental Assessment for Application in Trinidad and Tobago. *The Journal of the Association of Professional Engineers of Trinidad and Tobago* 38(1): 42-49

<sup>31</sup> USEPA. (2011). Drinking Water Treatment Plant Residuals Management Technical Report. Retrieved from <https://www.epa.gov/sites/production/files/2015-11/documents/dw-treatment-residuals-mgmt-tech-report-sept-2011.pdf>

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calcium hydroxide and aluminum sulfate<sup>32</sup>; which in turn can also produce by-products harmful to the environment.

### Impacts of Anthropogenic Activities to the Environment

According to the World Wide Fund for Nature (World Wildlife Fund), some of the major threats to the southern Caribbean Sea include anthropogenic pollution (e.g. untreated waste from coastal areas and oil pollution from drilling), overfishing and destruction by activities such as coastal development<sup>33</sup>. These pressures have resulted in devastating impacts to marine life including the death of fish, sea turtles and marine mammals and have contributed to the destruction of valued coral reefs, mangrove swamps and seagrass meadows<sup>34</sup>. T&T is no exception to these threats faced by the southern Caribbean Sea and wider region, whether anthropogenic or natural. Some environmental incidents that have impacted marine water quality in T&T in 2015 include: *Sargassum* incidents, oil spills; and fish kills.

#### **Sargassum Incidents:**

Between 2013 and 2015, T&T's beaches, like several areas of the Caribbean, experienced an influx of massive amounts of species of brown seaweed (macroalgae) known as *Sargassum* (Figure 2). It has been argued that the increased frequency of these masses of seaweed washing up on Caribbean beaches may be connected to increased water temperatures and low winds, which has been linked to changing ocean currents that transport the floating algae<sup>35</sup>. Researchers have also attributed the *Sargassum* influx to pollution of the marine environment by sewage, nitrogen-rich fertilizers and oils<sup>36</sup>.

The presence of these large island-like masses of *Sargassum* can lead to foul odours on beaches and attract insects<sup>37</sup>; may cause fish kills as algae naturally decomposes and depletes oxygen present in the water<sup>38</sup>; trap debris such as plastic which can be ingested by juvenile sea turtles that use the seaweed as a source of food<sup>39</sup>; and hinder tourism in affected areas<sup>40</sup>.

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<sup>32</sup> Water and Sewerage Authority (WASA). (2008). The Water Treatment Process. Retrieved from [http://www.wasa.gov.tt/WASA\\_Education\\_water\\_WaterTreatment.html](http://www.wasa.gov.tt/WASA_Education_water_WaterTreatment.html)

<sup>33</sup> World Wide Fund for Nature (World Wildlife Fund). (2015). Southern Caribbean Sea. Retrieved from [http://wwf.panda.org/about\\_our\\_earth/ecoregions/southern\\_caribbean\\_sea.cfm](http://wwf.panda.org/about_our_earth/ecoregions/southern_caribbean_sea.cfm)

<sup>34</sup> World Wide Fund for Nature (World Wildlife Fund). (2015). Southern Caribbean Sea. Retrieved from [http://wwf.panda.org/about\\_our\\_earth/ecoregions/southern\\_caribbean\\_sea.cfm](http://wwf.panda.org/about_our_earth/ecoregions/southern_caribbean_sea.cfm)

<sup>35</sup> Caribbean Hotel and Tourism Association. (2015). Sargassum A Resource Guide for the Caribbean. Retrieved from <http://www.onecaribbean.org/wp-content/uploads/SargassumResourceGuideFinal.pdf>

<sup>36</sup> Ibid.

<sup>37</sup> Doyle, E. & Franks, J. (2015). Sargassum Fact Sheet. Gulf and Caribbean Fisheries Institute.

<sup>38</sup> Clement, C., Bricker, S.B. & Pirhalla, D.E. (2001). Eutrophic Conditions in Estuarine Waters. In: NOAA's State of the Coast Report. Silver Spring, MD: National Oceanic and Atmospheric Administration. Retrieved from [http://state-of-coast.noaa.gov/bulletins/html/eut\\_18/eut.html](http://state-of-coast.noaa.gov/bulletins/html/eut_18/eut.html)

<sup>39</sup> Weis, J. S. (2015). Marine Pollution: What Everyone Needs to Know. Oxford University Press.

<sup>40</sup> Caribbean Hotel and Tourism Association. (2015). Sargassum A Resource Guide for the Caribbean. Retrieved from <http://www.onecaribbean.org/wp-content/uploads/SargassumResourceGuideFinal.pdf>



Efforts have been made to reduce the quantity of Sargassum on the beaches of affected areas such as Speyside in Tobago, through clean-up events<sup>41</sup>. It has been suggested that the algae can be used as biological indicators of heavy metal pollution<sup>42</sup>, biofuel<sup>43</sup>, fertilizer, compost and even fish and livestock food<sup>44</sup> in order to promote waste utilization and sustainably manage future occurrences.

Figure 2: Sargassum Seaweed in Lovers Bay, Speyside, Tobago



Source: *Trinidad Express*, (2015)<sup>45</sup>

### Oil Spills:

T&T's offshore oil and gas facilities represent one of the major contributors of discharge effluent into the marine environment. Some POCs discharged from these facilities that may exceed the Schedules of the WPR, include TPHs, total oil and grease, BOD, TSS, ammoniacal nitrogen, total residual chlorine, faecal coliforms and copper. Besides direct point source discharges, facilities (rigs and platforms) carry an additional threat of unforeseen events such as oil spills. These may occur due to natural disasters, during drilling operation, transportation or storage of oil, break down of equipment (e.g. leaking pipelines),

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<sup>41</sup> Tobago House of Assembly. (2015). Massive Seaweed Clean-up in Speyside, Tobago. Retrieved from <http://www.tha.gov.tt/news/massive-seaweed-clean-up-in-speyside-tobago/>

<sup>42</sup> McHugh, D.J. (2003). A guide to the seaweed industry. FAO Fisheries Technical Paper 411. Food and Agricultural Organization of the United Nations (FAO): Rome.

<sup>43</sup> Borines, M.G., de Leon R.L. & Cuello, J.L. (2013). Bioethanol production from the macroalgae *Sargassum* sp. *Bioresource Technology* 138: 22-9.

<sup>44</sup> Doyle, E. & Franks, J. (2015). Sargassum Fact Sheet. Gulf and Caribbean Fisheries Institute.

<sup>45</sup> Trinidad Express Newspaper. (2015). Massive Seaweed clean up in Speyside. Retrieved from <http://www.trinidadexpress.com/20150812/features/massive-seaweed-clean-up-in-speyside>

human error or deliberate acts such as vandalism. This causes an immediate negative impact to the marine environment<sup>46</sup>.

Oil spills may therefore be seen as a threat to marine nearshore and deepwater environment, which can hinder biodiversity, productivity and the overall health of the marine environment. For example, oil can kill sea birds as it is ingested, damage the structure of their wings and can also affect their reproductive success<sup>47</sup>. Other marine biota may experience toxic effects if oil is ingested or absorbed through skin or via respiration<sup>48</sup>, and toxins found in oil may biomagnify through the aquatic ecosystem<sup>49</sup> and pose detrimental health effects for humans. In 2015, T&T experienced a number of oil spills (Table 1), which impacted both the onshore and offshore environment.

**Table 1: Oil Spills Occurring in T&T in 2015**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Total Spills</b>	10	9	8	3	13	5	12	12	8	7	8	5
<b>Total Offshore</b>	3	4	2	0	1	0	2	3	0	1	3	1

Source: *Environmental Management Authority, (2015)*

### Fish Kills:

Fish are frequently threatened by a combination of natural causes (such as predation and weather conditions) and unnatural causes (such as water pollution). However, fish kill events do occur which is the destruction of large quantities of fish at one time. For example, fish kills result from low oxygen levels, which may happen during the decomposition of organic waste in water bodies under eutrophic (nutrient rich) conditions<sup>50</sup> or the presence of pesticides, sewage or toxic substances in the water body<sup>51</sup>.

In 2015, the GOP and coastal areas in T&T were plagued by the occurrence of dead marine life (Figure 3). Eleven fish kill events were reported to the ERI (Emergency Response & Investigations) Unit of the EMA in 2015, four (4) of which occurred offshore (Table 2).

<sup>46</sup> National Oceanic and Atmospheric Administration. (n.d.). How do spills happen? Retrieved from <http://response.restoration.noaa.gov/training-and-education/education-students-and-teachers/how-do-spills-happen.html>

<sup>47</sup> Global Marine Oil Pollution Information Gateway. (n.d.). Effects of oil pollution on marine wildlife. Retrieved from <http://oils.gpa.unep.org/facts/wildlife.htm>

<sup>48</sup> Mendelssohn, I.A., Andreson, G.L., Baltz, D.M., Caffey, R.H., Carman, K.R., Fleeger, J.W., ... Rozas, L. (2012). Oil Impacts on Coastal Wetlands: Implications for the Mississippi River Delta Ecosystem after the Deepwater Horizon Oil Spill. *BioScience* 62(6): 562-574.

<sup>49</sup> Jorgensen, A.E. (2008). Toxicology - Biomagnification. *Encyclopaedia of Ecology* 1: 441-448.

<sup>50</sup> U.S. Congress, Office of Technology Assessment. (1987). *Wastes in Marine Environments*. OTA-0-334. Washington, D.C: U.S. Government Printing Office.

<sup>51</sup> Ibid.



**Figure 3. Fish Kills on the Southwest Coast of Trinidad**



Source: Environmental Management Authority, (2015)

**Table 2. Fish Kill incidents reported in Trinidad and Tobago in 2015**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Total Fish Kills</b>	0	1	2	2	1	0	2	1	0	1	1	0
<b>Total Offshore</b>	0	0	0	0	1	0	2	1	0	0	0	0

Source: Environmental Management Authority, (2015)

**Human Health and Ecological Impacts of Pollutants:**

In addition to the ecological impacts previously cited, the pollutants listed in the WPR have been identified as negatively impacting human health. Table 3 highlights each of the pollutants listed in the First and Second Schedules of the WPR and its health impacts to humans and aquatic life.

**Table 3. Table Listing All Pollutants in the Water Pollution Rules, 2001 (as amended) and its Impacts.**

<b>Parameter</b>	<b>Primary Sources of Parameter in Water</b>	<b>Human Health and Ecological Impacts</b>
Ammoniacal Nitrogen	Industrial effluent and through discharges of treated effluent from sewage treatment plants.	Indicates the possibility of sewage pollution and the presence of pathogenic micro-organisms.
Arsenic	Paint and pharmaceutical plants, industrial effluents and naturally from minerals/ores.	Increases possibility of cancer.
Cadmium	Industrial discharges from electroplating, paint-making, plastic manufacturing; and landfill leachates.	Very toxic and can accumulate in human tissues, e.g. kidneys.
COD (Chemical Oxygen Demand)	High levels attributed to emulsified oils, industrial and domestic wastewater effluent.	COD is a measurement of the oxygen required to oxidize organic matter in water. Thus, it is an indicator of overall water quality and has no direct hazard implications.
Chloride	Mineral deposits, sewage and industrial effluents.	No direct hazard implications. Higher concentrations give rise to detectable taste in water.
Chromium	Discharges from electroplating, tanning, textile, paint and dyeing plants.	Increases possibility of cancer and causes irritation to the skin.
Copper	Industrial wastes.	Very toxic for aquatic life.
Cyanide	Industrial effluents.	Reactive and highly toxic; causes mortality to humans and fish; and nerve damage or thyroid problems.
Dissolved Hexavalent Chromium	Discharges from electroplating, tanning, textile, paint and dyeing plants.	Increases possibility of cancer and causes irritation to the skin.
Dissolved Iron	Acid drainage and effluent discharges.	Tissue damage in humans and toxic to aquatic life.

Parameter	Primary Sources of Parameter in Water	Human Health and Ecological Impacts
DOC (Dissolved Oxygen Content)	Low levels attributed to excessive algae growth.	DOC represents a measure of the amount of oxygen in water. Low levels of oxygen cause asphyxiation.
Faecal Coliforms	Industrial and domestic wastewater effluent.	Indicates that harmful bacteria is present which can cause disease symptoms such as diarrhoea, cramps, nausea, and jaundice
Five-day BOD	High levels attributed to higher amounts of organic matter from industrial and domestic wastewater discharges.	BOD is the amount of dissolved oxygen absorbed by bacteria when it degrades oxidisable matter. Thus, It is an indicator of overall water quality and has no direct hazard implications.
Hydrogen Ion (pH)	Low levels attributed to higher levels of carbon dioxide (fossil fuel combustion and automobiles) and higher levels attributed to carbonate-rich soils.	Extreme values are lethal to aquatic organisms and affects reproduction and other biological processes.
Lead	Leaching from ores, paints and petrol additives and effluent discharges.	Delays physical or mental development in children. Causes kidney problems in adults. Bioaccumulative in the tissues of fish.
Mercury	Natural biological processes and industrial waste discharges.	Causes kidney damage. Toxic to aquatic life.
Nickel	Minerals and industrial wastes.	Toxic to plant life and aquatic animals. Increased cancer risk to humans.
Oil and Grease	Oil spillages and effluent discharges.	Increased cancer risk to humans.
Phenolic Compounds	Petrochemical industries, pesticides, runoff from polluted surface waters from roads/road works; and industrial effluents.	Liver or kidney and thymus gland problems; increased cancer risk; immune deficiencies; reproductive or nervous system difficulties.
Phosphorus	Runoff; sewage discharges and occurs naturally in plants, micro-organisms and animal wastes.	Eutrophication results when high concentrations of nutrients like phosphorus lead to excessive biological growth. Although a natural process, it degrades water quality and threatens aquatic life.

Parameter	Primary Sources of Parameter in Water	Human Health and Ecological Impacts
Radioactivity	Chemical elements with unstable atoms that can emit ionizing radiation and naturally occurring in soils and rocks.	Increased cancer risk to humans; causes reproductive and genetic problems in aquatic life.
Residual Chlorine	Water treatment processes, industrial effluents, chlorinated sewage and other effluents.	Toxic to aquatic life.
Solid Waste	Industrial and domestic wastewater effluent.	Introduces a variety of toxic chemicals to the water body; decreases light penetration.
Sulphide	Industrial and domestic wastewater effluent.	Toxic to humans and aquatic life.
Temperature	Higher levels attributed to discharge of heated industrial effluents.	Affects metabolism, growth, and reproduction of aquatic life.
TPH	Oil spillages and effluent discharges.	Increased cancer risk to humans, blockage of pipes, fouling of plant and animal life, odour and taste problems.
TSS	Algae, wastewater effluent, sediments from runoff and erosion.	Reduces light penetration in surface waters and interferes with aquatic life.
Toxicity	Leachates, pesticides, heavy metals, and industrial wastes.	Ranges from reproduction problems in aquatic life to brain damage in humans.
Zinc	Leaching from pipes, industrial and domestic wastewater effluent.	Zinc is bioaccumulative in all species and is toxic to aquatic life.

Source: *United States Environmental Protection Agency, (2001)*<sup>52</sup>;  
*Food and Agriculture Organization of the United Nations, (n.d.)*<sup>53</sup>

<sup>52</sup> United States Environmental Protection Agency. (2001). Parameters of Water Quality: Interpretation and Standards. Retrieved from [https://www.epa.ie/pubs/advice/water/quality/Water\\_Quality.pdf](https://www.epa.ie/pubs/advice/water/quality/Water_Quality.pdf)

<sup>53</sup> Food and Agriculture Organization of the United Nations. (n.d.). Potential Pollutants, Their Sources and Their Impacts. Retrieved from <http://www.fao.org/docrep/X5624E/x5624e04.htm>

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## AGREEMENTS AND LEGISLATION

The EMA is guided by national legislation and international obligations in managing water pollution, namely UN SDGs, the Land Based Sources and Activities Protocol and the EM Act.

### International Agreement - United Nations Sustainable Development Goals

The UNs' *"Transforming our world: the 2030 Agenda for Sustainable Development"* provides ambitious and aspirational targets under the SDGs. Poverty reduction, environmental sustainability and economic growth all pivot, in some way, to the quality of water available to human use. The SDG targets that speak specifically to water quality are critically important, including:

- 3.9 – By 2030 substantially reduce the number of deaths and illness from hazardous chemicals in air, water and soil pollution and contamination;
- 6.3 – By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated waste water and substantially increasing recycling and safe reuse globally; and
- 6.6 – By 2030, protect and restore water-related ecosystems, including mountains, forests, wetlands, aquifers and lakes.

Respectful of the principle of common but differentiated responsibilities, the UN's framework relies on each country to develop its own strategies to meeting these targets in a manner that is respectful of their given context. T&T's environmental management framework, inclusive of the instruments within the remit of the EMA, play a pivotal role in realizing these targets. Moving forward, T&T will continue to build on the WPR and nascent ambient water quality standards. Additionally, the EMA is committed to working on the major water quality initiative of creating national water quality indicators as further discussed in Section 6.0.

### Regional Agreement - Land-Based Sources and Activities Protocol

The Cartagena Convention (Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Area) is a legally binding, regional agreement for the protection and development of the Wider Caribbean Region<sup>54</sup>. Through this agreement, the LBSAP (Land-Based Sources and Activities Protocol) was developed and implemented in 2010 to address overall reduction in water pollution and improve water quality and health of marine ecosystems<sup>55</sup>. The LBSAP is a tool that assists the wider Caribbean Region to meet the following goals and obligations of:

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<sup>54</sup> United Nations Environment Programme. (2013). The LBS Protocol Overview. Retrieved from <http://www.cep.unep.org/cartagena-convention/lbs-protocol/the-lbs-protocol-overview.pdf/view>

<sup>55</sup> United Nations. (1999). Protocol Concerning Pollution from Land-based Sources and Activities to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region. Retrieved from <http://cep.unep.org/repcar/lbs-protocol-en.pdf>

- 1) The UN Convention on the Law of the Sea, which requires members to embrace laws and regulations that “prevent, reduce and control pollution of the marine environment from land based sources”; and
- 2) The Global Plan of Action for the Protection of the Marine Environment from Land-Based Activities, which promotes action to be taken to reduce pollutant load from LBSs (Land-based Sources) to the sea<sup>56</sup>.

LBS of pollution account for approximately 80% of pollution occurring in the marine environment in the Caribbean<sup>57</sup>. Some priority pollutants in the marine environment of T&T include sewage, nutrients, heavy metals, TPHs, POPs (Persistent Organic Pollutants), sediments and litter<sup>58</sup>. As a signatory to the LBSAP, T&T is obligated to develop and implement appropriate plans, programmes and measures to ensure that pollution is prevented, reduced and controlled within the nation’s capability<sup>59</sup>.

#### Local Policy – National Environmental Policy

Section 18 of the EM Act requires the EMA to develop a NEP (National Environmental Policy) which seeks to balance economic growth with environmentally sound practices in order to enhance the quality of life and meet the needs of present and future generations by providing a practical and comprehensive framework for environmental management in T&T<sup>60</sup>. Section 3.7 of Chapter 3 of the 2006 NEP, entitled “*Water Resources*” states that the GORTT (Government of the Republic of T&T) will ensure that development decisions that impact water resources are guided by acceptable water quality and quantity criteria and that these criteria are met on a sustainable basis<sup>61</sup>. It further lists twenty-three (23) principles that the government is committed to in order to achieve these criteria, which include:

- Control water pollution through a system of permits for facilities that are the sources of any release of water pollutants. This control system will be based on the Polluter Pays Principle, which

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<sup>56</sup> Caribbean Environment Programme. (n.d.). LBS Protocol. Retrieved from <http://www.cep.unep.org/cartagena-convention/lbs-protocol>

<sup>57</sup> National Ocean Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. (2012). How Pollution Affects Coral reefs. Retrieved from <http://celebrating200years.noaa.gov/visions/coral/side.html>

<sup>58</sup> Bullock, C. & Nelson, W. (2014). The Marine and coastal environment of Trinidad and Tobago: Impacts of marine pollution on water, sediment and biota quality. Institute of Marine Affairs 14<sup>th</sup> Research Symposium, 17<sup>th</sup> September. Retrieved from [http://www.ima.gov.tt/home/images/presentations/IMA\\_SYMPOSIUM\\_2014 - Bullock and Nelson - 2014 Symposium-Session 2-EQP Bullock and Nelson.pdf](http://www.ima.gov.tt/home/images/presentations/IMA_SYMPOSIUM_2014_-_Bullock_and_Nelson_-_2014_Symposium-Session_2-EQP_Bullock_and_Nelson.pdf)

<sup>59</sup> United Nations. (1999). Protocol Concerning Pollution from Land-based Sources and Activities to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region. Retrieved from <http://cep.unep.org/repcar/lbs-protocol-en.pdf>

<sup>60</sup> Environmental Management Act. (2000). Retrieved from [http://www.ema.co.tt/new/images/pdf/act\\_no\\_3\\_of\\_2000-environmental\\_management\\_act.pdf](http://www.ema.co.tt/new/images/pdf/act_no_3_of_2000-environmental_management_act.pdf)

<sup>61</sup> National Environmental Policy. (2006). Retrieved from <http://www.ema.co.tt/new/images/policies/national-environmental-policy2006.pdf>

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will set pollution limits or performance standards for water. The cost of pollution prevention or of minimising environmental damage due to pollution will be borne by those responsible for pollution; and

- Use economic incentives as well as regulations to achieve its water management objectives<sup>62</sup>.

The EMA is currently revising this policy to update and address current environmental issues through revised frameworks and responses, such as the UN SDGs.

#### Local Legislation - The Water Pollution Rules (WPR), 2001 (as amended)

The EM Act is the local enabling legislation for managing water pollution in T&T, mainly the WPR. Effluent discharge is also monitored through the CEC (Certificate of Environmental Clearance) process. Where the EMA grants a CEC, the issued CEC may include mitigation measures for any significant adverse effects resulting from an activity. Currently, point and non-point sources of water pollution are managed through the requirement of Best Management Plans, such as Stormwater Management Plans, required as a condition of an issued CEC.

The WPR was established by the EMA through Sections 26, 48, 52, 53 and 54 of the EM Act. The WPR was amended in 2006 and officially implemented on February 27, 2007. The main objective of the WPR is to reduce the levels of water pollution in T&T by first getting facilities that discharge water pollutants to report on their releases and then putting measures and systems in place to achieve compliance with the discharge standards. The WPR has two (2) main processes: the SR (Source Registration) and WPP (Water Pollution Permitting) processes. Existing facilities discharging water pollutants into the environment<sup>63</sup> are required to register as a source of water pollution with the objectives being to:

- Establish a register/inventory of water pollutants emitted into the country's waterways;
- Determine pollutant loads entering the nation's water bodies; and
- Identify pollutant hotspots, major polluters and facilities for permitting.

The First Schedule of the WPR lists 29 parameters/substances and defines at what quantity, condition or concentration each parameter or substance is considered a water pollutant (Table 4). Between 2007 and 2015, the EMA received 817 applications from facilities that applied for a SR Certificate and registered 431 facilities and the remainder of applications require further information in order to be processed. These facilities are required to test and report on their effluent discharges which are compared to the First Schedule of the WPR to determine if the facility is a source of water pollutants. They are guided by the TTS (Trinidad & Tobago Standard) 547:1998 Specification for the Effluent from Industrial Processes Discharged into the Environment, which lists the parameters that may be analysed according to facility type as well as their knowledge of process inputs which will contribute to the effluent waste stream. Facilities are required to provide discharge characteristics for all of their

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<sup>62</sup> Ibid.

<sup>63</sup> Water Pollution Rules (2001). Section 7(1) - Registration Certificate.

discharge points and to identify the receiving environment for each of these discharges such as inland water surfaces, coastal, offshore areas or ESAs (Environmentally Sensitive Areas).

**Table 4. The Register of Water Pollutants as Listed in the First Schedule of the WPR**

REGISTER OF WATER POLLUTANTS		
No.	Parameters or Substances	Quantity, Condition or Concentration at which substance or parameter is defined as a pollutant <sup>a</sup>
1.	Temperature	Maximum variation of 3°C from ambient
2.	Hydrogen ion (pH)	Less than 6 or greater than 9.
3.	Dissolved Oxygen Content (DO)	<4
4.	Five day Biological Oxygen Demand (BOD <sub>5</sub> at 20° C)	>10
5.	Chemical Oxygen Demand (COD)	>60
6.	Total Suspended Solids (TSS)	>15
7.	Total Oil and Grease (TO&G) or n-Hexane Extractable Material (HEM)	>10
8.	Ammoniacal Nitrogen (as NH <sub>3</sub> -N)	>0.01
9.	Total Phosphorus (as P)	>0.1
10.	Sulphide (as H <sub>2</sub> S)	>0.2
11.	Chloride (as Cl <sup>-</sup> )	>250
12.	Total Residual Chlorine (as Cl <sub>2</sub> )	0. 2
13.	Dissolved Hexavalent Chromium (Cr <sup>6+</sup> )	>0.01
14.	Total Chromium (Cr)	>0.1
15.	Dissolved Iron (Fe)	>1.0
16.	Total Petroleum Hydrocarbons (TPH)	NIAA
17.	Total Nickel (Ni)	>0.5
18.	Total Copper (Cu)	>0.01
19.	Total Zinc (Zn)	>0.1
20.	Total Arsenic (As)	>0.01
21.	Total Cadmium (Cd)	>0.01
22.	Total Mercury (Hg)	>0.005
23.	Total Lead (Pb)	>0.05
24.	Total Cyanide (as CN <sup>-</sup> )	>0.01
25.	Phenolic Compounds (as phenol)	>0.1
26.	Radioactivity	NIAA
27.	Toxicity	NATE
28.	Faecal Coliforms	>100
29.	Solid Waste	No solid debris

<sup>a</sup> all units are in milligrams per litre (mg/L) except for temperature (°C), pH (pH units), turbidity (NTU), faecal coliforms (counts per 100 ml), radioactivity (Bq/L) and toxicity (toxic units).  
NIAA—no increase above ambient  
NATE—no acute toxic effects  
>greater than <less than

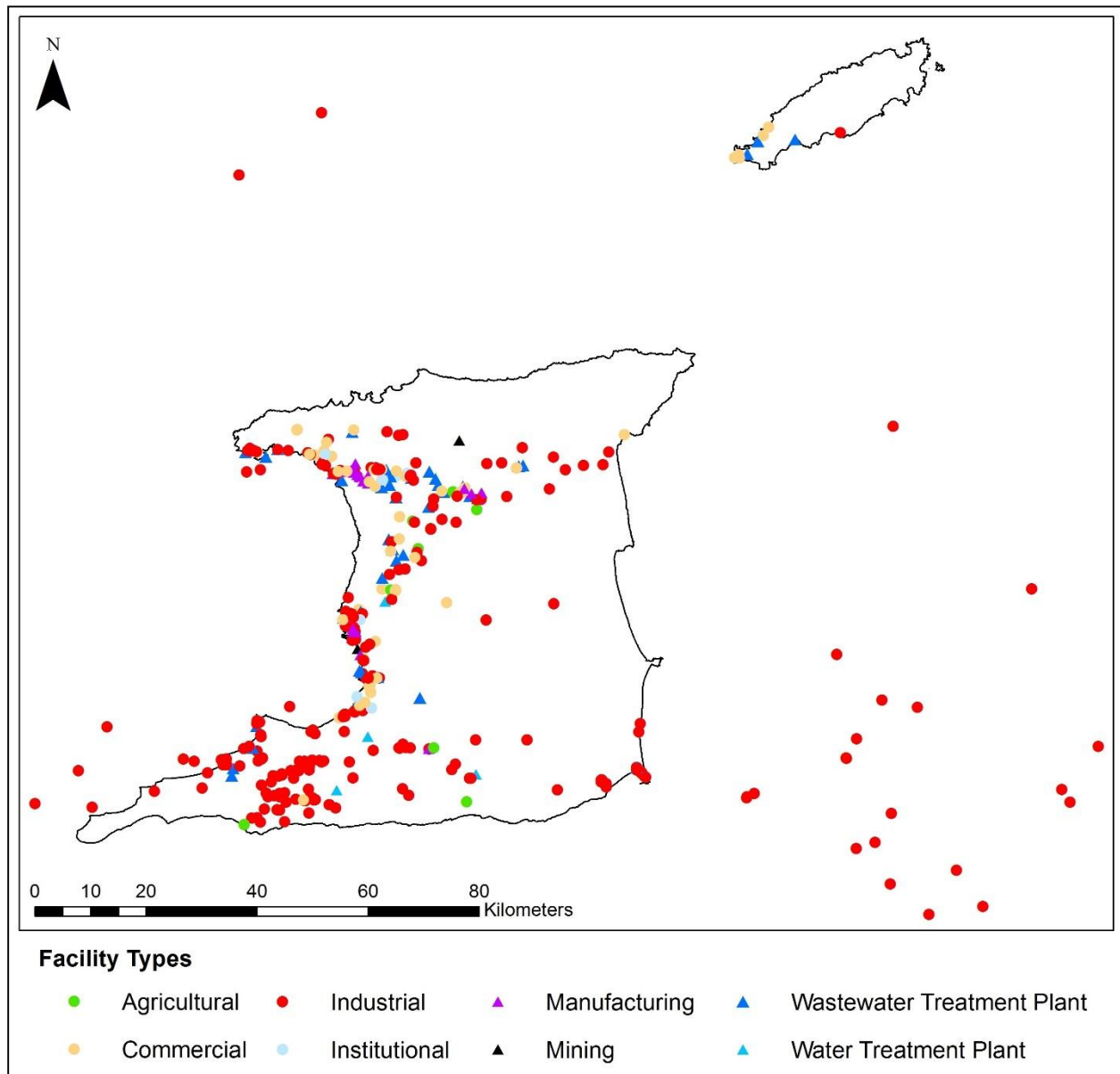
Source: *Water Pollution Rules, (2001) (as amended)*<sup>64</sup>

<sup>64</sup> Water Pollution Rules. (2001). Schedule 1. Retrieved from [www.ema.co.tt/new/images/pdf/water\\_pollution\\_rules2001.pdf](http://www.ema.co.tt/new/images/pdf/water_pollution_rules2001.pdf)



Figure 4 illustrates the locations of registered facilities in T&T. The offshore points represent oil and gas facilities which have discharge points directly into the marine environment.

**Figure 4. Map Showing the Locations of Facilities with a Source Registration Certificate According to Facility Type for the Period 2007 – 2015**



Source: *Environmental Management Authority, (2015)*

Based on the data collected under the registration process, the EMA may notify a person/facility to apply for a water pollution permit if it is determined that they are releasing a water pollutant(s) in exceedance

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of the permissible levels specified in the Second Schedule of the WPR<sup>65</sup>. The main features of a permit are to establish:

- Effluent discharge points and representative sampling locations;
- Interim and final discharge levels for each pollutant, and the date(s) by which these must be achieved; and
- A monitoring programme (parameters to be sampled, frequency of sampling, sampling type) for both effluent and ambient water quality.

The Second Schedule lists the same 29 parameters/substances as in the First Schedule but specifies permissible levels for discharge into inland surface water, coastal nearshore, marine offshore and ESAs and/or ground water<sup>66</sup> (Table 5). Between 2007 and 2015, 69 registered facilities were notified to apply for a permit. The permit is valid for five (5) years from the date of issue and allows the owner to continue operations, whilst working towards achieving compliance with the WPR permissible limits.

This regulatory process can be effective as permitted facilities work towards achieving compliance by decreasing pollution concentrations through a reduction in the numbers of effluent discharge points from their premises and the implementation of better housekeeping and waste disposal practices. The results to date are discussed in Section 4.0.

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<sup>65</sup> Water Pollution Rules. (2001). Section 8(1) - Requirements to apply for a permit.

<sup>66</sup> Water Pollution Rules. (2001). Schedule 2 - Permissible Levels.

**Table 5. The Permissible Levels of Parameters as Listed in the Second Schedule of the WPR**

No.	Water Pollutants Parameters or Substances	Receiving Environment			
		Inland Surface Water	Coastal Nearshore	Marine Offshore	Environmentally Sensitive Areas and/or Groundwater
Levels or Conditions					
1.	Temperature	35	40	45	NIAA
2.	Dissolved Oxygen	<4	<4	<4	<4
3.	Hydrogenion (pH)	6-9	6-9	6-9	6-9
4.	Five day Biological Oxygen Demand (BOD <sub>5</sub> at 20°C)	30	50	100	10
5.	Chemical Oxygen Demand (COD)	250	250	250	60
6.	Total Suspended Solids (TSS)	50	150	200	15
7.	Total Oil and Grease (TO&G) or n-Hexane Extractable\ Material (HEM)	10	15	100	No release
8.	Ammoniacal Nitrogen (as NH <sub>3</sub> -N)	10	10	10	0.1
9.	Total Phosphorus (as P)	5	5	5	0.1
10.	Sulphide (as H <sub>2</sub> S)	1	1	1	0.2
11.	Chloride (as Cl <sup>-</sup> )	250	NIAA	NIAA	NIAA
12.	Total Residual Chlorine (as Cl <sub>2</sub> )	1	1	2	0.2
13.	Dissolved Hexavalent Chromium (Cr <sup>6+</sup> )	0.1	0.1	0.1	0.01
14.	Total Chromium (Cr)	0.5	0.5	0.5	0.1
15.	Dissolved Iron (Fe)	3.5	3.5	3.5	1.0
16.	Total Petroleum Hydrocarbons (TPH)	25	40	80	No release
17.	Total Nickel (Ni)	0.5	0.5	0.5	0.5
18.	Total Copper (Cu)	0.5	0.5	0.5	0.01
19.	Total Zinc (Zn)	2	2	2	0.1
20.	Total Arsenic (As)	0.1	0.1	0.1	0.01
21.	Total Cadmium (Cd)	0.1	0.1	0.1	0.01
22.	Total Mercury (Hg)	0.01	0.01	0.01	0.005
23.	Total Lead (Pb)	0.1	0.1	0.1	0.05
24.	Total Cyanide (as CN <sup>-</sup> )	0.1	0.1	0.1	0.01
25.	Phenolic Compounds (as phenol)	0.5	0.5	0.5	0.1
26.	Radioactivity	NIAA	NIAA	NIAA	NIAA
27.	Toxicity	NATE	NATE	NATE	NATE
28.	Faecal Coliforms	400	400	400	100
29.	Solid Waste	NSD	NSD	NSD	NSD

<sup>a</sup> all units are in milligrams per litre (mg/L) except for temperature (°C), pH (pH units), faecal coliforms (counts per 100 ml), radioactivity (Bq/L) and toxicity (toxic units)  
NIAA—no increase above ambient  
NATE—no acute toxic effects  
NSD—No solid debris  
<—less than

Source: *Water Pollution Rules (2001) (as amended)*<sup>67</sup>

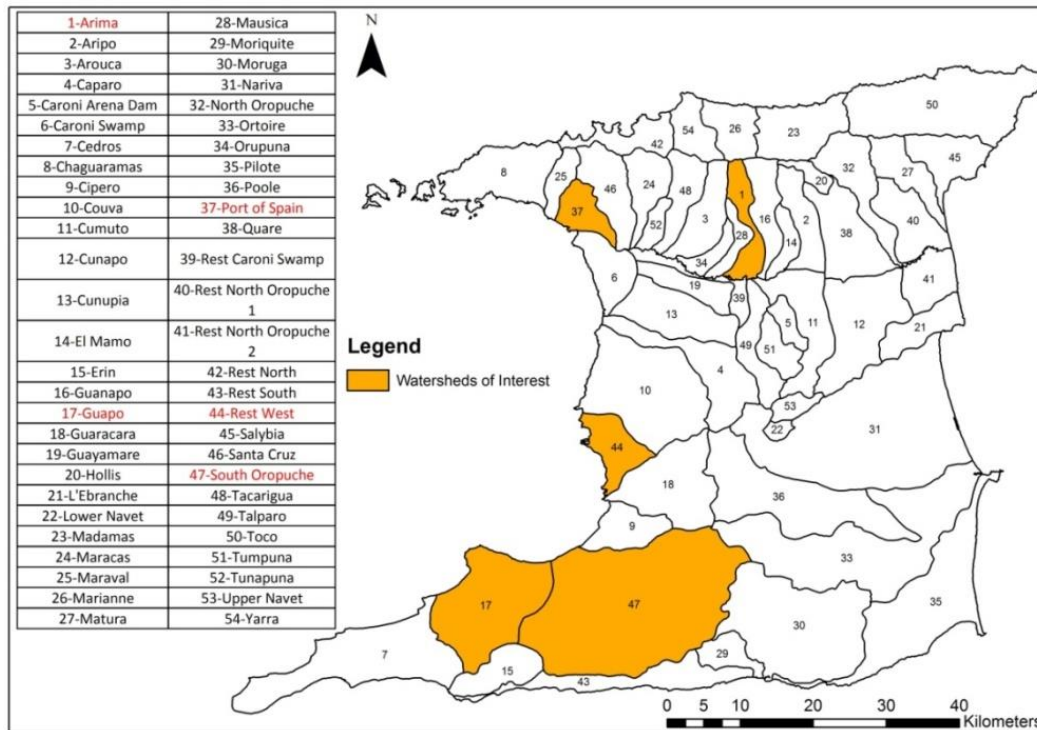
<sup>67</sup> Water Pollution Rules. (2001). Schedule 2. Retrieved from [www.ema.co.tt/new/images/pdf/water\\_pollution\\_rules2001.pdf](http://www.ema.co.tt/new/images/pdf/water_pollution_rules2001.pdf)

## WATER QUALITY DATA ANALYSIS

Since the implementation of the WPR, the EMA has collected data through the SR and WPP processes. This section will analyse the data collected from these processes within the most vulnerable watersheds in T&T.

The WRASTIC index study was used to determine which watersheds in T&T are the most vulnerable and therefore highlighted for analysis. This study was developed to evaluate watershed susceptibility to surface water contamination in any hydrogeological setting based on major watershed characteristics and land uses<sup>68</sup>. WRASTIC is an acronym for the following parameters: W – Wastewater discharges; R – Recreational land use impacts; A – Agricultural land use impacts; S – Size of watershed; T – Transportation avenues; I – Industrial land use impacts; C – amount of vegetative ground Cover. These parameters are weighted and combined to indicate the overall vulnerability of a watershed to contamination; where the higher the WRASTIC Index, the more sensitive the water supply is to contamination. Based on the WRASTIC index, five (5) watersheds with high vulnerability in Trinidad are Guapo, Rest West (Point Lisas area), Port of Spain, South Oropouche and Arima (Figure 5). In Tobago, the Tobago West Watershed is the only watershed with a high vulnerability rank.

**Figure 5. Map Showing the Locations of All Watersheds in Trinidad and the Five Watersheds Highlighted for Analysis**



<sup>68</sup> Rajkumar, W., Buckradee, A., de Roché, S. & Prince, K. (2009). Watershed Vulnerability Assessment using the WRASTIC Approach for Trinidad and Tobago. Environmental Management Authority: Trinidad and Tobago.

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### Analysis of Source Registration Data

Data analysis for this ASOER was performed for all registered facilities in the five (5) most vulnerable watersheds (Figures 6-10) in Trinidad, all offshore facilities (Figure 11) and all registered facilities in Tobago (Figure 12) between the years 2007 and 2015. POCs were determined using discharge data reported by facilities and were based on the following factors: 1) most frequent occurrence of the parameter among all registered facilities in the watershed and 2) highest number of facilities discharging the parameter in exceedance of the First Schedule (above 70%).

The data analysis is further categorized according to the following eight (8) facility types (as highlighted in the SR Application Form):

- Agricultural
- Commercial
- Industrial
- Institutional
- Manufacturing
- Mining
- Wastewater treatment plants
- Water treatments plants

Guapo Watershed - Industrial facilities represents 35 of the total 44 facilities in this watershed due to the large presence of oil reserves. TSS is the most commonly exceeded parameter as it is discharged in exceedance from 39 facilities. This is a problem for receiving environments as it decreases water temperature, dissolved oxygen and physically harms aquatic life. COD is measured in exceedance from 33 facilities. This means the quality of the receiving water body is decreasing as there is higher oxidizable organic material in the discharged water which reduces dissolved oxygen. TPH is a parameter of concern being discharged in exceedance (32 facilities) due to the heavy presence of oil in this area.

Rest West (Point Lisas area) Watershed – There are 16 facilities each as industrial and manufacturing types. TSS is the most common parameter of concern in this watershed with a total of 35 facilities out of 42 discharging the parameter outside of the First Schedule. Dissolved hexavalent chromium is discharged in exceedance at 9 facilities. This chemical is used in textile-

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dying processes, water treatment, metal finishing and chrome plating and production of stainless steel<sup>69</sup>.

Port of Spain Watershed - TSS was once again the dominant parameter of concern with 28 of the 31 facilities discharging the parameter above the permissible levels. Manufacturing facilities are the main type in this area having 18 facilities. Phosphorus is another common parameter of concern as it is discharged in exceedance from 15 facilities. Phosphorus causes eutrophication which is the excessive biological growth of algae due to the overabundance of the nutrient. This causes negative effects as it can reduce temperature and dissolved oxygen.

South Oropouche Watershed - Industrial facilities dominate with a total of 25 facilities out of 31. Once again, TSS is the most common parameter of concern with 25 facilities discharging the parameter. Similar to the Guapo Watershed which is adjacent to it, the two (2) other commonly occurring parameters in exceedance are COD and TPH.

Arima Watershed - Manufacturing facilities are the most dominant representing 8 of the 13 facilities. Ammoniacal nitrogen and BOD are the most common parameters exceeded in facility discharges in this watershed. This presents negative effects to aquatic life due to the lower oxygen levels.

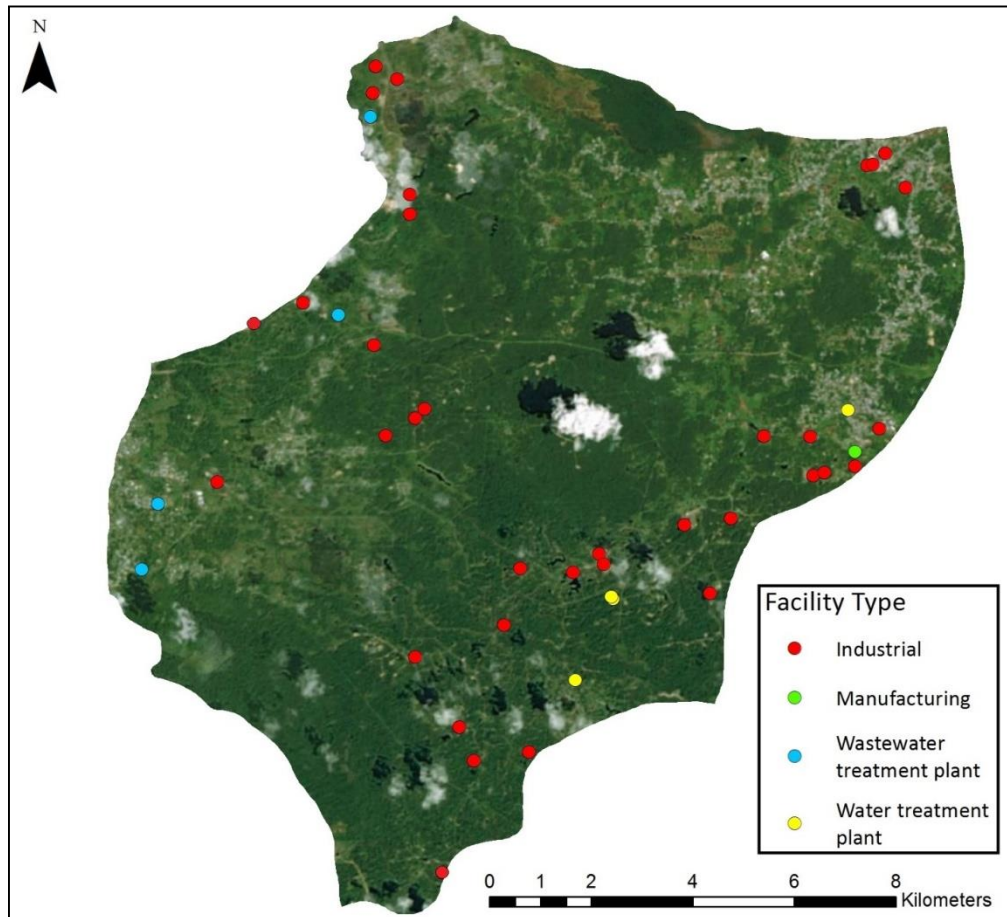
Offshore Facilities - Offshore industrial facilities release five (5) major POCs outside of permissible levels, with more than 70% of the facilities discharging each parameter. Similar to the onshore facilities, COD, BOD and TSS are all discharged into the marine environment. Most notably is the presence of faecal coliforms due to a lack of appropriate treatment of sanitary effluent.

Tobago - There are five (5) commercial facilities and four (4) wastewater treatment plants which exceeded in TSS, BOD and dissolved oxygen content. This indicates that the water being discharged is having a negative effect on the receiving environment due to decreasing oxygen level.

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<sup>69</sup> U.S. Department of Health and Human Services Secretary. (2014). Report on Carcinogens- Chromium Hexavalent Compounds. Retrieved from <https://ntp.niehs.nih.gov/ntp/roc/content/profiles/chromiumhexavalentcompounds.pdf>

Figure 6. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POCs Based on Facility Type within the Guapo Watershed

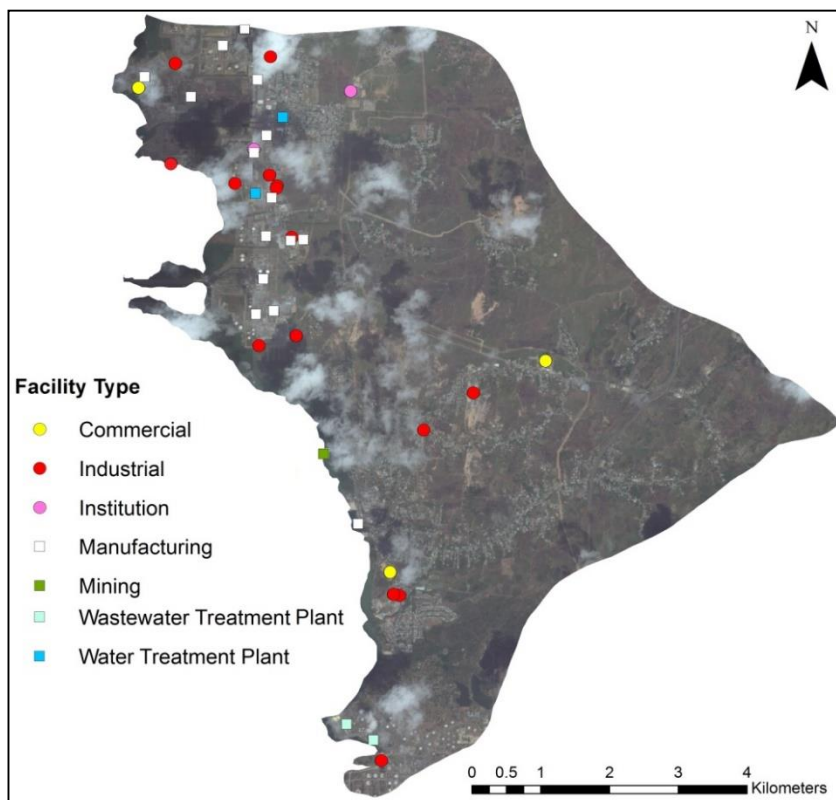


Type of Facility	Number of facilities	Pollutants Discharged from Facilities Exceeding Permissible Levels
Industrial	35*	Arsenic ( <b>21</b> /26), cadmium ( <b>24</b> /30), chemical oxygen demand ( <b>30</b> /33), chloride ( <b>25</b> /30), dissolved hexavalent chromium ( <b>28</b> /29), total suspended solids ( <b>30</b> /33)
Manufacturing	1 <sup>+</sup>	Chemical oxygen demand, phosphorus, total oil and grease and total suspended solids
Wastewater treatment plant	4 <sup>+</sup>	Dissolved oxygen content, five day biological oxygen demand and total suspended solids
Water Treatment Plant	4*	Hydrogen ion (pH) ( <b>3</b> /4), total suspended solids

\*Values in red indicate the number of facilities discharging the pollutant above permissible levels out of the total number of facilities discharging the pollutant. Listed parameters were discharged above permissible levels from the total number of facilities stated.



Figure 7. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POC Based on Facility Type within the Point Lisas Watershed



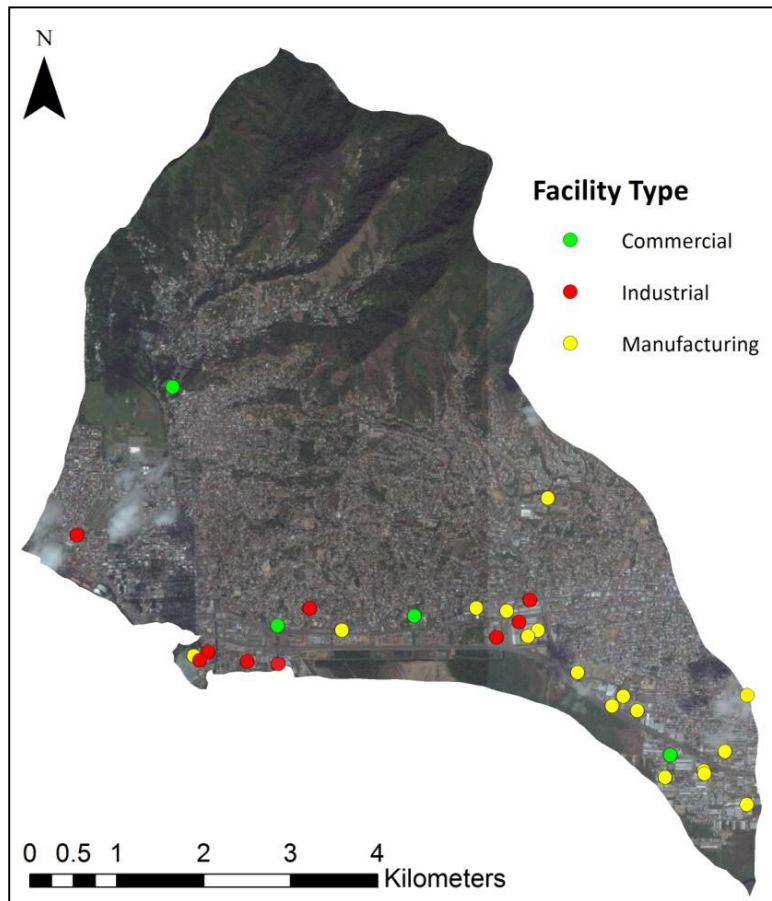
Type of Facility	Number of Facilities	Pollutants Discharged from Facilities Exceeding Permissible Levels
Commercial	2 <sup>+</sup>	Faecal coliforms, five-day biological oxygen demand and total suspended solids
Industrial	16 <sup>*</sup>	Total suspended solids ( <b>14</b> /16)
Institutional	2 <sup>+</sup>	Five-day biological oxygen demand
Manufacturing	16 <sup>*</sup>	Total suspended solids ( <b>11</b> /16)
Mining	1 <sup>+</sup>	Total suspended solids, total petroleum hydrocarbons and faecal coliforms
Wastewater treatment plant	2 <sup>+</sup>	Ammoniacal nitrogen, cadmium, chemical oxygen demand, chromium, copper, sulphide, total suspended solids, zinc
Water Treatment Plant	2 <sup>*</sup>	Five-day biological oxygen demand ( <b>1</b> /2)

*\*Values in red indicate the number of facilities discharging the pollutant above permissible levels out of the total number of facilities discharging the pollutant.*

*\*Listed parameters were discharged above permissible levels from the total number of facilities stated.*



Figure 8. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POCs Based on Facility Type within the Port of Spain Watershed

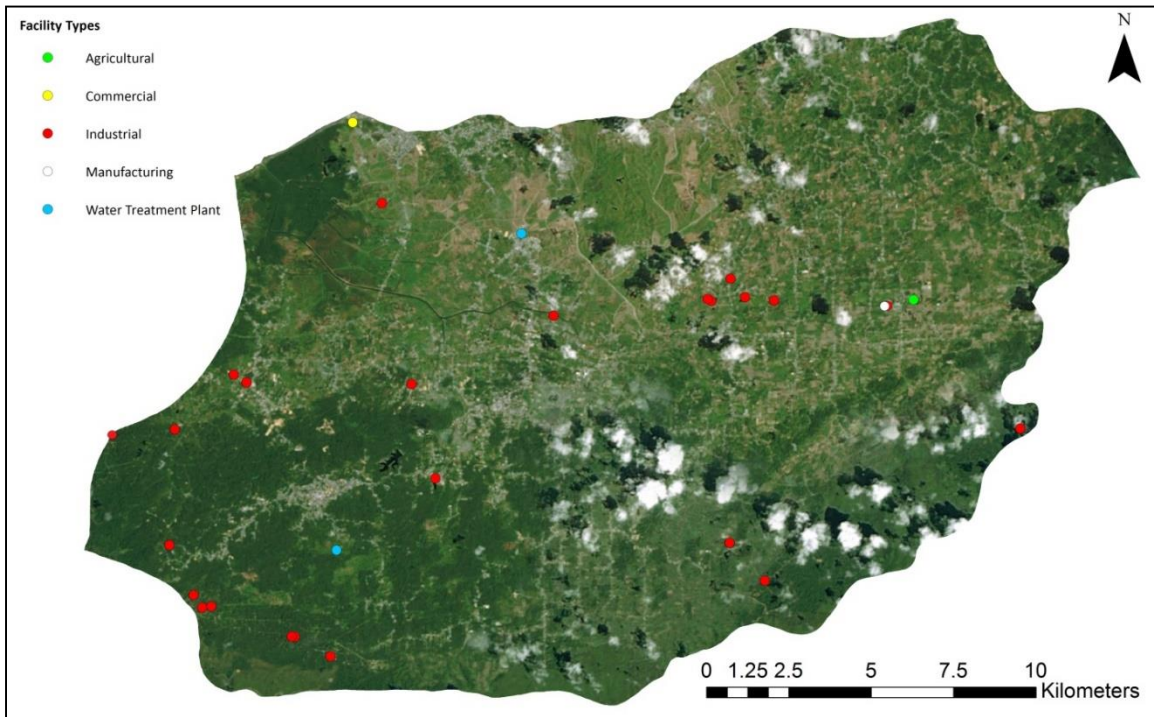


Type of Facility	Number of Facilities	Pollutants Discharged from Facilities Exceeding Permissible Levels
Commercial	4 <sup>+</sup>	Phosphorus and total suspended solids
Industrial	9 <sup>*</sup>	Chemical oxygen demand ( <b>7</b> /8), total suspended solids
Manufacturing	18 <sup>*</sup>	Total suspended solids ( <b>16</b> /18)

*\*Values in red indicate the number of facilities discharging the pollutant above permissible levels out of the total number of facilities discharging the pollutant.*

*\*Listed parameters were discharged above permissible levels from the total number of facilities stated.*

**Figure 9. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POC Based on Facility Type within the South Oropouche Watershed**

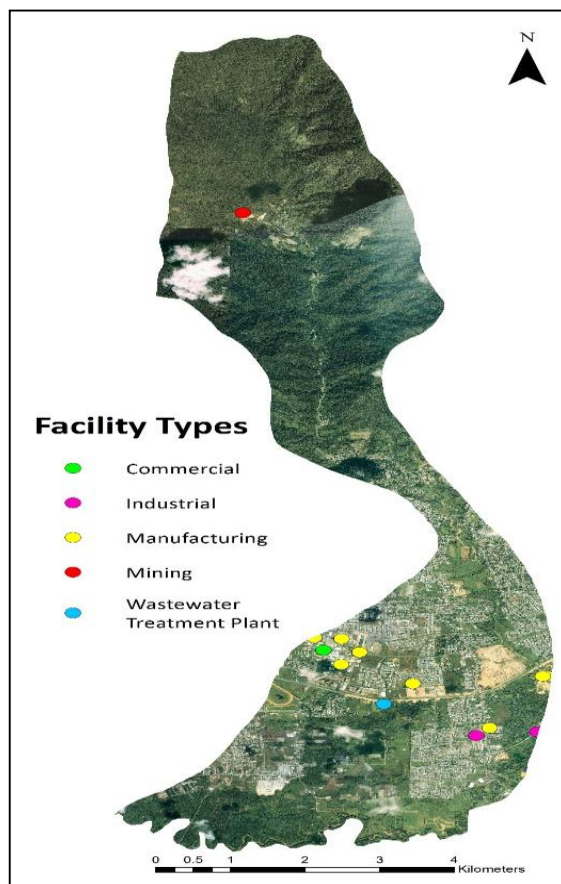


Type of Facility	Number of facilities	Pollutants Discharged from Facilities Exceeding Permissible Levels
Agricultural	1 <sup>+</sup>	Hydrogen ion (pH), five-day biological oxygen demand, total suspended solids, phosphorus, faecal coliforms
Commercial	1 <sup>+</sup>	Five-day biological oxygen demand, total suspended solids, total residual chlorine, faecal coliforms
Industrial	25*	Chemical oxygen demand ( <b>22/25</b> ), total suspended solids ( <b>22/25</b> ), chloride ( <b>16/21</b> )
Manufacturing	2 <sup>+</sup>	Ammonical nitrogen, chemical oxygen demand, chloride, chromium, copper, cyanide, dissolved hexavalent chromium, dissolved iron, faecal coliforms, five-day biological oxygen demand, lead, oil and grease, phenolic compounds, phosphorus, sulphide, total residual chlorine, total suspended solids and zinc
Water Treatment Plant	1 <sup>+</sup>	Total suspended solids

*\*Values in red indicate the number of facilities discharging the pollutant above permissible levels out of the total number of facilities discharging the pollutant.*

*\*Listed parameters were discharged above permissible levels from the total number of facilities stated*

Figure 10. Locations of the Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POC Based on Facility Type within the Arima Watershed

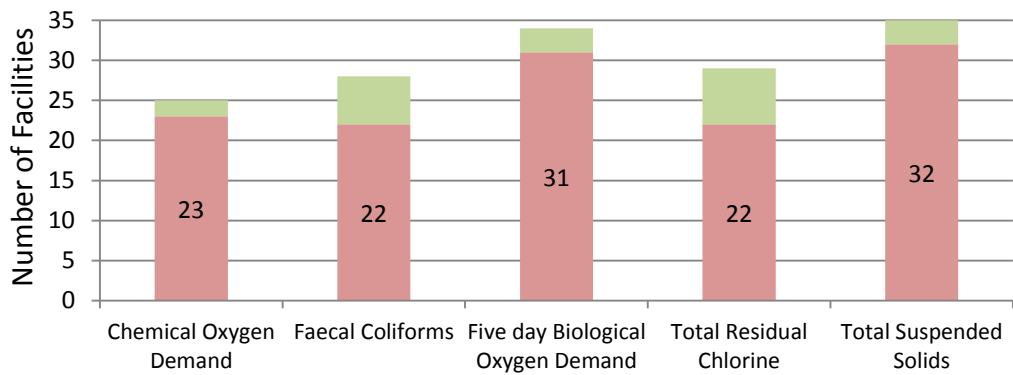
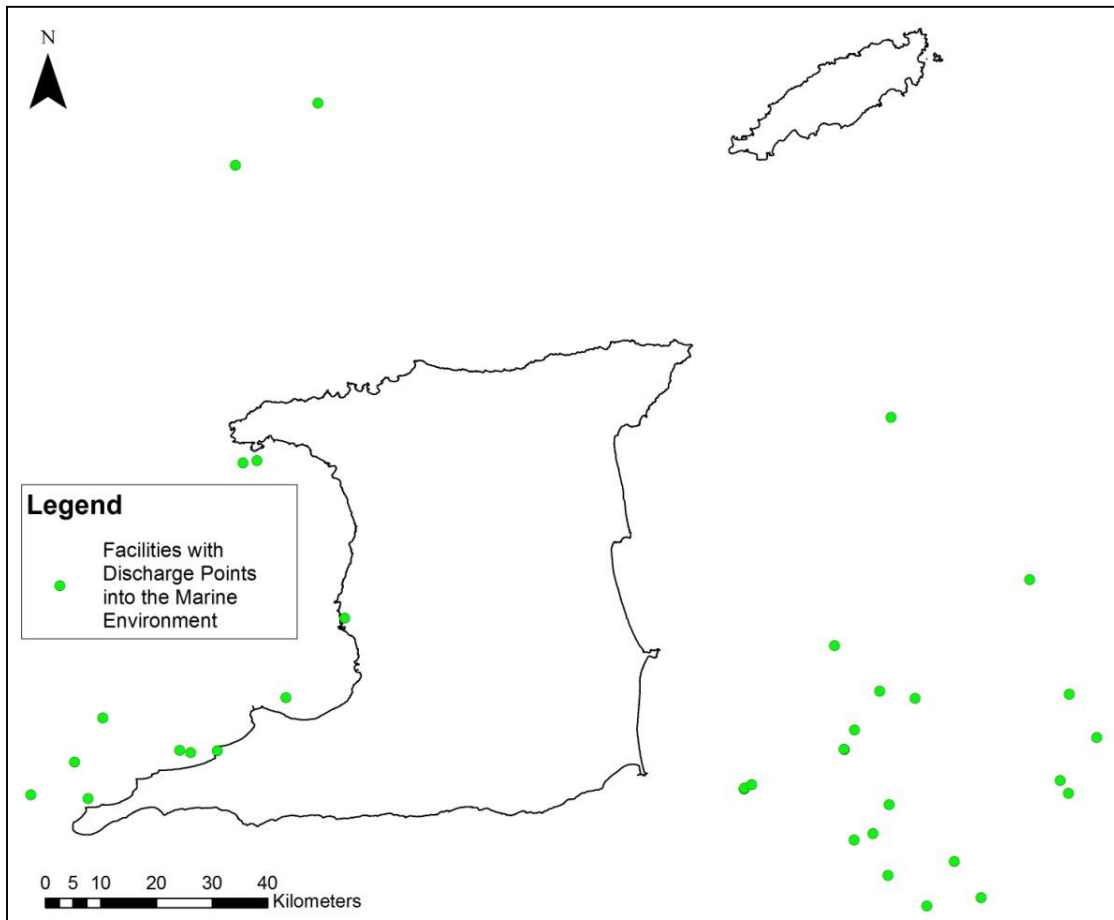


Type of Facility	Number of facilities	Pollutants Discharged from Facilities Exceeding Permissible Levels
Commercial	1 <sup>+</sup>	Hydrogen ion (pH), iron, lead, total suspended solids
Industrial	2 <sup>+</sup>	Hydrogen ion (pH), total suspended solids
Manufacturing	8 <sup>*</sup>	Ammoniacal nitrogen, five-day biological oxygen demand (5/7), total suspended solids
Mining	1 <sup>+</sup>	Cadmium, phosphorus, total suspended solids
Wastewater Treatment Plant	1 <sup>+</sup>	Chemical oxygen demand, dissolved oxygen content, faecal coliforms, five-day biological oxygen demand, total suspended solids

*\*Values in red indicate the number of facilities discharging the pollutant above permissible levels out of the total number of facilities discharging the pollutant.*

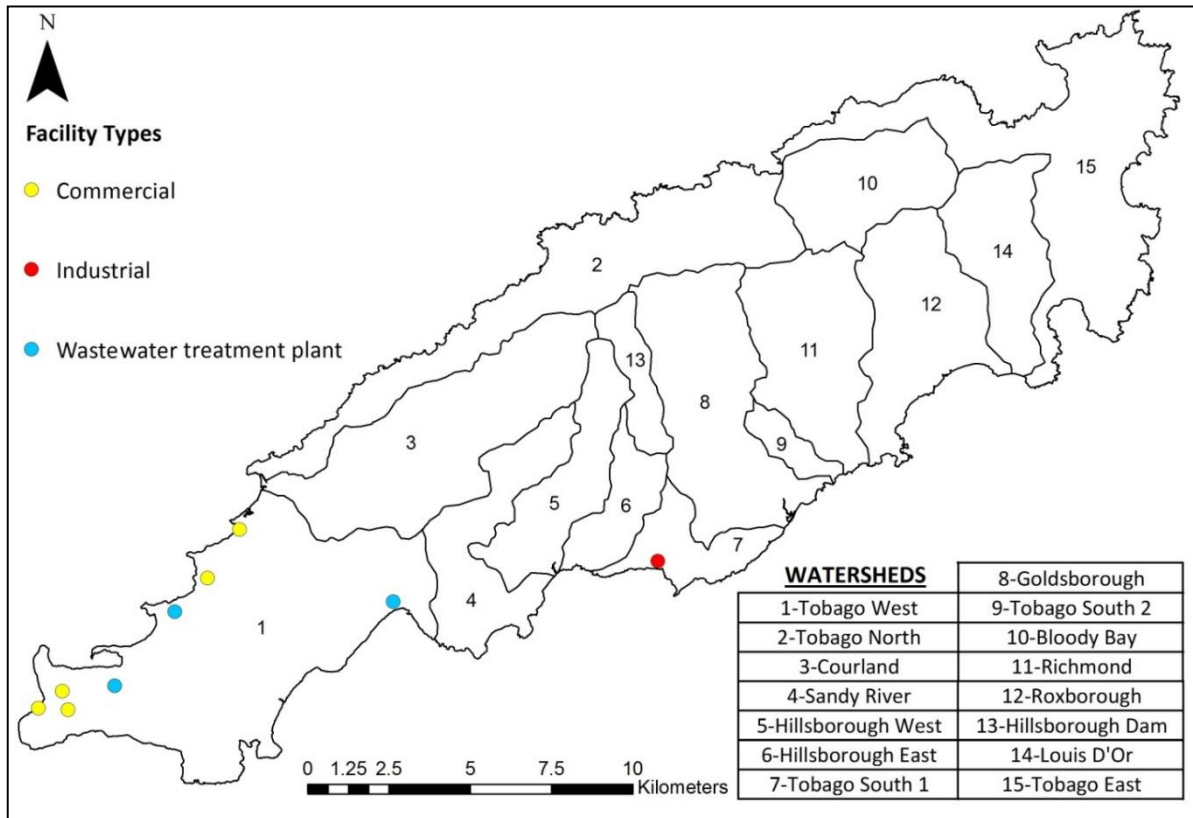
*\*Listed parameters were discharged above permissible levels from the total number of facilities stated.*

Figure 11. Locations of 35 Offshore Facilities with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Graph of the POC



■ Facilities discharging pollutants above permissible levels ■ Facilities discharging pollutants within permissible levels

Figure 12. Map of Tobago Showing the Facility Locations with a Water Pollution Source Registration Certificate between 2007 and 2015 and a Table Showing the POC Based on Facility Type



Type of Facility	Number of facilities	Pollutants Discharged from Facilities Exceeding Permissible Levels
Commercial	5*	Ammoniacal nitrogen (4/5), dissolved oxygen content (3/4), five-day biological oxygen demand (4/5), phosphorus (4/5) and total suspended solids
Industrial	1 <sup>+</sup>	Dissolved hexavalent chromium, hydrogen ion (pH), lead, total suspended solids
Wastewater Treatment Plant	3 <sup>+</sup>	Five-day biological oxygen demand, total suspended solids

\*Values in red indicate the number of facilities discharging the pollutant above permissible levels out of the total number of facilities discharging the pollutant.

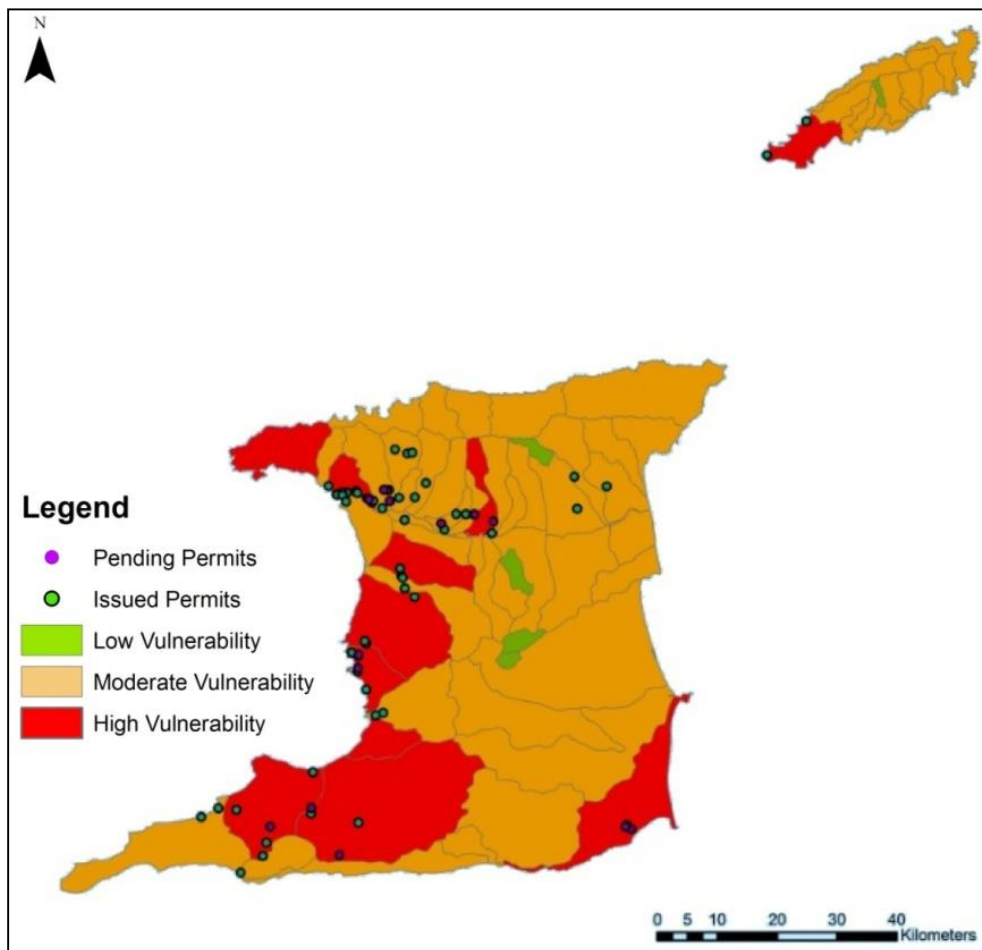
<sup>+</sup>Listed parameters were discharged above permissible levels from the total number of facilities stated.

### Analysis of Water Pollution Permit Data

The permitting process begins when the EMA notifies a facility with a SR Certificate with pollutants in exceedance of the Second Schedule to apply. Facilities which usually need to apply for a WPP are those associated with higher pollution impacts due to the nature of operations and pollution loads; have a history of complaints from the public; and are located within a watershed classified as highly vulnerable.

Figure 13 shows the locations of facilities with permits that have either been issued, or are in the process of being issued a WPP between 2009 and 2015. The map also highlights the watersheds in T&T according to its vulnerability based on the WRASTIC Index.

**Figure 13. Locations of Facilities with a Permit and those with a Pending Status between 2009 and 2015**



Source: *Environmental Management Authority, (2015)*

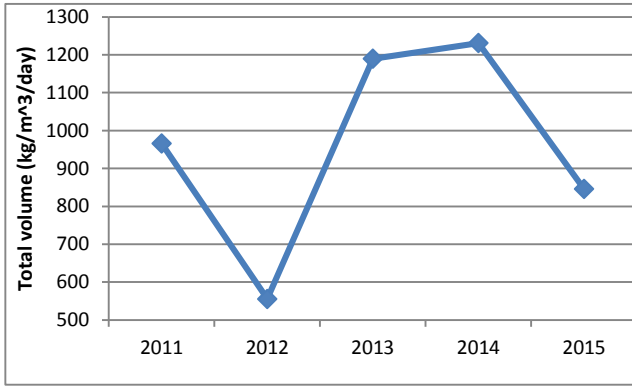
This analysis focuses on data obtained from WPPs issued in the East Port of Spain area as this watershed was one of the first to be permitted and thus, there is the most available data. Within



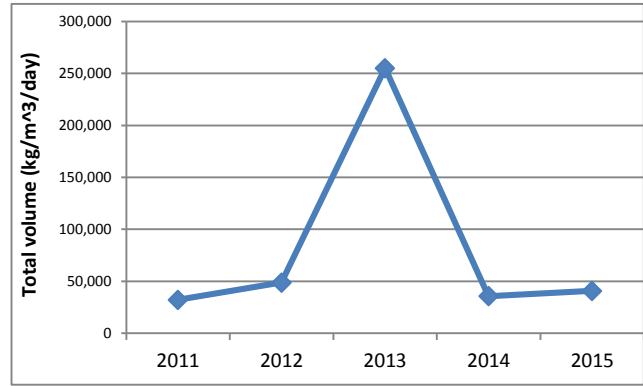
this area, the EMA monitors seven (7) WPPs. Figure 14 (a) to (e) illustrates the average daily loads of five (5) common parameters/substances from the seven (7) facilities between 2011 and 2015.

**Figure 14. Graphs of the Average Daily Loads (kg/m<sup>3</sup>/day) of Five (5) Parameters Discharged by Seven (7) Facilities in the East Port of Spain Area with WPPs Issued between 2011 and 2015**

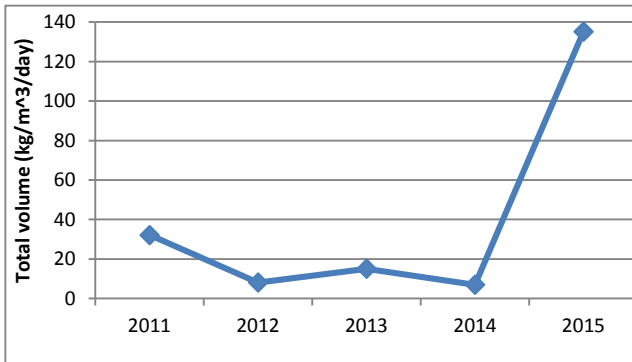
(a) Biological Oxygen Demand (4 facilities)



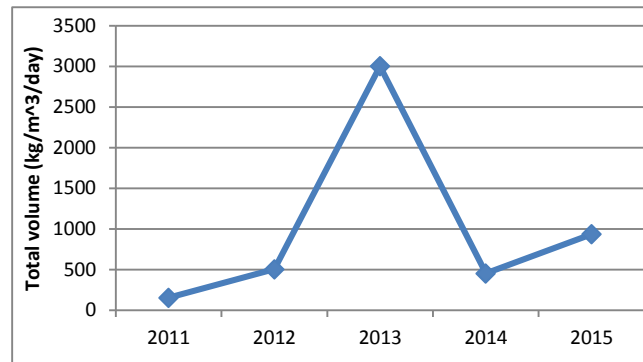
(b) Chemical Oxygen Demand (4 facilities)



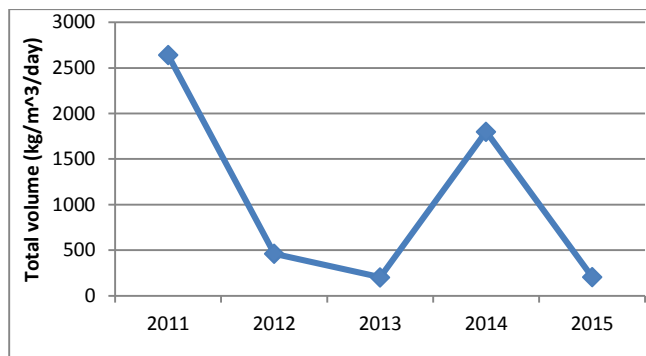
(c) Total Oil and Grease (3 facilities)



(d) Total Petroleum Hydrocarbons (4 facilities)



(e) Total Suspended Solids (6 facilities)



Source: Environmental Management Authority, (2015)

*Note:* the annual load cannot be estimated by multiplying these values by 365 or 366 days as not all the discharges occur daily based on facility operational cycle.

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The average daily load of BOD peaked in 2013 and 2014 and dramatically reduced in 2015. The average daily load of TSS from six (6) facilities saw peaks in 2011 and 2014 and noticeable decreases in the subsequent years. The average daily loads for COD and TPH also saw a massive decrease in 2015 as compared to 2013. These most recent decreases may be as a result of achieving compliance with the WPR. On the other hand, there was a significant increase of the daily load of COD in 2013 due to one facility using higher volumes of water for industrial cooling in this year. TPHs also saw a peak in 2013 due to the facility receiving and using effluent from the Port of Spain area as well as sea water which contains high volumes of the pollutant. The total effluent discharge of total oil and grease across three (3) facilities was fairly low from 2011-2014 with a spike in 2015. The facility indicated this may be due to an accidental oil spill which the facility may not have been able to contain.

The EMA uses a facilitative approach with permit holders by advising that they identify the best practices and utilise what is applicable to their facility to achieve compliance with the WPR. Facilities can invest in pollution control technologies and improve on their best management practices with good housekeeping, employee training, spill prevention and control and incident reporting. Facilities can also audit their infrastructures to determine sources of pollutants and implement measures to prevent pollutants from entering into sensitive waterways. Industrial facilities can create stringent practices by cleaning spills immediately, placing barrels of oil on a spill palette/bermed area and do preventive maintenance by fixing cracks in their pipes/tanks.



## Analysis of Coastal and Nearshore Water Quality

The State of the Marine Environment Report produced by the IMA highlights the water quality of the coastal and nearshore waters around T&T (Figure 15). Further details on the information presented below can be found in the report.

Figure 15: Quality of Coastal & Nearshore Waters Around T&T

### TRINIDAD

- ❑ The Gulf of Paria receives excessive pollution loading from agriculture, industrial, and domestic sources. This has resulted in several hot spot areas characterized primarily by elevated levels of suspended solids, nutrients and hydrocarbons.
- ❑ Excessive total suspended solids (TSS) and sediment pollution affects the coastal water of Trinidad particularly near the mouth of the Caroni River (west coast) and the North Oropouche River (east coast) where levels greater than 50 mg/L have been recorded.
- ❑ Petroleum hydrocarbon levels in water and sediment are higher on the west coast compared to other coastal areas of Trinidad and Tobago. Dissolved dispersed petroleum hydrocarbon (DDPH) concentrations above 10.0 part per billion (ppb) were found close to oil and gas operations.
- ❑ Sediment quality off Pointe-a-Pierre, La Brea and Granville indicated hotspot areas with elevated levels (>100.0 ppm) of hydrocarbons as adsorbed and absorbed petroleum hydrocarbons (AAPH).
- ❑ Heavy metal pollution of sediments is reported at sites within the Gulf of Paria.
- ❑ Bathing beach quality was poor in sections of the following bays: Maracas Bay; Las Cuevas Bay; William's Bay, Chaguaramas in the wet season; Chagville Bay, Chaguaramas after heavy rainfall; Welcome Bay, Chaguaramas in the wet season and King's Wharf, Sean Fernando.
- ❑ Analysis of oysters (*Crassostrea rhizophorae*) tissue collected at the Rousillac Swamp in 2014 for AAPH indicate elevated levels ranging between 10.58 and 38.59 ppm. Caution should be taken when consuming oysters since these organisms are filter feeders that can bio-accumulate toxic hydrocarbons. AAPH measures polycyclic aromatic hydrocarbons which are known carcinogens (US EPA, 1995) that can be harmful to human health if ingested.

### TOBAGO

- ❑ *Thalassia* dominated seagrass beds were lost along the north-western peninsula of Trinidad and in Kilgwyn and La Guira Bay in Tobago due to poor water quality. Seagrasses have spread into Nylon Pool as consequence of nutrient pollution.
- ❑ Coral reefs are negatively impacted by land-based sources of pollution (nutrients and sediments) making them more vulnerable to impacts from climate change (bleaching) and diseases. Many coral reefs around Tobago have been experiencing phase shifts in benthic cover away from hard coral to species more tolerant of nutrient enriched water.

Source: *Institute of Marine Affairs (2016). State of the Marine Environment Report 2016.*

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### Addressing the Limitations of the Water Pollution Rules

It is important to note that the WPR is only effective in managing water pollution from point sources within T&T. Unfortunately, the legislation does not establish water quality based standards for water bodies with different uses nor does it address the management of NPS (Non-Point Sources) of pollution. The EMA is seeking to strengthen its ability to mitigate water pollution through the development of ambient water quality standards for the country (Section 5.0 highlights this project in detail). From this project, a water use classification system for water bodies will be developed, water quality criteria deemed necessary to support the designated uses of each water body or segment thereof will be established and an anti-degradation policy, which ensures the protection of water quality for a particular water body where the quality exceeds levels necessary to protect uses such as fish and wildlife propagation and recreation on or in the water will be developed. This will ensure that water quality will be more effectively protected from point sources and NPS of pollution. Furthermore, the data from the project will be used in a NPS management programme. The data will assist in identifying the contributors of NPSs of pollution and developing management and monitoring plans to address the specific contributors. This aligns with Goal 6 of the UN SDGs by improving water quality through pollution reduction.

A more specific limitation of the WPR is that it does not provide for monitoring of facilities after they have achieved compliance to ensure they maintain compliance. The EMA is currently developing a voluntary compliance framework to address this in the short term. On the other hand, there is the possibility of facilities discharging pollutants into the environment without obtaining any of the appropriate permits. As such, in 2014, the EMA conducted a project to create a Water Pollution Inventory which identified the locations of all point sources of water pollution. This study identified 5,584 unregistered potential sources of water pollution<sup>70</sup>. It can be used by the EMA to inform facilities of the WPR that they may be a potential source of water pollutants and they should apply for a SR Certificate<sup>71</sup>.

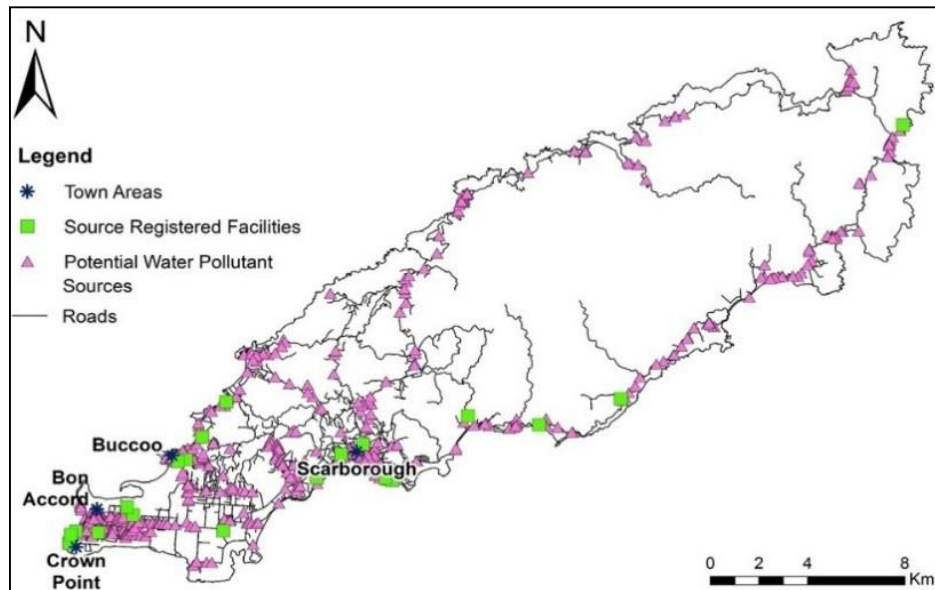
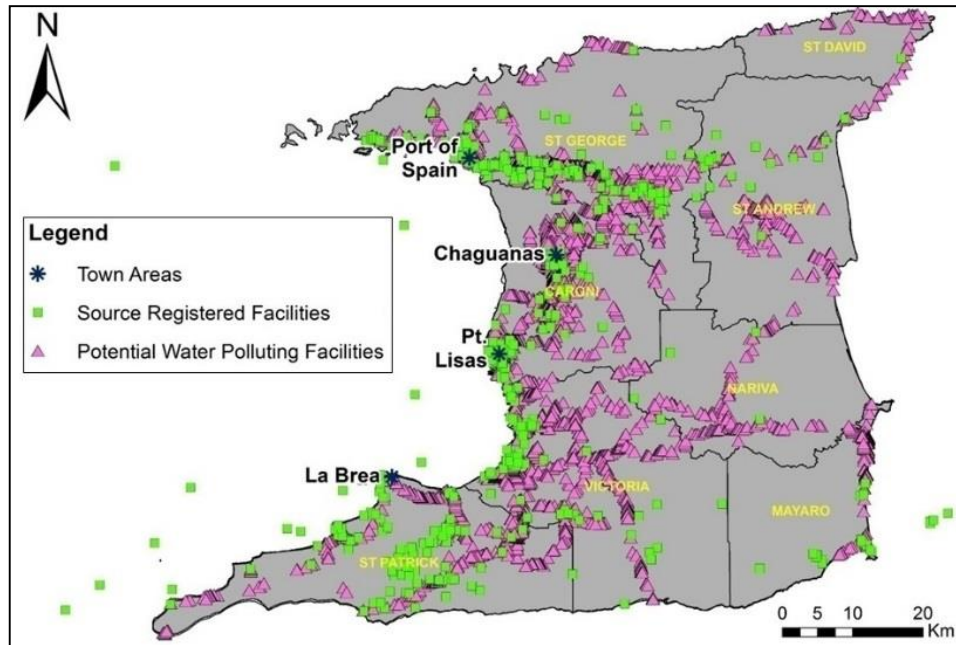
Figure 16 highlights the results of the Water Pollution Inventory in both Trinidad and Tobago. The maps illustrate a high potential for registering many other possible sources of water pollution. Using this inventory can greatly control and improve the quantity of effluent entering into the fresh water and marine environments by increasing the number of registered facilities.

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<sup>70</sup> Environmental Management Authority. (2014). Final Report- An Inventory of Air and Water Pollutants for T&T.

<sup>71</sup> Ibid.

Figure 16. Maps Showing Locations of Source Registered and Potential Water Pollutant Sources for Trinidad and Tobago between 2007 and 2014



Source: Environmental Management Authority, (2014)<sup>72</sup>

<sup>72</sup> EMA. (2014). Final Report- An Inventory of Air and Water Pollutants for Trinidad and Tobago.

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## ASOE 2015 SPOTLIGHT: Development of Ambient Water Quality Standards (AWQS) for T&T

AWQS define the water quality goals of a water body, or portions thereof, by designating its use or uses and by setting the criteria necessary to protect such uses<sup>73</sup>. These standards ultimately control pollution entering into the water body from a variety of sources such as industrial facilities and water treatment plants<sup>74</sup>. It also establishes anti-degradation policies which include implementation procedures that serve to maintain and protect water quality<sup>75</sup>. As such, in 2013, the EMA began a project to develop AWQS for T&T. The objective of the project is to develop AWQS for all watersheds in T&T. The specific objectives for each of the 54 watersheds in Trinidad and 15 watersheds in Tobago are:

- Define and designate water use(s) for inland and coastal waters including ground water;
- Develop ambient water quality standards to support the use(s) identified; and
- Develop anti-degradation policies and management strategies to protect and preserve waters of a high quality.

To achieve these objectives, the project is being implemented in the following three (3) phases:

- Phase I, which was completed in 2014, involved the review of available and relevant literature for each watershed and sub-watershed in T&T; identification of current water uses; development of a preliminary water use classification and ambient water quality criteria for each of the watersheds; the conduct of a use attainability analysis and the development of a proposal for data collection.
- Phase II will begin in 2016 and involves a pilot study for designating water uses and criteria through data collection and analysis. Part 1 of this phase involves water and sediment sample collection in two watersheds: Arima Watershed in Trinidad and Courland Watershed in Tobago. The second part to this phase will involve data collection in at least six (6) watersheds within Trinidad and Tobago, which will be a representative geographical distribution of different water quality conditions. This Phase is expected to be conducted over a two (2) year period.
- Phase III will include the establishment of a Technical Steering Committee, national stakeholder consultations and a Public Comment period in accordance with Section 28 of the EM Act, in order to finalise a national water use classification system and AWQS.

### Completed Step - Phase I

The current water uses within each watershed in T&T could be categorized as: domestic, agricultural, industrial and recreational (Figure 17). The existence of a town within each watershed in T&T indicates the use of water for domestic purposes. Recreational purposes include the use of waterfalls, rivers and swamps in watersheds.

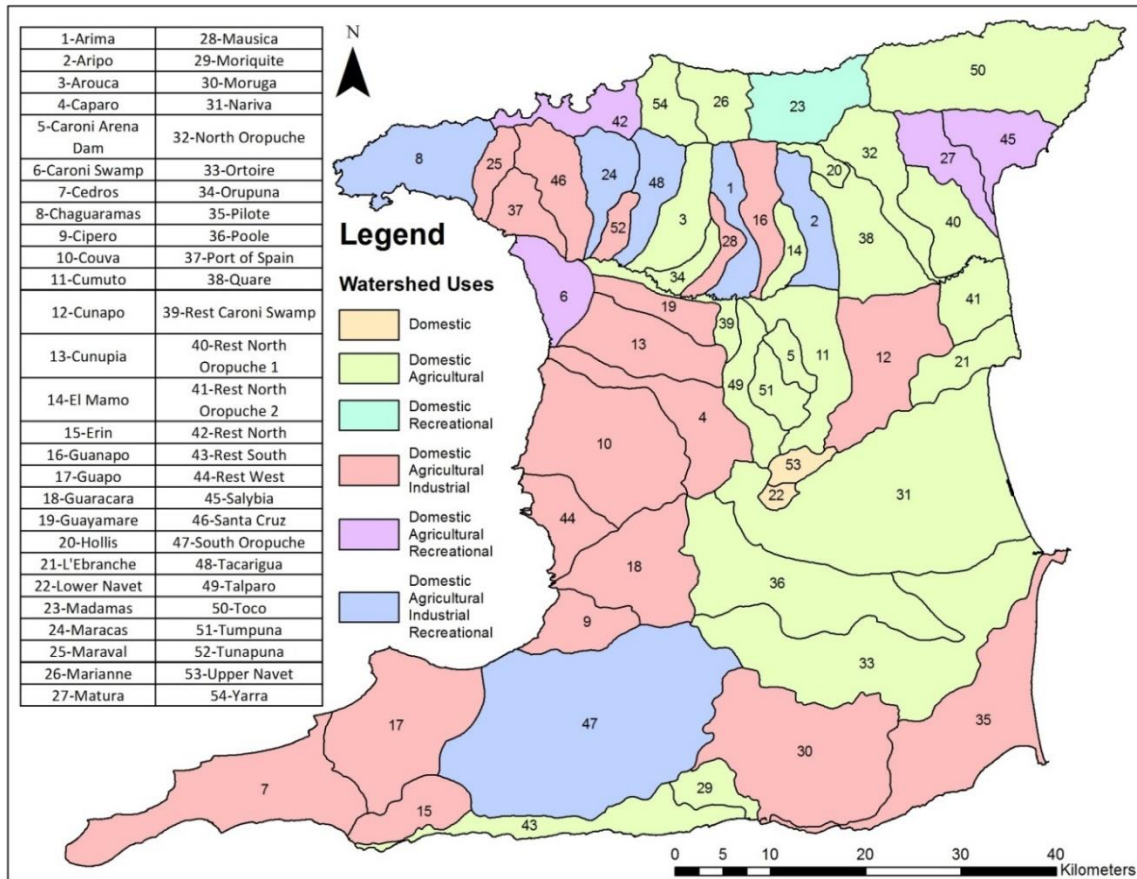
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<sup>73</sup> Code of Federal Regulations (CFR), (n.d.). Water Quality Standards. Retrieved from <https://www.law.cornell.edu/cfr/text/40/130.3>

<sup>74</sup> United States Environmental Protection Agency (USEPA), (2015). What are Water Quality Standards? Retrieved from <https://www.epa.gov/standards-water-body-health/what-are-water-quality-standards>

<sup>75</sup> USEPA. (1991). Technical Support Document for Water Quality-based Toxics Control.

Figure 17. Map Showing Current Water Uses in the 54 Watersheds in Trinidad.

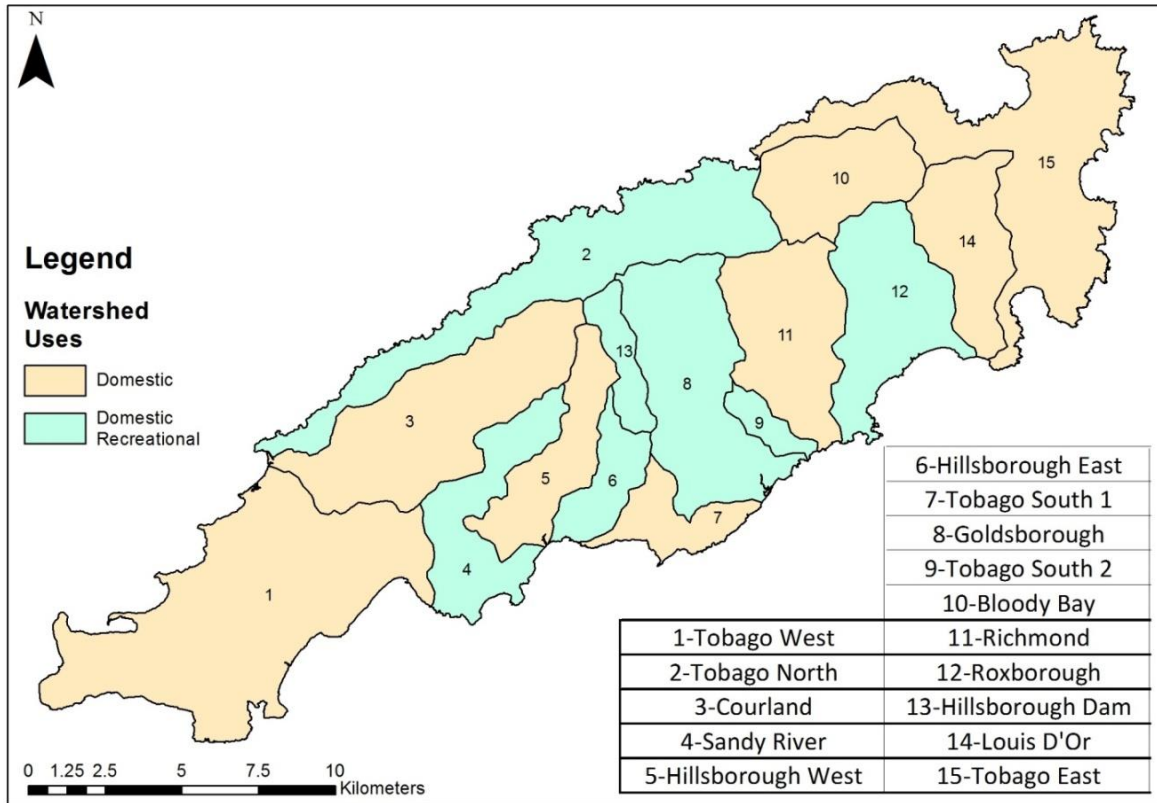


Source: Environmental Management Authority, (2015)<sup>76</sup>

<sup>76</sup> Map created using data from: University of the West Indies, (2014). Final Report - Development of Ambient Water Quality Standards for Trinidad and Tobago – Phase 1. Prepared for the EMA.

The water uses within the 15 watersheds in Tobago were identified as mainly domestic and recreational (Figure 18). Data regarding the use of water for agricultural and industrial activities were unavailable for Tobago<sup>77</sup>.

Figure 18. Map Showing Current Water Uses in the 15 Watersheds in Tobago



Source: Environmental Management Authority, (2015)<sup>78</sup>

Phase I also included the proposal of a water use classification scheme for fresh water in T&T to include the following defined categories: protection of aquatic life and ecologically sensitive aquatic ecosystems, water supply, primary and secondary contact recreation and agriculture. It also proposed the following classification categories for coastal/marine waters as: protection of aquatic life and ecologically sensitive aquatic ecosystems, recreation and industry.

<sup>77</sup> University of the West Indies, (2014). Final Report - Development of Ambient Water Quality Standards for Trinidad and Tobago – Phase 1. Prepared for the EMA.

<sup>78</sup> Map created using data from: University of the West Indies, (2014). Final Report - Development of Ambient Water Quality Standards for Trinidad and Tobago – Phase 1. Prepared for the EMA.



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## Current Step - Phase II

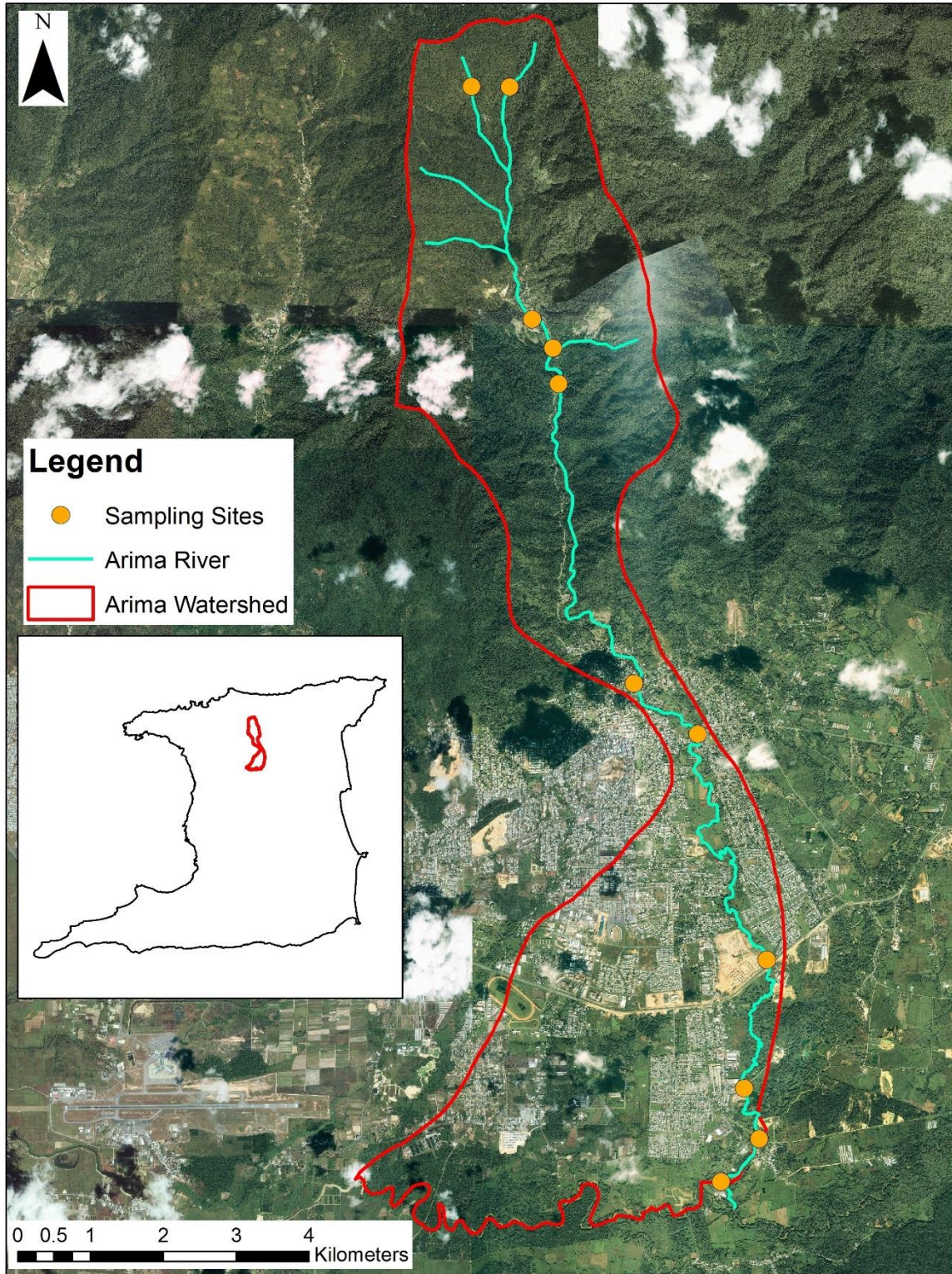
The EMA is currently in the process of finalizing the logistics of Phase II of the Project. The watersheds for this pilot study as identified in Phase I are the Arima watershed in Trinidad and the Courland watershed in Tobago. Preliminary site visits to these watersheds were conducted and 21 sample sites were selected in the Arima and Courland Watersheds (Figures 19 & 20). Water and sediment samples are to be collected once every two (2) months for a period of one (1) year.

The samples collected will be analyzed for the following 36 parameters: temperature; pH; dissolved oxygen; five-day BOD<sub>5</sub> at 20°C); total oil and grease (n-hexane extractable material); conductivity; salinity; total alkalinity; total hardness; total nitrates; total phosphates; ammoniacal nitrogen; TSS; sulphate; chloride; total arsenic; total barium; total cadmium; total chromium; total copper; dissolved iron; total lead; total mercury; total nickel; total cyanide; total zinc; faecal coliforms; total coliforms; *enterococcus*; malathion; paraquat; BTEX (benzene, toluene, ethylbenzene, xylene); MTBE (methyl tert-butyl ether); and trihalomethanes.

Other work to be done during this phase will include the following:

1. Data collection and analysis of water and sediment samples in six (6) additional watersheds in Trinidad and Tobago. The watersheds will be chosen based on the WRASTIC index and will represent each vulnerability class (low, moderate or high).
2. Conduct of a UAA (Use Attainability Analysis) for each pilot watershed. The UAA is a structured scientific assessment of the factors affecting the attainment of uses designated for a water body. The factors to be considered in such an analysis include the physical, chemical, biological, and economic factors;
3. Development of a draft Water Use Classification System and AWQS for these watersheds;
4. Development of draft anti-degradation policies and management strategies to protect and preserve waters of a high quality in these watersheds;
5. Development of a database to manage all data collected through this project. The data will also be used to support decision making by the EMA and other government agencies; and
6. Conduct of focus group meetings with relevant stakeholders to refine the draft water use classification system and AWQS for the pilot study watersheds.

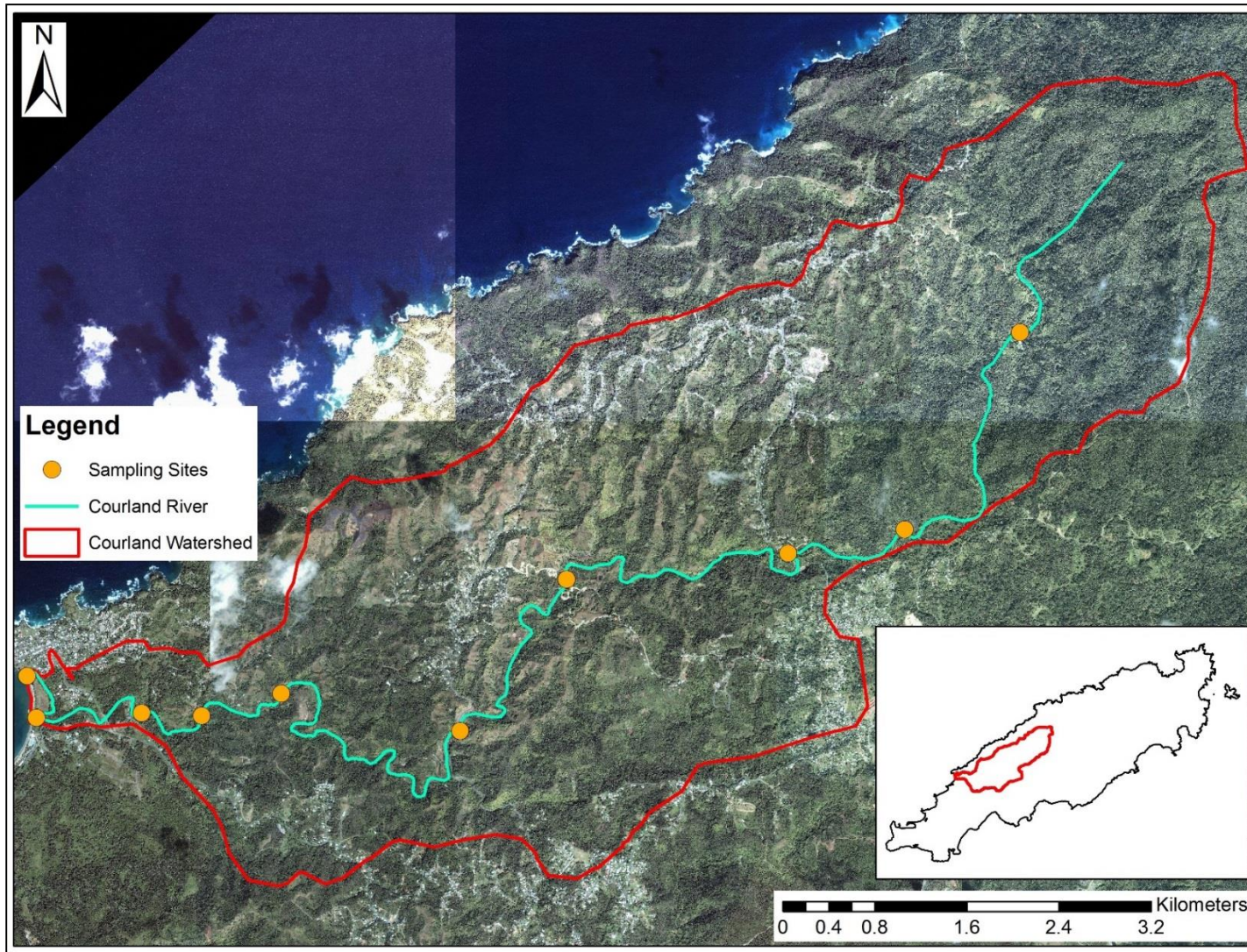
Figure 19. Map Showing the Location of the Arima Watershed in Trinidad and Sampling Points for Phase II of the Project



Source: *Environmental Management Authority, (2015)*



Figure 20. Map Showing the Location of the Courland Watershed in Tobago and Sampling Points for Phase II of the Project



Source: Environmental Management Authority, (2015)

## THE WAY FORWARD

As previously mentioned, T&T follows International and Regional Agreements along with Local Legislation to protect the quality of its water bodies. This section discusses the next steps to be taken to measure and further protect the health of water bodies through the development and use of water quality indicators and water pollution management plans.

### National Water Quality Indicators

The purpose of water quality indicators is to describe and assess physical, chemical, biological and aesthetic characteristics of water quality, which would provide early warning signs of potential water pollution<sup>79</sup>. Assessing water quality involves comparing measured parameter concentrations to standards in existence to meet ecosystem health objectives<sup>80</sup>. Thus, water quality indicators will be a key tool in measuring the health of water bodies in T&T once ambient water quality standards have been developed. Indicators for T&T will be used to inform decision makers of the current state of a water body by identifying water quality trends and to aid investigations into problems such as non-point source pollution and nutrient enrichment<sup>81</sup>. The following case study illustrates the importance and effectiveness of environmental indicators in a local context (Figure 21).

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<sup>79</sup> Department of Environment and Heritage Protection, Queensland Government. (2015). Ecosystem Health Indicators. Retrieved from [https://www.ehp.qld.gov.au/water/monitoring/assessment/water\\_quality\\_indicators.html](https://www.ehp.qld.gov.au/water/monitoring/assessment/water_quality_indicators.html)

<sup>80</sup> Regional Aquatics Monitoring Program. (n.d.). Water Quality Indicators. Retrieved from <http://www.ramp-alberta.org/river/water+sediment+quality/chemical.aspx>

<sup>81</sup> Lower Colorado River Authority. (2015). Water Quality Indicators. Retrieved from <http://www.lcra.org/water/quality/colorado-river-watch-network/pages/water-quality-indicators.aspx>

Figure 21: Environmental Indicator Case Study for the Caroni Swamp

Benthic invertebrates play a key role in the nutrient cycling, pollution metabolism and energy flows through the marine food webs. Epibenthic and benthic conditions can, in turn, have significant direct and indirect effects on fisheries, as well as species of conservation concern such as; sea turtles or rays that feed on the sea floor. Monitoring of key ecosystem indicators is an important component of successful management in marine protected areas. Monitoring can help identify stresses on the environment which may lead to early mitigation of the problem, and is also crucial to detect large-scale changes in environmental systems such as climate change so that resource managers can adjust conservation strategies.

In 2015, the Institute of Marine Affairs (IMA) sampled the benthic community along the Caroni Swamp in the months of April and August. Of the three major bodies of water flowing through the Caroni Swamp, the Blue River was found to have the healthiest benthic community with the most species, number of individuals and highest diversity. One thousand one hundred and thirteen (1,113) organisms were collected during the two sampling periods. Thirty four (34) species were recorded in the dry season and 44 species in the wet season. Arthropoda accounted for 52% of organisms found, polychaetes 45% and all other organisms 3%. Evidence from this study showed that the Caroni Swamp is dominated by species that are tolerant to pollution. This coupled with the presence of few pollution intolerant species supports the hypothesis that the Caroni Swamp is slightly to moderately polluted as it receives polluted water in its catchment area from industrial, agricultural and domestic sources. Gobin and Agard (1992) have suggested that areas of impoverished benthic fauna are characteristic of being moderately disturbed.

*Source: Extracted from the Institute of Marine Affairs State of the Marine Environment Report for 2016*

To determine whether water quality is acceptable or not, one must first focus on the purpose of the water quality assessment. For example, a particular parameter concentration may be suitable for industrial uses but not for drinking or bathing<sup>82</sup>. As such, water quality indicators for T&T will range according to the use(s) of a watershed and the marine environment such as: protection of aquatic life and ecologically sensitive aquatic ecosystems, drinking water supply, primary and secondary contact recreation, agriculture and industry.

Efforts are currently being made to establish baseline data for watersheds through Phases II and III of the project to develop AWQS for T&T. Chosen water quality indicators for T&T would be based on the parameters and its concentrations outlined in the developed standards. Once water quality standards are refined to a local context, indicators can be proposed to measure and evaluate how successful the nation is in meeting the standards over time. The process of water quality indicator development will also require heavy stakeholder engagement at all stages of development. This includes but is not limited to stakeholder engagement in the process of addressing information gaps, proposing suitable water quality indicators on a national level based on scientifically sound data and ensuring consistent and long term monitoring of pollutants of concern. The EMA holds the responsibility of convening group meetings with stakeholders to determine and finalize water quality indicators for the country. Stakeholders that need to be engaged include, but are not limited to, IMA, WASA (Water & Sewerage Authority), WRA (Water Resources Agency), TTBS (Trinidad & Tobago Bureau of Standards), UTT (University of Trinidad & Tobago) and UWI (University of the West Indies).

The following section presents two case studies showing the importance and use of indicators on a small scale and another on a larger scale in other jurisdictions.

#### Regional Aquatic Monitoring Program – Alberta, Canada

In Alberta, Canada, the RAMP (Regional Aquatic Monitoring Program) is an industry-funded, multi-stakeholder environmental monitoring program which uses six (6) chemical indicators to assess water quality. It is a great start to identifying some key parameters which affect water quality. The categories of parameters which the RAMP measures include the following:

- *Temperature and dissolved oxygen* - these are measured as they are considered the most important and essential characteristics of an aquatic system as it directly affect both biological and chemical processes<sup>83</sup>;
- *Conventional variables* - the RAMP measures these to give a general indication of how a water body is able to support aquatic life. These conventional variables are listed as: pH (a measure of the hydrogen ion concentration); total dissolved solids and conductivity (a

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<sup>82</sup> Regional Aquatics Monitoring Program. (n.d.). Water Quality Indicators. Retrieved from <http://www.ramp-alberta.org/river/water+sediment+quality/chemical.aspx>

<sup>83</sup> Regional Aquatics Monitoring Program (RAMP). (n.d.). Water Quality Indicators: Temperature and Dissolved Oxygen. Retrieved from <http://www.ramp-alberta.org/river/water+sediment+quality/chemical/temperature+and+dissolved+oxygen.aspx>



measure of the quantity of dissolved substances in water and the ability of water to conduct an electric current, respectively); and suspended sediment (the mass of suspended sediment per unit volume of water)<sup>84</sup>;

- *Nutrients* - the RAMP measures organic and inorganic particulates and dissolved organic and inorganic nutrients such as phosphorus and nitrogen. This is to indicate the likelihood of eutrophication occurring in the system<sup>85</sup>;
- *Metals* - these are measured to assess the levels of toxicity that can affect aquatic life. Metals measured include manganese, zinc and copper<sup>86</sup>;
- *Hydrocarbons* - due to the industrial state of Alberta, this parameter must be measured to assess the potential levels of toxicity to aquatic animals<sup>87</sup>; and
- *Industrial chemicals (PCBs and dioxins/furans)* - this parameter is measured due to the health effects it causes on immune, reproductive, nervous and endocrine systems<sup>88</sup>.

#### Biological Condition Gradient – USEPA (United States Environmental Protection Agency)

The USEPA uses a stress gradient analysis. A stress gradient is defined using a single or a combination of known, measurable pollutants that represent a portion of the stressors impacting a water body.<sup>87</sup> The USEPA has created a conceptual framework known as the Biological Condition Gradient which identifies and measures every possible factor which can affect the biological conditions of aquatic resources. Thus, their method seeks to represent a cumulative stress in a water environment which would more precisely define and interpret baseline biological conditions, help evaluate potential for improvement in degraded waters, and measure and document incremental changes in condition along a gradient of anthropogenic stress due to the presence of multiple stressors.<sup>87</sup>

A well-defined, quantitative list of stressors, and the underlying data used to develop it, links biological and causal assessments<sup>89</sup>. This further enhances the bond between management goals and its respective actions for protection or restoration of a water body<sup>90</sup>. It identifies the major factors as water quality, flow regime, energy source, physical habitat structure and biotic interaction (Figure 22).

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<sup>84</sup> RAMP. (n.d.). Water Quality Indicators: Conventional Variables. Retrieved from <http://www.ramp-alberta.org/river/water+sediment+quality/chemical/conventional.aspx>

<sup>85</sup> RAMP. (n.d.). Water Quality Indicators: Nutrients. Retrieved from <http://www.ramp-alberta.org/river/water+sediment+quality/chemical/nutrient.aspx>

<sup>86</sup> RAMP. (n.d.). Water Quality Indicators: Metals. Retrieved from <http://www.ramp-alberta.org/river/water+sediment+quality/chemical/metals.aspx>

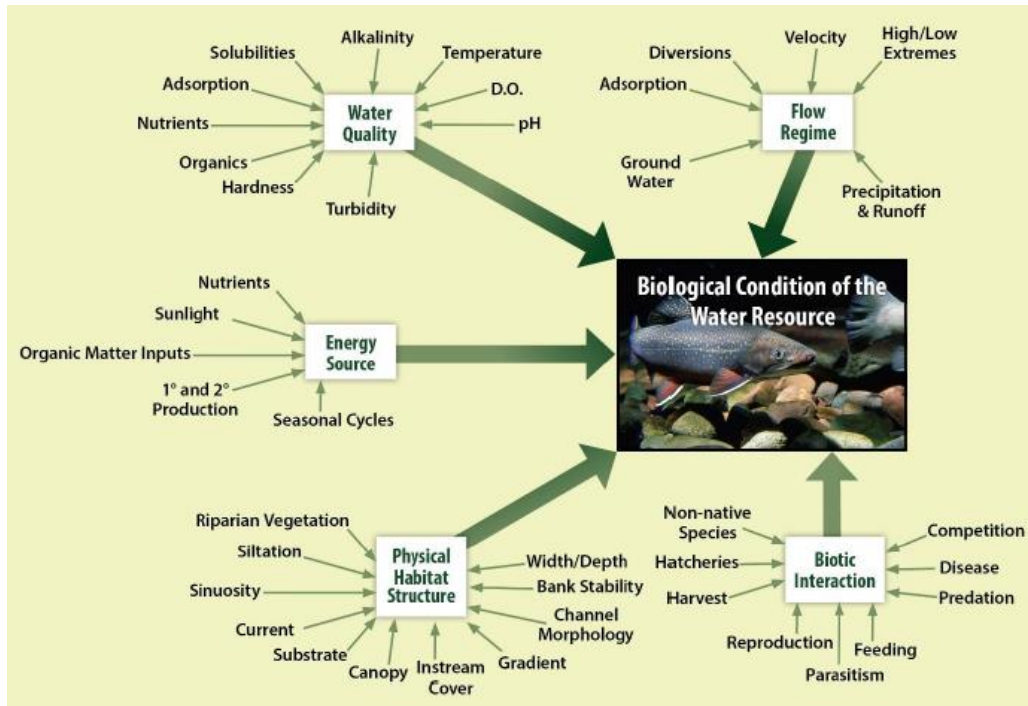
<sup>87</sup> RAMP. (n.d.). Water Quality Indicators: Hydrocarbons. Retrieved from <http://www.ramp-alberta.org/river/water+sediment+quality/chemical/industrial.aspx>

<sup>88</sup> RAMP. (n.d.). Water Quality Indicators: Industrial Chemicals. Retrieved from <http://www.ramp-alberta.org/river/water+sediment+quality/chemical/industrial+chemicals.aspx>

<sup>89</sup> USEPA. (2015). A Practitioner's Guide to the Biological Condition Gradient: A Framework to Describe Incremental Change in Aquatic Ecosystems. Retrieved from <https://www.epa.gov/sites/production/files/2016-02/documents/bcg-practioners-guide-report.pdf>

<sup>90</sup> Ibid.

Figure 22. Diagram Showing the Factors Affecting the Biological Conditions of Aquatic Resources.



Source: United States Environmental Protection Agency (USEPA), (2015)<sup>91</sup>

## Water Pollution Management Solutions

### Non-Point Source (NPS) Pollution Management Programme

The EMA recognizes the need to develop a national NPS pollution management programme which will complement the WPR. Such a programme will have “the long term goal of protecting T&T’s waters from further degradation by NPS pollution and restoring water quality through scientific assessment, implementation of voluntary and mandatory control measures based on these assessments, and public education and awareness initiatives on NPS pollution”<sup>92</sup>. Although a programme will be effective in the short-term, legislation tailored towards tackling the issue of NPS pollution must still be developed. It will ensure that lands, ground water and surface waters will be properly managed and protected during activities such as land farming, mining, logging, etc.<sup>93</sup>. The key to reducing NPS pollution is engaging the public through awareness/education

<sup>91</sup> USEPA. (2015). A Practitioner’s Guide to the Biological Condition Gradient: A Framework to Describe Incremental Change in Aquatic Ecosystems. Retrieved from <https://www.epa.gov/sites/production/files/2016-02/documents/bcg-practioners-guide-report.pdf>

<sup>92</sup> EMA. (2013). Development of a National Non-Point Source Pollution Management Programme. Retrieved from <http://www.ema.co.tt/new/index.php/non-point-source-pollution-management-programme>

<sup>93</sup> EMA. (2016). Water Pollution Management Programme Revised Draft Report. Internal document. First draft can be retrieved from <http://www.ema.co.tt/docs/techServ/water/rewpmp.pdf>

programmes on examples of how to prevent it and thus, encouraging them to play an active role through practicing conservation<sup>94</sup>.

### Produced Water Policy

Produced water is a by-product that is brought to the surface during oil and gas operations which contains minerals, particulate and dissolved organics<sup>95</sup>. It is separated from TPHs and may be discharged into water environments with or without further treatment. The WPR does not address the continuous loading of pollutants into the same environment and its cumulative impacts in relation to produced water. One way to approach this issue, is to create a Policy which focuses on reducing toxic parameters associated with produced water which are not included in the WPR. Some of these parameters include BTEX and PAHs for which technology exists to remove over 99% of these compounds from water<sup>96</sup>. The MEEI (Ministry of Energy & Energy Industries) has legal authority for regulation of the energy sector and may require operators to do more than what is required by the EMA's WPR<sup>97</sup>. Therefore, the EMA is collaborating with MEEI to create a Produced Water Policy for the effective management of produced water in T&T.

### Wastewater Reuse Policy

As the source of freshwater declines and wastewater continues to negatively impact ecosystems, it is recognised that enhanced wastewater management is required<sup>98</sup>. The development and implementation of management programmes to include wastewater reuse will be especially important as a valuable alternate source of water. The EMA will develop and implement a wastewater reuse policy to effectively manage the quality and quantity of wastewater discharged into the environment to achieve the requirements of Goal 6 of the UN SDGs and the NEP.

The EMA will be conducting the NPS water pollution management programme and will also implement the Produced Water and Wastewater Reuse Policies in the coming years. These entail extensive research, collaborations with stakeholders and development of the documents. This will assist with closing the gaps that exists within the WPR by covering a wider range of aspects that negatively impact the fresh water and marine environments in T&T.

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<sup>94</sup> EMA. (2016). Water Pollution Management Programme Revised Draft Report. Internal document. First draft can be retrieved from <http://www.ema.co.tt/docs/techServ/water/rewpmp.pdf>

<sup>95</sup> EPA. (n.d.). Utilizing Produced Water as a New Water Resource. Retrieved from [https://www.epa.gov/sites/production/files/documents/stewart\\_1.pdf](https://www.epa.gov/sites/production/files/documents/stewart_1.pdf)

<sup>96</sup> EMA. (2015). Draft International and Local Review of Produced Water Treatment and Effluent Discharge Report. Internal EMA document.

<sup>97</sup> Ibid.

<sup>98</sup> EMA. (2016). Water Pollution Management Programme Revised Draft Report. Internal document. First draft can be retrieved from <http://www.ema.co.tt/docs/techServ/water/rewpmp.pdf>

## PART B: ACTIVITIES, ACCOMPLISHMENTS AND GOALS OF THE EMA

In 2015 the EMA actively engaged with state, public, civil society and international agencies as enshrined in its coordination mandate in Section II, 14 (1) (b) of the EM Act. This engagement and collaboration assisted the EMA in delivering on its key activities and resulting accomplishments. Among the notable accomplishments in 2015 were:

- Enactment of the APR (Air Pollution Rules) on April 8, 2015;
- Receipt of 219 new Water Pollution Source Registration applications;
- An increase in CEC applications by 4.8% and noise variation applications by 6% respectively when compared to the previous year;
- Successful introduction of the iCARE Programme championed by the character Ronnie and;
- Good progress on the scope of the NRCSWLP (National Restoration Carbon Sequestration Wildlife and Livelihoods Project);
- Ongoing environmental public education with schools, civil society, communities and special interest groups;

The following summarizes the major activities of the EMA in 2015, as executed by the core functional units.

### TECHNICAL SERVICES DEPARTMENT

#### WGIS (Water & GIS Unit)

Work on implementation of the WPR carried-out in 2015 included ongoing SR, Source Registration Renewal, WPPs and Water Pollution Permits Renewals, as well as, Variations.

Table 6: Applications & Permits under the WPR for 2015

Process	Applications Received	Certificates/Permits Issued
Source Registration	53	13
Source Registration Renewal	65	51
Water Pollution Permits	4	4
Water Pollution Permit Variations	9	9
Water Pollution Permit Renewals	7	2
<b>Total</b>	<b>219</b>	<b>79</b>

Additionally:

- i. Responsibility of post compliance monitoring of permits was transferred to the PMCHSE (Permit Monitoring, Complaints & HSE) Unit.
- ii. Managed implementation of Component 2 of the GEF CReW Project – Resource Valuation Study
- iii. Continued implementation of the project - Development of AWQS for T&T
- iv. Represented EMA on the National Coordinating Committee to guide the implementation of the Montreal Protocol



- v. In collaboration with Legal Services, commenced enforcement against facilities who failed to submit applications for SR (who were guided to apply or required to renew)
- vi. Participated in the IWRM (Integrated Water Resource Management) Forum, presenting on the implementation of the WPR
- vii. Participated in the SPE (Society of Petroleum Engineers) Oil and Gas Effluent Discharges Management Workshop, presenting on the implementation of the WPR

**CEC Unit**

The CEC Rules, 2001 provided the EMA with an ongoing tool for effectively ensuring a sustainable balance between development and environmental protection.

**Key accomplishments:**

- In 2015 the CEC Unit received 348 CEC applications, an increase of 4.8% from 2014 in which 332 CEC applications were received. In 2015 the CEC unit issued 203 CECs, representing a decrease of 10.6% from the previous year in which 227 CECs were granted;
- The number of CECs requiring EIAs (Environmental Impact Assessments) decreased by 50% in 2015, with 6 CEC applications requiring an EIA, compared to the 2014 figure of 12;
- The number of CEC applications issuing NORs (Notice of Refusals) remained constant in 2015 with 8 NORs issued as in the previous year;
- Some ongoing challenges faced in 2014 in the administration of the CEC process included:
  - Reduction in available human resources of the Unit.
  - Lack of guiding policy for the treatment of wastewater discharge from offshore oil and gas facilities and other critical issues.
  - Increase in the number of applications received where activities had already started without approval.
  - Submission of incomplete applications.

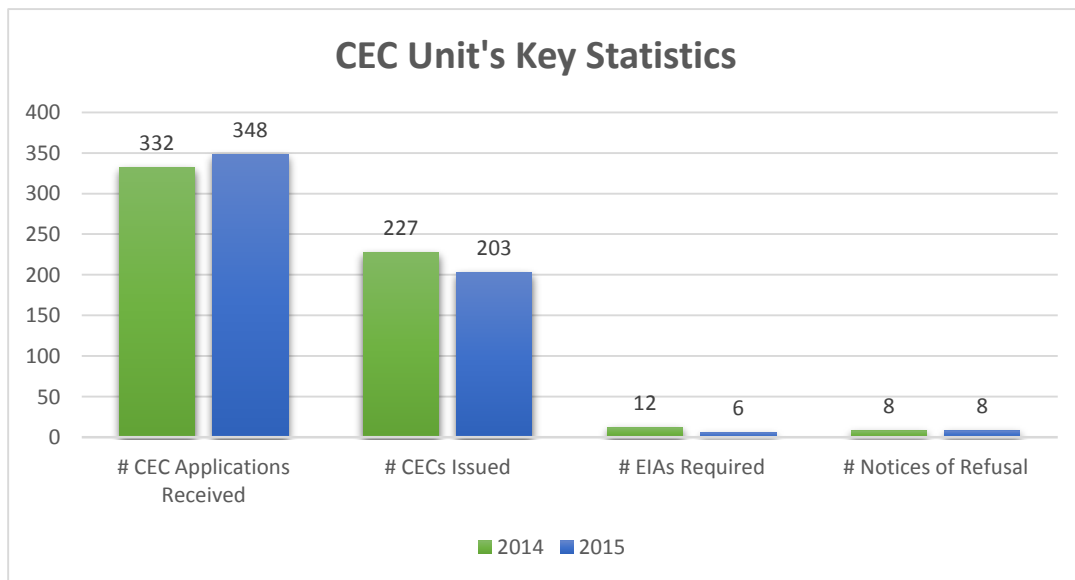


Figure 23: CEC Unit's Key Statistics 2014 vs 2015

## Air Noise & Waste Unit

- This Unit received 526 applications\* for Noise Variations in 2015, compared to 497 in 2014, representing a 6% (approximate) increase over the previous year. The determinations of these Noise Variation applications were as follows:

Issued	Refused	Cancelled	Withdrawn
501	1**	14	7
<p><i>* 4 applications were put on hold by the Applicants as their activities were postponed until further notice.</i></p> <p><i>**In 2015, there was 1 Refusal of a Noise Variation, based on the advice of the Noise Advisory Council. This was for a proposed event at Gulf View, for which there were objections in the form of a petition, from the neighbours.</i></p>			

- Notable meetings/stakeholder engagements included:
  - Awareness session with the Tobago TTPS – EMA conducted sessions on noise related legislation and the role of the EMA in the control of noise pollution;
  - TTPS Carnival Stakeholder sessions – EMA participated in Northern and Southwestern Division meetings;
  - Port-of-Spain City Corporation – EMA, on invitation, met with the City Corporation to discuss noise issues and possible avenues for addressing these issues;
  - SPORTT – EMA met with the Management of SPORTT to discuss concerns of residents surrounding some of their sporting venues (Hasely Crawford Stadium, Jean Pierre Complex, Ato Boldon Stadium);
  - Queen’s Park Cricket Club – EMA met with the Cricket Club to discuss monitoring of Noise Variations.

## Public Education Unit (PEU)

- **Lecture/Presentations** -In 2015, PEU conducted 47 lectures, to a wide variety of audiences and covering a range of environmentally-themed topics. Over 2000 people were reached via this medium. Two of these sessions were done as part of the EMA’s sensitisation of its role, to the Councillors and Aldermen of the Regional Corporations.

There were two training sessions involving officers of the TTPS (Trinidad & Tobago Police Service). One was held in Scarborough, Tobago in January and focused on noise pollution; there were 24 officers in attendance. The other was held in Trinidad for 30 officers of the North East division, to make them aware of legislation related to protection of the pawi (*Pipile pipile*).

- **Displays/Exhibitions** - PEU facilitated EMA booths at 12 exhibitions and interacted with more than 2,300 people, via this medium. Four life-sized models of ESS (Environmentally Sensitive Species)

were completed and received, to add to the Unit's exhibition and education tools. These were the golden tree frog, white-tailed sabrewing hummingbird, pawi and ocelot.

- **Protected Areas and Species Research Symposium-** PEU collaborated with STRAR (Strategy & Research Unit) to host the 'Protected Areas and Species Research Symposium' which was held at the Trinidad Hilton on November 16<sup>th</sup>, 2015. The Unit was also instrumental in developing models of the ESS. These were exhibited and received high commendation from the attendees as effective educational tools.
- **iCARE Project-** In July 2015, the implementation of the RSWCP (Recyclable Solid Waste Collection Programme), under the iCARE Project, was launched and became one of the main focus of the Unit during the months that followed. This included, but was not limited to:
  - Attendance at all committee meetings and relevant stakeholders' meetings;
  - Completion of implementation plans for the schools' programme; completion of the Terms of Reference for the production of educational materials for the schools' programme;
  - Development of the poster and treatment proposal for the schools' animation;
  - Testing the mascot 'Ronnie' with children;
  - Obtaining the Ministry of Education's approval for the implementation of the schools' programme; sourcing companies to provide labour for the mascot;
  - Development and execution of the promotional and public awareness programme for National Week of Recycling, as well as, bag distribution at various locations for the national recycling week (curb side collection).
- **Environmental Club Programme-** The EMA's Enviro Club Programme promoted a tree planting initiative in commemoration of World Environment Day. Thirteen (13) schools participated with most planting more than one tree on their school compound.
- **EIA Reviews-** Staff of PEU assisted with the review of the socio-cultural aspect of four (4) EIAs.
- **Las Cuevas Beach Blue Flag Status-** PEU served on the National Jury, which evaluated the acceptability of Las Cuevas Beach to receive Blue Flag status. The Blue Flag is a certification by the FEE (Foundation for Environmental Education) that a beach, marina or sustainable boating tourism operator meets its stringent standards. The FEE's Blue Flag criteria include: standards for water quality, safety, environmental education and information, the provision of services and general environmental management criteria. The Blue Flag is sought for beaches, marinas and sustainable boating tourism operators as an indication of their high environmental and quality standards.

### **Information Centre**

In 2015, the Information Centre continued its provision of access to sources of environmental information via print and non-print materials. Both internal and external clients were able to access the services via e-mails, telephone or visits. There were requests for information from books, the National Registers [CECs, Water Polluters and Noise Variations], Information Files, posters, brochures and handouts.

**Key accomplishments:**

In 2015, the Information Centre disseminated information to 1,772 clients. The number of clients were 983 external and 789 internal. For the period, 556 persons (external) visited the Information Centre.

- **Documents Usage-** Users perused 6338 documents inclusive of books, reports, journals, Information Files and National Register applications. There were 60 Information Files used by clients. Posters (brochures and handouts) were distributed to 90 persons.
- **National Registers-** Clients used 4585 CEC applications from the National Register. The number of applications requested from the National Registers for Water Polluters was 99 and 41 for Noise Variations respectively. There was a record of 376 requests for extracts from CEC applications; extracts from the Water Polluters' were 49 and Noise Variations were 15.

**Strategy & Research Unit (STRAR)**

- **Assessment of Produced Water and Completion Fluid in T&T a Draft Report-** was produced in December 2015 and submitted for technical review by the Manager- Technical Services;
- **Assessment of the Quarry Sector In Trinidad & Tobago** (PSIP: Public Sector Investment Programme)-
  - The deliverables for this project were:
    - Applicant Guidebook
    - Field Officer Guidebook
    - Final Report
    - Power Point Presentation on the final report to members of Technical Services and Legal Compliance & Enforcement Departments.
  - Draft "Managing Quarry Rehabilitation" information paper identifying issues faced by the EMA in managing quarry rehabilitation programs was also completed and submitted for review.
  - The Rehabilitation Guidelines first draft 'framework' was completed for the rehabilitation plan development and commenced a draft of the guide book
- **Quarry Rehabilitation Plan Guidelines-** the draft guidelines developed and circulated for discussions. The first draft of the guidebook was completed in June 2015 and sent for technical review
- **Biodiversity activities** included:
  - Implementation of the Management and Recovery Plan for the ESS the Trinidad Piping Guan or Pawi (Pipile Pipile) – PSIP Project
  - An ESS Sensitization Session was conducted in June 2015 and involved the TTPS, EPU (Environmental Police Unit), MALF (Ministry of Agriculture, Land and Fisheries) (Fisheries and Forestry Division).
  - A Research Symposium "Managing our Protected Areas and Species: Linking Science to Policy and Decision-making" was successfully held in November 2015.

- An abridged booklet of the symposium was produced and distributed to all attendees and participants and posted on the EMA website.
- **The Revision of the NEP (PSIP)** - preliminary discussions were held with stakeholders in Tobago (THA Divisions, NGOs and Associations) to better understand their environmental concerns.
- **Mainstreaming GIS (Geographic Information System) within the EMA:**
  - Update of the GIS Drive to ensure that all shapefiles are error free, in the correct projected coordinate system and include the metadata to each shapefile;
  - Sample set of CEC applications were geo-referenced.
  - Conducted training within the various units on how to use the GIS software efficiently and effectively.
  - Conducted an assessment of the usage of GIS within the EMA for the Air, Waste and Noise, Water, CEC, Strategy and Research, Education and Project Units.
- **Development of AWQS for T&T (PSIP):**
  - This is a PSIP Project to develop ambient water quality standards for all watersheds in T&T and would be completed via three phases.
  - Phase I was completed in 2015; Phase 1 entailed a desktop literature review the results of which were used to inform the way forward with Phase 2.
- **IMS (Information Management System):**
  - Piloted a project to explore the potential of a centralised data/information system; the IMS is intended to enhance the decision-making processes within the organisation;

## **PMU (PROJECT MANAGEMENT UNIT)**

### **The NRCSWLP (National Restoration Carbon Sequestration Wildlife and Livelihoods Project)**

The NRCSWLP is a pioneering multifaceted, community-based restoration and conservation initiative. This Project was designed to restore 500 ha of the Nariva Swamp which is the largest, most diverse freshwater ecosystem in T&T. This wetland is of national importance not only of its services as a carbon sink but also due to the very bio-diverse eco system. The Project is executed through seven (7) activities, based on a community model crafted to foster participatory conservation - by the community for the community. The Project also delivers our national commitment to the UN SDGs, supporting goals **# 13 on Climate Action**, **# 14** on conservation and sustainable use of **Life Below Water** and goal **#15 on Life on Land** - directing sustainable management of forests, combating desertification, halting and reversing land degradation and biodiversity loss.

In 2015 the major activities undertaken by the project included:

- 1) Some 214 (43%) hectares of degraded lands were reforested out of the 500 hectare target. In spite of these challenges of forest fires during the previous dry season, a platform has been firmly established upon which all future initiatives regarding environmental protection and climate resilience in Nariva

can be actioned – this was one of the key objectives of NRCSWLP, which is the building capacity and advocacy in conservation.

- 2) Collaborations intensified with the FAO (Food & Agriculture Organization) led project “Improving Forest and Protected Area Management in T&T” which aims to update the framework for the selection, legal designation and management of a national system of protected areas. More specifically the NRCSWLP participates as a member of the Nariva Swamp and Coastal Zone Pilot Protected Area Subcommittee (representing the EMA). The project’s activities dovetails and supports protected area management conservation objectives to commence in 2016 and beyond.
- 3) Interim Wildlife Survey results were presented to MALF
- 4) Works were ongoing on the establishment of the studio complete with equipment for the environmental cable broadcasting channel.
- 5) A more aggressive CEPA (Communications Education Public Awareness) program was executed during this period utilising promotional tools such as a branded calendar, production a book entitled **‘Replanting Nariva’** and increased stakeholder engagement in target communities of Nariva.
- 6) Livelihood opportunities were key deliverables to the surrounding communities of Nariva with conservation tasks (fire suppression, national wildlife survey) performed by CBOs commenced in October 2015.

**Table 6. Other Project Achievements Summarized:**

Project Objectives	Status at end of 2015
<b>To restore approximately 500 hectares and conserve the Nariva wetlands, through the recognition of the services it provides as a carbon sink and a biodiversity ecosystem by 2017</b>	214 hectares planted with a potential to sequester 28,248 tonnes of carbon.
<b>To develop sustainable livelihood opportunities for surrounding communities who depend on the swamp’s resources (through life skills training, employment opportunities; specialized training in services and business management; exposure to new trades linked to promotion and conservation of the environment.)</b>	Plans developed for skills transfer training in basic fire management, eco-tourism and <a href="#">Community Tour Guiding Fundamentals</a> commencing in 2016.
<b>The provision of job opportunities through the Reforestation and Wildlife Conservation (implementation of EMA Project activities i.e. Planting; Fires Suppression; Tending; Nursery; Wildlife Surveys)</b>	Work on planning and scheduling of 2016 job opportunities carried out for community labour in fire suppression and wildlife surveys with estimates of 350+ families projected to benefit from employment opportunities.
<b>To develop a workable management regime for the Nariva Swamp with the participation of community and relevant national stakeholders. (Continuous relationship building and implementation of project activities with the involvement of all relevant project stakeholders).</b>	Public-private partnership conservation action - Invaluable practical and case study experience in wetland reforestation from theory to practice involving 17 CBO groups and government stakeholders in conservation.

- **PSB (Police Surveillance Bays)**

In September 2011, the EMA, in collaboration with the then MPHE (Ministry of Planning, Housing & the Environment), GFEU (Green Fund Executing Unit) and the MNS (Ministry of National Security) partnered in the implementation of PSBs along the UBH (Uriah Butler Highway) and SHH (Sir Solomon Hochoy Highway).

The main objectives are to demonstrate the feasibility and benefits of employing alternative energy for novel applications. To provide infrastructure to allow increased police surveillance along UBH and SHH and to allow accident and emergency response vehicles and national security vehicles to utilize these bays thereby enhancing road safety monitoring and accident and emergency response.

The EMA received funds from the GFEU for the Supply and Installation of Solar-Powered Equipment for thirteen (13) sites. The then MOW (Ministry of Works) was responsible for the preparation of the 13 sites, to accommodate the installation of the solar-powered equipment by SRL (Synergy Resources Limited). This number was reduced to nine (9) sites as a result of a number of challenges the MOW had in locating four (4) other suitable sites.

The nine (9) sites identified were:

1. Past Caroni Bird Sanctuary Flyover;
2. Radio 610 Transmitter;
3. Before Munroe Road Flyover;
4. Chase Village Seereeram Brothers;
5. Freeport Highway Roti Shop;
6. Couva Before Preysal Flyover;
7. Couva Indian Trail Flyover;
8. Reform-Tarouba Stadium;
9. Golconda.

The nine (9) sites were prepared by the MOW and the solar-powered equipment was installed at these sites. At each of the nine (9) sites SRL installed Solar-Powered signs; **“POLICE ZONE AHEAD,” “NO STOPPING OR TURNING,” “EMERGENCY VEHICLES ONLY,” Solar-Powered Flashing Amber Light, Solar Street Light, Solar Photovoltaic Power for the cameras and Solar-Powered Road Markers** that can be read by traffic moving both in the Northbound and Southbound lanes.

Through Cabinet approval (Minute #469 of Feb 26<sup>th</sup>, 2015), TTPS will assume the responsibility for the repair, maintenance and overall management of the nine PSBs. Upon completion of the remedial works of all 9 sites to full functionality and operation.

- **BCCP (Beverage Container Clean-up Project)**

The Green Fund funded, BCCP which commenced in September 2013 was aimed at the removal of all waste beverage containers over an eight (8) month period to precede the enactment of the BCB (Beverage Container Bill) 2012.

The BCB sought to provide for the establishment of a deposit and refund system for prescribed size beverage containers and it was intended that the legislation will treat with the collection of beverage containers in order to reduce their disposal into the environment. The main objectives of the BCCP are:

- ✓ To clean up and dispose of discarded beverage containers, prior to the introduction of a deposit-refund system
- ✓ To gain an informed public, through an aggressive public education and awareness campaign, to solicit citizens’ participation and cooperation in maintaining a litter-free environment.
- ✓ To analyze and collate environmental data information and GIS information to guide a future waste management policy.

The EMA was responsible for oversight of the project including project management, public education and awareness, and monitoring and evaluation. The CEPEP Company Limited was responsible for the collection and removal of all beverage containers from cities and communities across Trinidad (such as drains, streets, public open spaces, river courses and coastal areas). SWMCOL activities were haulage from sites; transfer to the sorting and processing center located at Sea Lots, Tobago’s collection activities, and sorting, processing and marketing of materials to international recycling centers. IMA spearheaded the spatial and statistical analysis of all data collected, the design and generation of key data collection forms, creation of a database, development of baseline indicators, and training of personnel.



SWMCOL has processed 100% of the collected material by sorting, shredding and or baling all the materials except glass bottles which were sold to Carib Glass for recycling.

Despite many challenges the BCCP has provided many substantial benefits, environmentally, socially and institutionally by providing temporary employment for seventy-one (71) contracted teams and cleaning 134 districts in all fourteen (14) municipalities. The biggest accomplishment through the project thus far, is the establishment of the first Polyethylene Terephthalate (PET) Wash Plant in the English speaking Caribbean by SWMCOL. This facility which is located in Sealots, Port of Spain, was established in June 2015 and has the capacity to process 500 kg/hr of PET bottles.

- **RSWCP (Recyclable Solid Waste Collection Project)**

The EMA secured a grant from GFEU to execute a comprehensive solid waste collection project, aimed at the establishment of collection sites for all recyclable waste e.g. plastics ,glass, tetra paks, aluminium cans, tyres and e-waste to reduce their disposal into the environment and the subsequent pollution and waste management problems that arise.

This project commenced in June 2015. The EMA's role includes project management, supervision, monitoring and evaluation, contracts & technical assistance, capacity building, research & development and public education and awareness. RSWCP is collaborating with the other stakeholder agencies, responsible for waste collection such as SWMCOL and Regional Corporations to structure a cohesive approach to national waste management. Preceding RSWCP, the EMA implemented the BCCP which revealed the public is keenly interested in taking a participatory approach to addressing waste management. This indicator has championed the successes of recycling initiatives aimed at improving the quality of life in T&T.

The primary objective of RSWCP is the infrastructural and logistical preparation of the country for the passage of the EMA Solid Waste Rules and other relevant legislation with respect to a deposit and refund system for beverage containers. Simultaneously creating a heightened awareness of the purpose and benefit to all stakeholders.

To date the project has successfully established ninety-one (91) publicly accessible drop-off points in eighty-four locations throughout Trinidad. Recyclable solid waste is collected across the country daily by private haulage contractors and delivered to the "Collection Depots" located at NAMDEVCO, and Forres Park for storage. One (1) temporary Depot currently exists in Couva for the storage of the project's assets such as Containers and Bins.

The provision of employment opportunities is another achievement attained by RSWCP. Direct and indirect employment has been created through our engagements with State agencies such as SWMCOL, and CEPEP. Private contractors for haulage, bin fabrication, branded tokens have also benefitted from the project. Additionally sole-traders/micro-enterprises also receive opportunities to reward their entrepreneurial skills through grass cutting/clearing and security for the sites.

The development of a public education campaign is ongoing. The first phase included a softer branding of the project to a relatable iCARE, which means "Community Awareness Recycling Everyday" at a project launch. The launch was featured on television programmes such as CNMG

(Morning Edition), TV6 (Morning Brew) and GISL (Morning Prime). Followed by the birth of a mascot “Recycling Ronnie” and the launch of an informative Facebook page. A major feature of the campaign is the School programme. There are a total of 477 primary and 224 secondary schools. RSWCP has made many appearances at school exhibitions, and furnished schools that have existing EnviroClubs with outdoor bins for recycling. iCARE officials have been present on various local television and radio stations to promote all aspects of the project.

A two weekend curb-side collection was conducted, this pilot cleanup campaign collected over 6000 bags of recyclable solid waste. Some special events saw iCARE’s involvement in the Beach cleanup of the likes of St. Peter’s bay and Chacachacare beach. The data recorded on numbers and types of recyclables recovered will be shared to guide decision making on avenues for sale to international buyers or to other local downstream markets. This can result in an increased creativity amongst small and micro enterprises that can be motivated and sensitised to start to an efficient recycling industry. Long-term sustainability is the objective and it is given priority.

Forging partnerships and unifying network relations are high priority to the approaches taken by RSWCP. Meetings and consultations are being conducted with key stakeholders such as Regional Corporations, SWMCOL, other corporate entities presently using recyclable materials, to structure the new lines of action.

Looking forward the RSWCP is devising sustainable plans for the:

- Complete the establishment and management of collection depots for future independent operations within existing infrastructure
- Collection of Tyres and E-waste at depots for proper disposal
- Long term data collection, sorting, collation and analysis of recyclable waste for further developments
- Transition from Project to the Waste Recycling Management Authority.

- **IDB (Inter-American Development Bank) Funded Climate Change Project**

In June 2015, the EMA concluded a technical cooperation with the IDB on the ‘**Institutional Strengthening of the EMA in relation to Climate Change**’ (TT-1035). TT-1035 comprised two distinct arms executed by two (2) separate consultants.

The first was a **review of legislation** with an aim of amendment to integrate climate change considerations. This was conducted by consultant de Romilly & de Romilly. The second arm included an **institutional capacity assessment** conducted by Business Strategy Limited in association with Environmental Solutions.

These consultancies produced recommendations for internal capacity building, which were complemented by recommendations for policy/legislative revisions. The recommendations included:

1. Establish a specific climate change mandate in the EMA’s strategic plan and operational strategy;
2. Utilizing the existing provisions of the EM Act to establish a CCPU (Climate Change Program Unit) within the EMA;

3. Amend the EM Act to include provisions to legally establish a NCCC (National Climate Change Committee) as well as a NCCTF (National Climate Change Trust Fund) for receiving international climate finance;
  4. Establish the regulatory mechanisms that is independent, fair, transparent, efficient and effective for the reporting, reduction and control of greenhouse gases;
  5. Amend subsidiary legislation to the EM Act, or establish the appropriate regulatory mechanisms as necessary for:
    - a. The conservation and effective management of carbon sinks;
    - b. The enhancement of ecosystem resilience to the effects of climate change
    - c. The integration of climate change mitigation and adaptation into the CEC and EIA processes, inclusive of addressing the causes and impacts of climate change and to enforce a national climate resilient, low carbon building code
  6. Integrate climate change considerations into the CEC process through the provision of guidance documents and tools;
  7. Collaborate with the Ministry with the responsibility for the Environment and other stakeholders to formulate rolling 5-year plans for the NCCP (National Climate Change Policy) and other policies related to climate change;
  8. Conclude MOU (Memoranda of Understanding) other agencies and civil society on roles and responsibilities for giving effect to the rolling 5-year implementation plans for the NCCP, UNFCCC (United Nations Framework Convention on Climate Change) and INDC (Intended Nationally Determined Contributions);
  9. Establish database and baseline information required to monitor and report on effectiveness of UNFCCC implementation, and ensure accessibility by public at large;
  10. Strengthen institutional capacity of CCPU within the EMA so that it can carry out its mandate as an Accredited Entity under the GCF (Green Climate Fund);
  11. Become an Accredited Entity to the GCF;
- Prepare proposals for submission to national Green Fund and international GCF to implement 5-year NCCP implementation plan.

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## LEGAL COMPLIANCE & ENFORCEMENT (LCE)

### LEGAL SERVICES

- **Enforcement Action**

Legal Services initiates enforcement action against legal entities which violate environmental requirements, as guided by Part VI of the EM Act, through the issuance of NOV's (Notices of Violation).

In this regard, Legal Services served approximately ninety-eight (98) NOV's resulting from breaches of the EM Act and its subsidiary legislation. Furthermore, one (1) Administrative Order was issued pursuant to Section 64 of the EM Act as a consequence of a Violator's failure to resolve their NOV.

Analysis of the matters indicated that approximately 66% of the breaches related to Designated Activities as listed in the CEC (Designated Activities) Order, 2001, 29% were related to the WPR and 5% were related to the NPCR (Noise Pollution Control Rules, 2001) .

A total of thirty-one (31) Consent Agreements were successfully executed thereby resolving their corresponding NOVs. The Consent Agreements included mitigation measures to minimize or eliminate the existing and/or potential negative environmental impacts caused by the Violators' conduct of designated activities to the benefit of the environment and surrounding receptors. Further, to date, all water-related NOVs have been resolved. All other matters were en route to resolution.

- **Litigation**

1. A major matter that was heard in the Court of Appeal is that of ***FFOS (Fishermen and Friends of the Sea) v MPHE and the EMA*** - This matter involved the judicial review of the decision of the EMA, inter alia, to prescribe the permit fees issued under the Water Pollution (Fees) (Amendment) Regulations, 2006. The High Court ruled in favour of FFOS, however, this was reversed by the Court of Appeal on July 16, 2015. The Court of Appeal held that the regulations do, in fact, apply the Polluter Pays Principle.
2. The EMA was also involved in at least four (4) matters at the Environmental Commission which were resolved via mediation or other alternative dispute resolution mechanism.
3. The EMA was further involved in a further five matters in the High Court regarding environmental matters.

- **Legislative Review**

- The APR were gazetted on January 23, 2015 and laid in Parliament on February 24, 2015. They became law on April 08, 2015.

- **Other Activities**

- Legal Services processed fifteen (15) Claims of Confidentiality and reviewed fifty-one (51) Freedom on Information applications within their respective statutory deadlines as mandated by law.
- Legal Services supported EMA processes and functions by examining and vetting a total of twenty-two (22) contracts, providing five (5) Legal opinions and processing claims for confidentiality in 2015.

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## **PERMIT MONITORING, COMPLAINTS & HSE (PMCHSE)**

In February 2015, the Unit acquired the full complement (i.e. 22 staff members) of staff.

### **Key Accomplishments:**

- All CECs issued (203) were assigned to monitoring officers;
- Implemented verification of all Post-CEC documentation and developed Instructional Flow Chart and Checklist in order to reduce delays in processing of Post-CEC submissions by permit holders;
- In November 2015, it was decided that PMCHSE will assume all responsibilities for post compliance monitoring (with the exception of renewal, variation and verification of annual permit fees) for WPPs. A water permit monitoring sub unit was then created in the Unit, which consisted of Environmental Investigator IIs, who conducted joint site visits with WGIS to ensure a smooth handover of responsibilities. As at the end of 2015, 28 WPPs were received from WGIS for monitoring from a total of 53 WPPs issued;
- Two audits were conducted- 'permit monitoring files' audit and 'CECs assigned audit'. The permit monitoring file audit was conducted in March 2015, on permit monitoring files during the period 2012 – 2014 (date of issued CECs). The CECs assigned audit was conducted in August 2015. It was concluded that based on the period April – June 2015 of the CEC's assigned, on average 30% had started, 1% stalled and 62% had not started.
- The Unit provided feedback to the Air Unit on all the administrative forms for source registration for the APR in May 2015. These changes were reviewed and the documents were revised to reflect them.
- In 2015, research was conducted on voluntary compliance systems in different jurisdictions to develop a system which can be used locally; this led to the creation of an EAPC (Environmental Audit Programme Certificate) Policy and certificate, which targeted sawmills, quarries and scrap yards. The research findings were submitted to the Board of Directors of the EMA;
- Awareness & Training Session on Planetary Boundaries – An environmental awareness survey was disseminated to the staff of PMCHSE in January 2015. The purpose of this survey was to determine the level of awareness amongst the staff on current environmental issues and topics. The Unit was then grouped into teams and issues/topics were equally divided for each group to present.

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## **EMERGENCY RESPONSE & INVESTIGATIONS (ERI)**

Emergency response activities are described in Section 25 of the EM Act which ERI was tasked with coordination, oversight and other related activities for environmental emergencies. Section 22 of the EM Act outlines the investigative capabilities of the EMA which guides ERI's other core function of investigating all general environmental complaints received by the EMA. The present complement includes eleven (11) officers which is less than half of the intended twenty-seven (27) officers for the approved organizational structure.

### **Key Accomplishments:**

- Increased efficiency in responding to environmental emergencies. Achieved target of 100% response within twenty-four (24) hours of notification for one hundred and fifteen (115) environmental emergencies in 2015. These include oil/ chemical spills, animal deaths (fish, birds, etc) and landfill fires. One of the highlighted emergencies related to the disruption of operations at the Caroni Water Treatment Plant as a result of a hydrocarbon substance in the Caroni River.
- Continued improvement in the complaint management system (ZOHO) for complaints and emergencies whereby turnaround time between notifications and investigations was reduced. A total of one thousand, one hundred and thirty-five (1,135) tickets were created on this system which were either investigated by the EMA or referred to another agency. One highlighted complaint that was investigated involved part of the Caroni Swamp being indiscriminately backfilled to create a laydown yard for pipelines in support of activities of the Beetham Wastewater Treatment Pipeline to Point Lisas which was issued CEC3951/ 2013.
- Increased rate of referral of potential breaches of an environmental requirement to Legal Services to initiate enforcement proceedings. A total of seventy-five (75) RFEs (Requests for Enforcement) were referred in 2015 as compared to 18 RFEs in 2014.
- Improved efficiency in the closure rate for resolving investigations whereby a rate of 50% was achieved in 2015 as compared to 26% in 2014.
- Improved relations with ten (10) of the fourteen (14) Municipal Corporations and other external agencies. One hundred and thirty-two (132) matters were referred to these external stakeholders during 2015. Additionally, the timeframe to provide feedback to these agencies in addressing environmentally-related matters was improved as evident by attendance of monthly meetings at several Municipal Corporations. One highlighted matter involved the alleged encroachment of lands belonging to the Asa Wright Nature Centre by quarrying activity to which referrals were made to both the Commissioner of State Lands and the Mineral Advisory Committee for urgent attention.
- Participated in workshop conducted for the Strengthening of the EMA's Institutional Capacity for Environmental Management in the Context of Climate Change.
- Provided support for Sensitisation Workshops at Municipal Corporations which were conducted by the Public Education Unit.

- Assisted Technical Services with the review of two (2) EIAs.
- ERI Officers received ICS (Incident Command System) training at various levels of 100, 200 and 300.
- ERI Officers received training in the Multi RAE handheld air monitoring equipment from ROSE Environmental.
- ERI Officers participated in training with respect to installation, maintenance and troubleshooting of new Air Pointers Monitoring Equipment stationed at both north and central offices.
- Attended presentation by EMA's consultant, GISCAD, on findings of the PSIP project 'Assessment of the Quarry Sector in T&T.'
- Participated in Sensitization Meeting hosted by TTPS for stakeholders of the Woodbrook District to discuss security, noise pollution and other issues affecting the community.
- Participated in Dam Hydraulics Seminar hosted by UWI which provided details on hydraulic modelling and sediment dynamics of dams. The Hollis Dam was examined to demonstrate the design and operation as a source of potable water as well as some of the challenges encountered.
- Participated in seminar 'Understanding Dispersants in Oil Spill Response' hosted by Petrotrin.

### **ENVIRONMENTAL POLICE UNIT (EPU)**

The EPU consist of Special Reserve Officers from the TTPS who have been assigned to the EMA and appointed Environmental Inspectors under the EM Act. They provide security escort of EMA personnel, investigate noise-related complaints, monitor noise variations, and issue NOV's prepared by Legal Services as well as performing their duties as a Police Officer. The complement consists of twenty-two (22) officers in Trinidad and five (5) in Tobago.

#### **Key Accomplishments:**

- Increased efficiency of EPU through the development of weekly shift schedules which are documented and executed.
- Weekly reporting of actions taken which include monitoring of events with/ without a Noise Variation, investigation of noise-related complaints and other actions taken in accordance with TTPS Regulations.
- EMA, through the EPU, executed a Baseline Monitoring Project at the Port of Spain General Hospital during December 2015 which was conceptualized through discussions between the EMA and the National Carnival Bands Association. This project sought to determine the baseline noise levels around the hospital prior to the commencement of the 2016 Carnival Season for comparison with monitored (source) noise levels.
- Participated in Sensitization Meeting hosted by TTPS for stakeholders of the Woodbrook District to discuss security, noise pollution and other issues affecting the community.
- Introductory meeting with Senior Superintendent of the Central Division and the Chaguanas TTPS station to discuss strategies for collaboration and cooperation. A list of bar owners in the central area was provided to the TTPS to initiate public awareness sessions with owners of Liquor Licensed premises about Noise Pollution.

**PART C: ENVIRONMENTAL TRUST FUND AUDITED FINANCIAL REPORT  
FOR THE YEAR ENDED 30 SEPTEMBER 2015**

**Environmental Management Authority  
Environmental Trust Fund**

**Financial statements  
for the year ended 30 September 2015**  
(Expressed in Trinidad and Tobago dollars)



**Environmental Management Authority Environmental Trust Fund**

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<b>Contents</b>	<b>Page</b>
Statement of management's responsibility	1
Independent auditor's report	2
Statement of financial position	3
Statement of profit or loss and other comprehensive income	4
Statement of movement in funds	5
Statement of cash flows	6
Notes to the financial statements	7 – 26

**Environmental Management Authority Environmental Trust Fund**

**Statement of management's responsibilities**

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Management is responsible for the following:

- Preparing and fairly presenting the accompanying financial statements of Environmental Management Authority Environmental Trust Fund ('the Authority') which comprise the statement of financial position as at [year ended], the statements of profit or loss and other comprehensive income and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information;
- Ensuring that the Authority keeps proper accounting records;
- Selecting appropriate accounting policies and applying them in a consistent manner;
- Implementing, monitoring and evaluating the system of internal control that assures security of the Authority's assets, detection/prevention of fraud, and the achievement of the Authority's operational efficiencies;
- Ensuring that the system of internal control operated effectively during the reporting period;
- Producing reliable financial reporting that comply with laws and regulations; and
- Using reasonable and prudent judgement in the determination of estimates.

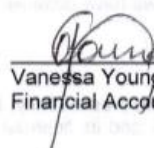
In preparing these audited financial statements, management utilised the International Financial Reporting Standards, as issued by the International Accounting Standards Board and adopted by the Institute of Chartered Accountants of Trinidad and Tobago. Where International Financial Reporting Standards presented alternative accounting treatments, management chose those considered most appropriate in the circumstances.

Nothing has come to the attention of management to indicate that the Authority will not remain a going concern for next twelve months from the reporting date; or up to the date; the accompanying financial statements have been authorised for issue, if later.

Management affirms that it has carried out its responsibilities as outlined above.

  
\_\_\_\_\_  
Hayden Romano  
Managing Director

24 August 2017

  
\_\_\_\_\_  
Vanessa Young  
Financial Accountant

24 August 2017

## Independent auditor's report to the Shareholder of Environmental Management Authority Environmental Trust Fund

### Report on the financial statements

We have audited the accompanying financial statements of Environmental Management Authority Environmental Trust Fund (the 'Authority'), which comprise the statement of financial position as of 30 September 2015, the statement of profit or loss and other comprehensive income, the statement of movement in funds and statement of cash flows for the year then ended and a summary of significant accounting policies and other explanatory information.

### Management's responsibility for the financial statements

Management is responsible for the preparation and the fair presentation of these financial statements in accordance with International Financial Reporting Standards ('IFRS'), and for such internal control as Management determines necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

### Auditor's responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal controls relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.


We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### Opinion

In our opinion, the financial statement present fairly, in all material respects the financial position of the Authority as at 30 September 2015, and its financial performance and its cash flows for the year then ended in accordance with IFRS.

Deloitte & Touche  
Port of Spain  
Trinidad

24 August 2017




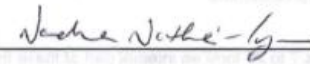
**Environmental Management Authority Environmental Trust Fund**

**Statement of financial position**  
(Expressed in Trinidad and Tobago dollars)

	Notes	Year ended 30 September	
		2015	2014
		\$	\$
<b>ASSETS</b>			
<b>Non-current assets</b>			
Property, plant and equipment	8	77,331,668	74,192,545
<b>Total non-current assets</b>		<b>77,331,668</b>	<b>74,192,545</b>
<b>Current assets</b>			
Cash In hand and at bank	5	135,138,233	47,689,365
Short-term investments	6	3,100,021	3,068,063
Accounts receivable and prepayments	7	3,333,996	7,250,106
<b>Total current assets</b>		<b>141,572,250</b>	<b>58,007,534</b>
<b>Total assets</b>		<b>218,903,918</b>	<b>132,200,079</b>
<b>LIABILITIES AND FUNDS</b>			
<b>Current liabilities</b>			
Accounts payable and accruals	9	134,893,135	47,754,116
Deferred Income		-	218,725
<b>Total liabilities</b>		<b>134,893,135</b>	<b>47,972,841</b>
<b>Funds</b>			
Government of Trinidad and Tobago (GORTT)		62,158,809	62,375,264
United Nations Development Programme (UNDP)		199,131	199,131
International Bank for Reconstruction and Development (IBRD)		2,806,990	2,806,990
Other		863,709	863,709
Revaluation surplus		17,982,144	17,982,144
<b>Total funds</b>		<b>84,010,783</b>	<b>84,227,238</b>
<b>Total liabilities and funds</b>		<b>218,903,918</b>	<b>132,200,079</b>

The notes on pages 7 to 26 form an integral part of these financial statements.

On 24 August 2017, the Board of Directors of Environmental Management Authority Environmental Trust Fund authorized these financial statements for issue.

 Director  Director

## Environmental Management Authority Environmental Trust Fund

### Statement of profit or loss and other comprehensive income

(Expressed in Trinidad and Tobago dollars)

	Notes	Year ended 30 September	
		2015	2014
		\$	\$
<b>Fund income</b>			
Government fund		45,151,763	45,545,226
Beverage container project		217,527	3,650,133
NSRCSL project fund		5,614,491	3,486,860
UNEP		220,783	-
Activities income		3,281,006	1,982,457
Highway police surveillance bays fund		163,990	-
Recycling solid waste collection project		2,948,495	-
Oil spill		3,133,852	-
Interest income		42,540	94,900
Gain on disposal of asset		-	246,175
<b>Total income</b>		<b>60,774,447</b>	<b>55,005,751</b>
<b>Project expenses</b>	13	<b>12,141,770</b>	<b>9,608,953</b>
<b>Income after project expenditure carried forward</b>		<b>48,632,677</b>	<b>45,396,798</b>
<b>Other expenses</b>			
Advertising		381,171	1,080,140
Audit fees		90,600	91,992
Conference costs		235,373	650
Contract services		548,781	897,474
Depreciation		3,297,681	2,492,962
Directors' fees and expenses		712,584	691,542
Interest and bank charges		27,130	26,746
Insurance		564,973	507,677
Loss on foreign exchange		15,995	7,546
Motor vehicle expenses		303,894	409,790
Maintenance contracts		-	746,229
Management fees		71,252	22,853
Office and general expenses		504,241	182,330
Permitting and compliance costs		280,226	393,856
Professional fees		1,836,859	2,265,890
Reference and research costs		291,588	277,592
Rent		3,828,750	2,413,138
Repairs and maintenance		1,047,201	432,765
Salaries and benefits		30,803,396	26,363,651
Security		1,150,380	907,624
Selection and recruitment		92,044	163,270
Severance		-	142,854
Supplies		1,016,310	979,467
Training		151,058	141,069
Travel		122,944	381,094
Utilities		1,474,701	1,447,700
<b>Total operating expenditure</b>		<b>48,849,132</b>	<b>43,467,901</b>
<b>Total (loss) / profit for the year</b>		<b>(216,455)</b>	<b>1,928,897</b>
<b>Other comprehensive income</b>		<b>-</b>	<b>-</b>
<b>Total comprehensive income</b>		<b>(216,455)</b>	<b>1,928,897</b>

The notes on pages 7 to 26 form an integral part of these financial statements.

**Environmental Management Authority Environmental Trust Fund**

**Statement of movement in funds**  
(Expressed in Trinidad and Tobago dollars)

	GORTT Fund \$	UNDP Fund \$	IBRD Fund \$	Other Fund \$	Revaluation Surplus \$	Total \$
<b>Year ended 30 September 2015</b>						
Balance as at 1 October 2014	62,375,264	199,131	2,806,990	863,709	17,982,144	84,227,238
Total loss for the year	(216,455)	-	-	-	-	(216,455)
<b>Balance at 30 September 2015</b>	<b>62,158,809</b>	<b>199,131</b>	<b>2,806,990</b>	<b>863,709</b>	<b>17,982,144</b>	<b>84,010,783</b>
<b>Year ended 30 September 2014</b>						
Balance as at 1 October 2013 previously reported	60,446,367	258,847	2,806,990	863,709	17,982,144	82,358,057
Prior year adjustment	-	(59,716)	-	-	-	(59,716)
Total profit for the year	1,928,897	-	-	-	-	1,928,897
<b>Balance at 30 September 2014</b>	<b>62,375,264</b>	<b>199,131</b>	<b>2,806,990</b>	<b>863,709</b>	<b>17,982,144</b>	<b>84,227,238</b>

The notes on pages 7 to 26 form an integral part of these financial statements.

## Environmental Management Authority Environmental Trust Fund

### Statement of cash flows

(Expressed in Trinidad and Tobago dollars)

	Notes	Year ended 30 September	
		2015	2014
		\$	\$
<b>Cash flows from operating activities</b>			
(Loss) / profit for year		(216,455)	1,928,896
Prior year equity adjustment		-	(59,716)
Adjustments for non-cash items:			
Depreciation	8	3,624,256	2,657,626
Gain on disposal of fixed assets		-	(240,464)
		<u>3,407,801</u>	<u>4,286,342</u>
<b>Movement in working capital</b>			
Net change in accounts receivable and prepayments		3,916,110	(4,459,845)
Net change in accounts payable and accruals		87,139,019	27,008,871
Net change in deferred income		(218,725)	(126,000)
		<u>94,244,205</u>	<u>26,709,368</u>
<b>Cash generated from operating activities</b>			
<b>Cash flows from investing activities</b>			
Proceeds from sale of assets		-	363,652
Purchase of property, plant and equipment	8	(6,763,379)	(29,386,873)
		<u>(6,763,379)</u>	<u>(29,023,221)</u>
<b>Cash used in investing activities</b>			
<b>Net change in cash and cash equivalents</b>		<b>87,480,826</b>	<b>(2,313,853)</b>
Cash and cash equivalents at the beginning of year		<u>50,757,428</u>	<u>53,071,281</u>
<b>Cash and cash equivalents at the year ended</b>		<b><u>138,238,254</u></b>	<b><u>50,757,428</u></b>
<b>Represented by:</b>			
Cash in hand and at bank		135,138,233	47,689,365
Short-term Investments		<u>3,100,021</u>	<u>3,068,063</u>
		<b><u>138,238,254</u></b>	<b><u>50,757,428</u></b>

The notes on pages 7 to 26 form an integral part of these financial statements.

## **Environmental Management Authority Environmental Trust Fund**

### **Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)**

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#### **1. Registration and activities**

The Environmental Management Authority (the Authority) is a Statutory Authority established when Parliament assented to the Environmental Management Act, 1995 on 7 March 1995. The Authority was established to develop and implement instructional arrangements for the regulation and management of the environment in the Republic of Trinidad and Tobago. Its principal place of operation is at #8 Elizabeth Street, St. Clair.

The Environmental Trust Fund was established by the Environmental Management Act, 1995 to fund the operations of the Authority and is administered by five members of the Board of Directors, designated by the President to act as Trustees.

The Environmental Management Act, 1995 was repealed on 8 March 2000 and replaced by the Environmental Management Act, 2000. The new Act changed the financial year end of the Authority to 30 September.

During the twelve month period ended 30 September 2015, the Authority continued its work in enforcing the Noise Pollution Control Rules, 2001; the Noise Pollution Control (Fees) Regulation 2001; Certificate of Environmental Clearance Rules; the Certificate of Environmental Clearance (Designated Activities) Amendment Order, 2007 & 2008; Certificate of Environmental Clearance (Designated Activities) Order, 2001; the Certificate of Environmental Clearance (Fees and Charges) Regulations, 2001; the Environmental Commission Rules of Practices and Procedure; Water Pollution (Amendment) Rules, 2006; Water Pollution Rules, 2001; Water Pollution (Amendment) Fees; Water Pollution (Fees) Regulations, 2001; the Environmentally Sensitive Areas Rules, 2001; and Environmentally Sensitive Species Rules, 2001.

The draft Waste Management Rules, 2008 is still being developed. The Authority has completed its Strategic Plan for the period 2017-2021

#### **2. Summary of significant accounting policies**

##### **a) Basis of preparation**

These financial statements are prepared in accordance with International Financial Reporting Standards (IFRS), and are stated in Trinidad and Tobago dollars, rounded to the nearest dollar. The financial statements are prepared under the historical cost convention as modified by the revaluation of land and buildings.

##### **b) Cash and cash equivalents**

Cash and cash equivalence include cash in hand, deposits held at call with banks and other short-term highly liquid investments with original maturities of three months or less at the time of purchase, which are subject to an insignificant risk of changes in value.

##### **c) Property, plant and equipment**

Land and building comprise offices occupied by the Authority and include land purchased for construction of a new office in Trincity. A valuation was completed on the building at #8 Elizabeth Street, St. Clair by independent valuator G. A. Farrell & Associate Limited. The effective date of the valuation was 4 January 2010 and the value of TT\$26 million was determined after consideration and use of one or more of the following approaches: the Direct Sale Comparison Approach; the Income Approach; and the Cost Approach. Land and building are stated at historical cost/valuation, less depreciation in the case of building. Historical cost include expenditure that is directly attributable to the acquisition of the items.



## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 2. Summary of significant accounting policies (continued)

##### c) Property, plant and equipment (continued)

Subsequent costs are included in the asset's carrying amount recognised as a separate asset, as appropriate, only when it is probable that future economic benefit associated with the item will flow to the Authority and the cost of the item can be measured reliably. All other repairs and maintenance are charged to the statement of profit or loss during the financial period in which they are incurred.

Depreciation is calculated on the reducing balance method to write off the cost of assets to their residual values over their estimated useful life as follows:

Leasehold improvement	-	10% per annum
Building	-	2% - 20% per annum
Furniture and fitting	-	10% per annum
Office equipment	-	20% per annum
Motor vehicles and computer equipment	-	25% per annum
Specialized equipment	-	20% per annum
Library/information	-	10% per annum
Computer equipment	-	20% per annum

Land is not depreciated as it deemed to have an indefinite life.

Where the carrying amount of an asset is greater than its estimated recoverable amount, it is written down immediately to its recoverable amount.

Gains and losses on disposal of property, plants and equipment are determined by reference to their carrying amounts and are included in the statement of profit or loss and other comprehensive income.

##### d) Government grants

###### Income and funding

Funding was provided to the Environmental Management Authority Environmental Trust Fund as follows:

- (i) Proceeds of a loan of US\$6.25 million from International Bank for Reconstruction and Development also known as the World Bank (IBRD) to the Government of the Republic of Trinidad and Tobago (GORTT). This loan facility closed on 31 December 2000.
- (ii) Ongoing funding from GORTT to cover recurrent and development programme expenditure. Government Grants are accounted for using the income approach. Under this approach, the grant is recognised in profit or loss on a systematic basis over the period in which the entity recognises as expenses, the related costs for which the grant is intended to compensate.
- (iii) Grant funds are provided by the United Nations Development Programme (UNDP) and United Nations Environment Programme (UNEP) to fund specific activities that are set out in the relevant multilateral agreements. The main projects administered by the Environmental Management Authority Environmental Trust Fund during the financial year ended 30 September 2012 are the Second National Communication to the Convention on Climate Change; Phase V of the Institutional Strengthening Programme for the Phase-out of Ozone Depleting Substances; and phase 11 of the Terminal Management Plan for the Phase-out of CFS's.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 2. Summary of significant accounting policies (continued)

##### d) Government grants (continued)

###### Income and funding (continued)

- (iv) A Memorandum of Agreement was signed on 20 April 2010 with the Minister of Planning, Housing and the Environment acting on behalf of the GORTT to receive funding from the Green Fund to continue with the Nariva Swamp Restoration, Carbon Sequestration and Livelihoods Project (NSRCSL Project). The project duration is from 20 April 2011 to 31 March 2017. Upon the signing of the agreement, the first tranche of TT\$8.471 million was received. The total amount to be disbursed over the period is TT\$68.545 million. Future disbursement will be made based on approved progress report.

##### e) Foreign currency transactions

Monetary assets and liabilities denominated in foreign currencies are expressed in Trinidad and Tobago dollars at rates of exchange ruling at the reporting date. All revenue and expenditure transactions denominated in foreign currencies are translated at the rates of exchange ruling at the date of the transaction and the resulting profits and losses on exchange from trading activities are recorded in the statement of profit or loss and other comprehensive income.

##### f) Trade and other payables

Trade payables are obligations to pay for goods or services that have been acquired in the ordinary course of business from suppliers. Trade payables are classified as current liabilities if payment is due within one year or less (or in the normal operating cycle of the business if longer). If not, they are presented as non-current liabilities.

Trade payables and other payables are recognised at fair value.

##### g) Taxation

The authority is exempt from taxation under the Environmental Management Act of 2000, Part V11 Section 76. According to Section 76:-

*'The Fund and the Authority shall be exempted from stamp duty, corporation tax, customs duties, value added taxes, motor vehicle taxes, fees, charges, assessments, levies and imposts on any income or profit or assets which are acquired for use by the Fund or the Authority.'*

##### h) Comparative information

Where necessary, comparative amounts have been adjusted to conform to changes in presentation in the current year.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 3. Application of new and revised International Financial Reporting Standards ('IFRS')

##### 3.1 Adoption of new and revised International Financial Reporting Standards

###### Standards and Interpretations adopted with no effect on financial statements

The Authority has adopted the following new standards and interpretations which had no effect on the financial statements and which were effective for annual periods beginning on or after 1 January 2014.

- Amendments to IFRS 10, IFRS 12 and IAS 27 Investment Entities
- Amendments to IAS 32 Offsetting Financial Assets and Financial Liabilities
- Amendments to IAS 36 Recoverable Amount Disclosures for Non-Financial Assets
- Amendments to IAS 39 Novation of Derivatives and Continuation of Hedge Accounting
- IFRIC 21 Levies
- Amendments to IAS 19 Defined Benefit Plans: Employee Contributions
- Annual Improvements to IFRS 2010-2012
- Annual Improvements to IFRS 2011-2013
- IFRS 7 Financial instruments – disclosure

##### 3.2 New and revised IFRS in issue but not yet effective

The Authority has not applied the following new and revised IFRS that have been issued but are not yet effective:

- |   |  |
|---|--|
| • IFRS 9                                    | Financial instruments <sup>3</sup>   |
| • IFRS 15                                   | Revenue from Contracts with Customers <sup>2</sup>   |
| • IFRS 16                                   | Leases <sup>2</sup>  |
| • Amendments to IFRS 11                     | Accounting for Acquisitions of Interest in Joint Operations <sup>1</sup>                           |
| • Amendments to IAS 16 and IAS 38           | Clarification of Acceptable Methods of Depreciation and Amortisation <sup>1</sup>                  |
| • Amendments to IAS 16 and IAS 41           | Agriculture: Bearer Plants <sup>1</sup>  |
| • Amendments to IFRS 10 and IAS 28          | Sale of Contribution of Assets between an Investor and its Associate or Joint Venture <sup>1</sup> |
| • Amendments to IFRS                        | Annual Improvements to IFRS 2012-2015 <sup>4</sup>   |
| • Amendments to IAS 1                       | Disclosure Initiative <sup>1</sup>   |
| • Amendments to IAS 27                      | Equity Method in Separate Financial Statements <sup>1</sup>  |
| • Amendments to IFRS 10, IFRS 12 and IAS 28 | Investment Entities: Applying the Consolidation Exception <sup>1</sup>                             |
| • Amendments to IAS 7                       | Disclosure initiative <sup>2</sup>   |
| • Amendments to IFRS                        | Amendments improvements to IFRS 2015-2016  |

<sup>1</sup> Effective for annual periods beginning on or after 1 January, 2016, with earlier application permitted.

<sup>2</sup> Effective for annual periods beginning on or after 1 January, 2017, with earlier application permitted.

<sup>3</sup> Effective for annual periods beginning on or after 1 January, 2018, with earlier application permitted.

<sup>4</sup> Effective for annual periods beginning on or after 1 July, 2016, with earlier application permitted.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 2. Summary of significant accounting policies (continued)

##### d) Government grants (continued)

###### Income and funding (continued)

- (iv) A Memorandum of Agreement was signed on 20 April 2010 with the Minister of Planning, Housing and the Environment acting on behalf of the GORTT to receive funding from the Green Fund to continue with the Nariva Swamp Restoration, Carbon Sequestration and Livelihoods Project (NSRCSL Project). The project duration is from 20 April 2011 to 31 March 2017. Upon the signing of the agreement, the first tranche of TT\$8.471 million was received. The total amount to be disbursed over the period is TT\$68.545 million. Future disbursement will be made based on approved progress report.

##### e) Foreign currency transactions

Monetary assets and liabilities denominated in foreign currencies are expressed in Trinidad and Tobago dollars at rates of exchange ruling at the reporting date. All revenue and expenditure transactions denominated in foreign currencies are translated at the rates of exchange ruling at the date of the transaction and the resulting profits and losses on exchange from trading activities are recorded in the statement of profit or loss and other comprehensive income.

##### f) Trade and other payables

Trade payables are obligations to pay for goods or services that have been acquired in the ordinary course of business from suppliers. Trade payables are classified as current liabilities if payment is due within one year or less (or in the normal operating cycle of the business if longer). If not, they are presented as non-current liabilities.

Trade payables and other payables are recognised at fair value.

##### g) Taxation

The authority is exempt from taxation under the Environmental Management Act of 2000, Part V11 Section 76. According to Section 76:-

*'The Fund and the Authority shall be exempted from stamp duty, corporation tax, customs duties, value added taxes, motor vehicle taxes, fees, charges, assessments, levies and imposts on any income or profit or assets which are acquired for use by the Fund or the Authority.'*

##### h) Comparative information

Where necessary, comparative amounts have been adjusted to conform to changes in presentation in the current year.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

---

#### 3. Application of new and revised International Financial Reporting Standards ('IFRS')

##### 3.1 Adoption of new and revised International Financial Reporting Standards

###### Standards and Interpretations adopted with no effect on financial statements

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- Amendments to IAS 39 Novation of Derivatives and Continuation of Hedge Accounting
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- Amendments to IAS 19 Defined Benefit Plans: Employee Contributions
- Annual Improvements to IFRS 2010-2012
- Annual Improvements to IFRS 2011-2013
- IFRS 7 Financial instruments – disclosure

##### 3.2 New and revised IFRS in issue but not yet effective

The Authority has not applied the following new and revised IFRS that have been issued but are not yet effective:

- |   |  |
|---|--|
| • IFRS 9                                    | Financial instruments <sup>3</sup>   |
| • IFRS 15                                   | Revenue from Contracts with Customers <sup>2</sup>   |
| • IFRS 16                                   | Leases <sup>2</sup>  |
| • Amendments to IFRS 11                     | Accounting for Acquisitions of Interest in Joint Operations <sup>1</sup>                           |
| • Amendments to IAS 16 and IAS 38           | Clarification of Acceptable Methods of Depreciation and Amortisation <sup>1</sup>                  |
| • Amendments to IAS 16 and IAS 41           | Agriculture: Bearer Plants <sup>1</sup>  |
| • Amendments to IFRS 10 and IAS 28          | Sale of Contribution of Assets between an Investor and its Associate or Joint Venture <sup>1</sup> |
| • Amendments to IFRS                        | Annual Improvements to IFRS 2012-2015 <sup>4</sup>   |
| • Amendments to IAS 1                       | Disclosure Initiative <sup>1</sup>   |
| • Amendments to IAS 27                      | Equity Method in Separate Financial Statements <sup>1</sup>  |
| • Amendments to IFRS 10, IFRS 12 and IAS 28 | Investment Entities: Applying the Consolidation Exception <sup>1</sup>                             |
| • Amendments to IAS 7                       | Disclosure initiative <sup>2</sup>   |
| • Amendments to IFRS                        | Amendments improvements to IFRS 2015-2016  |

<sup>1</sup> Effective for annual periods beginning on or after 1 January, 2016, with earlier application permitted.

<sup>2</sup> Effective for annual periods beginning on or after 1 January, 2017, with earlier application permitted.

<sup>3</sup> Effective for annual periods beginning on or after 1 January, 2018, with earlier application permitted.

<sup>4</sup> Effective for annual periods beginning on or after 1 July, 2016, with earlier application permitted.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 3. Application of new and revised International Financial Reporting Standards ('IFRS') (continued)

##### 3.1 New and revised IFRS in issue but not yet effective (continued)

- **IFRS 9 *Financial Instruments***

IFRS 9 issued in November 2009 introduced new requirements for the classification and measurement of financial assets. IFRS 9 was subsequently amended in October 2010 to include requirements for the classification and measurement of financial liabilities and for derecognition, and in November 2013 to include the new requirements for general hedge accounting. Another revised version of this IFRS was issued in July 2014 mainly to include a) impairment requirements for financial assets and b) limited amendments to the classification and measurement requirements by introducing 'fair value through other profit or loss' (FVTOCI) measurement category for certain simple debt instruments.

Key requirements of IFRS 9:

- all recognised financial assets that are within the scope of IAS 39 *Financial Instruments: Recognition and Measurement* are required to be subsequently measured at amortised cost or fair value. Specifically, debt investments that are held within a business model whose objective is to collect the contractual cash flows, and that have contractual cash flows that are solely payments of principal and interest on the principal outstanding are generally measured at amortised cost at the end of subsequent accounting periods. Debt instruments that are held within a business model whose objective is achieved both by collecting contractual cash flows and selling financial assets, and that have contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding, are measured at FVTOCI. All other debt investments and equity investments are measured at their fair value at the end of the subsequent accounting periods. In addition, under IFRS 9, entities may make an irrevocable election to present subsequent changes in the fair value of an equity investment (that is not held for trading) in profit or loss, with only dividend income generally recognised in profit or loss.
- with regard to the measurement of financial liabilities designated as at fair value through profit or loss, IFRS 9 requires that the amount of change in the fair value of the financial liability that is attributable to changes in the credit risk of that liability is presented in profit or loss, unless the recognition of the effects of changes in the liability's credit risk in profit or loss would create or enlarge an accounting mismatch in profit or loss. Changes in fair value attributable to a financial liability's credit risk are not subsequently reclassified to profit or loss. Under IAS 39, the entire amount of the change in the fair value of the financial liability designated as fair value through profit or loss is presented in profit or loss.
- in relation to the impairment of financial assets, IFRS 9 requires an expected loss model, as opposed to an incurred loss model under IAS 39. The expected loss model requires an entity to account for expected credit losses and changes in those expected credit losses at each reporting date to reflect changes in credit risk since initial recognition. In other words, it is no longer necessary for a credit event to have occurred before credit losses are recognised.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 3. Application of new and revised International Financial Reporting Standards ('IFRS') (continued)

##### 3.1 New and revised IFRS in issue but not yet effective (continued)

- **IFRS 9 *Financial Instruments* (continued)**

- the new general hedge accounting requirements retain three types of hedge accounting mechanisms currently available in IAS 39. Under IFRS 9, greater flexibility has been introduced to the types of transactions eligible for hedge accounting, specifically broadening the types of instruments that qualify for hedging instruments and the types of risk components of non-financial items that are eligible for hedge accounting. In addition, the effectiveness test has been overhauled and replaced with the principle of an 'economic relationship'. Retrospective assessment of hedge effectiveness is also no longer required. Enhanced disclosure requirements about an entity's risk management activities have also been introduced.

The directors of the Authority anticipate that the application of IFRS 9 in the future may have a material impact on the amounts reported in respect of the Authority's financial assets and liabilities. However it is not practicable to provide a reasonable estimate of the effect of IFRS 9 until the Authority undertakes a detailed review.

- **IFRS 15 *Revenue from Contracts with Customers***

In May 2014, IFRS 15 was issued which establishes a single comprehensive model for entities to use in accounting for revenue from contracts with customers. IFRS 15 will supersede the current revenue recognition guidance including IAS 18 *Revenue*, IAS 11 *Construction Contracts* and the related Interpretations when it becomes effective.

The core principle of IFRS 15 is that an entity should recognise revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. Specifically, the Standard introduces a 5-step approach to revenue recognition:

- Step 1: Identify the contract(s) with a customer
- Step 2: Identify the performance obligations in the contract
- Step 3: Determine the transaction price
- Step 4: Allocate the transaction price to the performance obligations in the contract
- Step 5: Recognise revenue when (or as) the entity satisfies a performance obligation

Under IFRS 15, an entity recognises revenue when (or as) a performance obligation is satisfied, i.e. when 'control' of the goods or services underlying the particular performance obligation is transferred to the customer. Far more prescriptive guidance has been added in IFRS 15 to deal with specific scenarios. Furthermore, extensive disclosures are required by IFRS 15.

The directors of the Authority anticipate that the application of IFRS 15 in the future may have a material impact on the amounts reported and disclosures made in the Authority's financial statements. However, it is not practicable to provide a reasonable estimate of the effect of IFRS 15 until the Authority performs a detailed review.



## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 3. Application of new and revised International Financial Reporting Standards ('IFRS') (continued)

##### 3.1 New and revised IFRS in issue but not yet effective (continued)

- **IFRS 16 Leases**

IFRS 16 specifies how an IFRS reporter will recognise, measure, present and disclose leases. The standard provides a single lessee accounting model, requiring lessees to recognise assets and liabilities for all leases unless the lease term is 12 months or less or the underlying asset has a low value. Lessors continue to classify leases as operating or finance, with IFRS 16's approach to lessor accounting substantially unchanged from its predecessor, IAS 17.

The directors of the Authority do not anticipate that the application of IFRS 16 in the future would have a material impact on the amounts reported and disclosures made in the Authority's financial statements.

- **Amendments to IFRS 11 Accounting for Acquisitions of Interest in Joint Operations**

The amendments to IFRS 11 provide guidance on how to account for the acquisition of a joint operation that constitutes a business as defined in IFRS 3 *Business Combinations*. Specifically, the amendments state that the relevant principles on accounting for business combinations in IFRS 3 and other standards (e.g. IAS 36 *Impairment of Assets* regarding impairment testing of a cash-generating unit to which goodwill on acquisition of a joint operation has been allocated) should be applied. The same requirements should be applied to the formation of a joint operation if and only if an existing business is contributed to the joint operation by one of the parties that participate in the joint operation.

A joint operator is also required to disclose the relevant information required by IFRS 3 and other standards for business combinations.

The amendments to IFRS 11 apply prospectively for annual periods beginning on or after 1 January 2016. The directors of the Authority do not anticipate that the application of these amendments to IFRS 11 will have a material impact on the Authority's financial statements.

- **Amendments to IAS 16 and IAS 38 Clarification of Acceptable Methods of Depreciation and Amortisation**

The amendments to IAS 16 prohibit entities from using a revenue-based depreciation method for items of property, plant and equipment. The amendments to IAS 38 introduce a rebuttable presumption that revenue is not an appropriate basis for Amortisation of an intangible asset. This presumption can only be rebutted in the following two limited circumstances;

- a) when the intangible asset is expensed as a measure of revenue; or
- b) when it can be demonstrated that revenue and consumption of the economic benefits of the intangible asset are highly correlated.

The amendments apply prospectively for annual periods beginning on or after 1 January 2016. Currently, the Authority uses the reducing balance method for depreciation and amortisation of its property, plant and equipment, and intangible assets respectively. The directors of the Authority believe that the reducing balance method is the most appropriate method to reflect the consumption of economic benefits inherent in the respective assets and accordingly, the directors of the Authority do not anticipate that the application of these amendments to IAS 16 and IAS 38 will have a material impact on the Authority's financial statements.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 3. Application of new and revised International Financial Reporting Standards ('IFRS') (continued)

##### 3.1 New and revised IFRS in issue but not yet effective (continued)

- **Amendments to IAS 16 and IAS 41 *Agriculture: Bearer Plants***

The amendments to IAS 16 and IAS 41 define a bearer plant and require biological assets that meet the definition of a bearer plant to be accounted for as property, plant and equipment in accordance with IAS 16, instead of IAS 41. The produce growing on bearer plants continues to be accounted for in accordance with IAS 41.

The directors of the Authority do not anticipate that the application of these amendments to IAS 16 and IAS 41 will have an impact on the Authority's financial statements as the Authority is not engaged in agricultural activities.

- **Amendments to IFRS 10 and IAS 28: *Sale or Contribution of Assets between an Investor and its Associate or Joint Venture***

The amendments to IFRS 19 and IAS 28 deal with situations where there is a sale or contribution of assets between an investor and its associate or joint venture. Specifically, the amendments state that gains or losses resulting from the loss of control of a subsidiary that does not contain a business in a transaction with an associate or a joint venture that is accounted for using the equity method, are recognised in the parent's profit or loss only to the extent of the unrelated investors' interest in that associate or joint venture. Similarly, gains and losses resulting from the measurement of investments retained in any former subsidiary (that has become an associate or a joint venture that is accounted for using the equity method) to fair value are recognised in the former parent's profit or loss only to the extent of the unrelated investors' interest in the new associate or joint venture.

The amendments should be applied prospectively to transactions occurring in annual periods beginning on or after 1 January 2016. The directors of the Authority do not anticipate that the application of these amendments will have a significant impact on the Authority's financial statements.

- **Annual Improvements 2012 – 2015**

The *Annual Improvements to IFRS 2012-2015* include a number of amendments to various IFRS, which are summarised below.

IFRS 5 — Adds specific guidance in IFRS 5 for cases in which an entity reclassifies an asset from held for sale to held for distribution or vice versa and cases in which held-for-distribution accounting is discontinued.

IFRS 7 — Additional guidance to clarify whether a servicing contract is continuing involvement in a transferred asset, and clarification on offsetting disclosures in condensed interim financial statements.

IAS 19 — Clarify that the rate used to discount post-employment benefit obligations should be determined by reference to market yields at the end of the reporting period on high quality corporate bonds. The assessment of the depth of for high quality corporate bonds should be at the currency level (i.e. the same currency as the benefits are to be paid). For currencies for which there is no deep market in such high quality corporate bonds, the market yields at the end of the reporting period on government bonds denominated in that currency should be used instead.

IAS 34 — Clarify the meaning of 'elsewhere in the interim report' and require a cross-reference.

The directors of the Authority do not anticipate that the application of these amendments will have a significant impact on the Authority's financial statements.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 3. Application of new and revised International Financial Reporting Standards ('IFRS') (continued)

##### 3.1 New and revised IFRS in issue but not yet effective (continued)

- **Amendment to IAS 1: *Disclosure Initiative***

Amendments were made to IAS 1 Presentation of Financial Statements to address perceived impediments to preparers exercising their judgement in presenting their financial reports by making the following changes:

- a) clarification that information should not be obscured by aggregating or by providing immaterial information, materiality considerations apply to all parts of the financial statements, and even when a standard requires a specific disclosure, materiality considerations do apply;
- b) clarification that the list of line items to be presented in these statements can be disaggregated and aggregated as relevant and additional guidance on subtotals in these statements and clarification that an entity's share of OCI of equity-accounted associates and joint ventures should be presented in aggregate as single line items based on whether or not it will subsequently be reclassified to profit or loss;
- c) additional examples of possible ways of ordering the notes to clarify that understandability and comparability should be considered when determining the order of the notes and to demonstrate that the notes need not be presented in the order so far listed in paragraph 114 of IAS 1.

The directors of the Authority do not anticipate that the application of these amendments will have a significant impact on the Authority's financial statements.

- **Amendments to IAS 27: *Equity Method in Separate Financial Statements***

Amendments were made to IAS 27 Separate Financial Statements to permit investments in subsidiaries, joint ventures and associates to be optionally accounted for using the equity method in separate financial statements. Consequently, an entity is permitted to account for these investments either:

- (i) at cost; or
- (ii) in accordance with IFRS 9 (or IAS 39); or
- (iii) using the equity method.

This is an accounting policy choice for each category of investment.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 3. Application of new and revised International Financial Reporting Standards ('IFRS') (continued)

##### 3.1 New and revised IFRS in issue but not yet effective (continued)

- **Amendments to IFRS 10, IFRS 12 and IAS 28 (*Investment Entities: Applying the Consolidation Exception*)**

Amendments were made to IFRS 10 Consolidated Financial Statements, IFRS 12 Disclosure of Interests in Other Entities and IAS 28 Investments in Associates and Joint Ventures (2011) to address issues that have arisen in the context of applying the consolidation exception for investment entities by clarifying the following points:

- a) The exemption from preparing consolidated financial statements for an intermediate parent entity is available to a parent entity that is a subsidiary of an investment entity, even if the investment entity measures all of its subsidiaries at fair value.
- b) A subsidiary that provides services related to the parent's investment activities should not be consolidated if the subsidiary itself is an investment entity.
- c) When applying the equity method to an associate or a joint venture, a non-investment entity investor in an investment entity may retain the fair value measurement applied by the associate or joint venture to its interests in subsidiaries.
- d) An investment entity measuring all of its subsidiaries at fair value provides the disclosures relating to investment entities required by IFRS 12.

The directors of the Authority do not anticipate that the application of these amendments will have a significant impact on the Authority's financial statements.

- **Amendments to IAS 7 Disclosure Initiative**

Amends IAS 7 Statement of Cash Flows to clarify that entities shall provide disclosures that enable users of financial statements to evaluate changes in liabilities arising from financing activities.

The directors of the Authority do not anticipate that the application of these amendments will have a significant impact on the Authority's financial statements.

- **Amendments to IFRS 2015-2016 Cycle**

The *Annual Improvements to IFRS 2015-2016 cycle* include a number of amendments to various IFRS, which are summarised below.

IFRS 1 First-time Adoption of International Financial Reporting Standards - Deleted the short-term exemptions of IFRS 1, because they have now served their intended purpose. Amendment effective for annual periods beginning on or after 1 January 2018.

IFRS 12 Disclosure of Interests in Other Entities – Clarify the scope of the standard by specifying that the disclosure requirements in the standard apply to an entity's interests that are classified as held for sale, as held for distribution or as discontinued operations in accordance with IFRS 5 Non-current Assets Held for Sale and Discontinued Operations. Amendment effective for annual periods beginning on or after 1 January 2017.

IAS 28 Investments in Associates and Joint Ventures - Clarified that the election to measure at fair value through profit or loss an investment in an associate or a joint venture that is held by an entity that is a venture capital organisation, or other qualifying entity, is available for each investment in an associate or joint venture on an investment-by-investment basis, upon initial recognition. Amendment effective for annual periods beginning on or after 1 January 2018.

The directors of the Authority do not anticipate that the application of these amendments will have an impact on these financial statements.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 4. Critical accounting estimates and judgements

The preparation of financial statements in accordance with International Financial Reporting Standards required management to make judgements, estimates and assumptions in the process of applying the Authority's accounting policies.

Estimates and judgements are continually evaluated and are based on historical experience and other factors, including expectations of future events that are believed to be reasonable under the circumstances. The Authority makes estimates and assumptions concerning the future and actual results could differ from those estimates as the resulting accounting estimates will, by definition, seldom equal the related actual results. The estimates and assumptions that have a significant risk of causing a material adjustment to the carrying amounts of assets liabilities within the next financial year are discussed below:

Changes in accounting estimates are recognised in the statement of profit or loss and other comprehensive income in the period in which the estimate is changed, if the change affects that period only. If the change affects a prior period, the Authority recognises this change in the Statement of Movement of Funds in the current period.

The critical judgements, apart from that involving estimations, which has the most significant effect on the amounts recognised in the financial statements, is as follows:

1. Which depreciation method for building and equipment is used and the useful life.
2. Whether fixed assets are measured at cost or revalued amount.

#### Contingent liabilities

Management applies its judgement to the facts and advice it receives from its attorneys, advocates and other advisors in assessing if an obligation is probable, more likely than not or remote. Such judgement is used to determine if the obligation is recognised as a liability or disclosed as a contingent liability.

The key assumption concerning the future and other key sources of estimation uncertainty at the reporting date (requiring management's most difficult, subjective or complex judgements) that has a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year is with respect to building and equipment. Management exercises judgement in determining whether future economic benefits can be derived from expenditures to be capitalised and in estimating the useful lives and residual values of these assets.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

5.	<b>Cash in hand and at bank</b>		
		<b>2015</b>	<b>2014</b>
		<b>\$</b>	<b>\$</b>
	Petty cash	13,385	9,000
	Republic Bank Limited:		
	Operating account	8,808,379	8,658,058
	US Dollar account	836,297	213,521
	NSRCSL project account	15,752,260	3,759,981
	Highway Police Surveillance HPS Bays Project	1,994,926	3,372,949
	Green Fund National BCBC Project	2,530,175	2,741,649
	Recyclable Solid Waste Collection Project	76,711,161	-
	First Citizens Bank Limited:		
	Oil Spill Assessment	16,865,637	19,999,997
	IDB Technical	837,150	36
	Permit income account	9,993,992	8,170,048
	RBTT Bank Limited:		
	Other projects	245,091	245,604
	Biodiversity	13,375	13,687
	Biosafety	96,815	97,115
	National Capacity Needs Self-Assessment	395,181	395,496
	Scotiabank Trinidad and Tobago Limited:		
	VTM card	15,779	-
	Terminal Phase out Management Plan	28,630	12,224
		<u>135,138,233</u>	<u>47,689,365</u>
6.	<b>Short-term investments</b>		
		<b>2015</b>	<b>2014</b>
		<b>\$</b>	<b>\$</b>
	Republic Bank Limited Pool Bond	2,253,517	2,229,245
	Trinidad and Tobago Unit Trust Corporation Money Market	846,504	838,818
		<u>3,100,021</u>	<u>3,068,063</u>
7.	<b>Accounts receivable and prepayments</b>		
		<b>2015</b>	<b>2014</b>
		<b>\$</b>	<b>\$</b>
	Accounts receivable	824,470	-
	VAT Receivable	1,956,391	5,321,613
	Other receivables	430,814	453,383
	Prepayments	122,321	1,475,110
		<u>3,333,996</u>	<u>7,250,106</u>

**Environmental Management Authority Environmental Trust Fund**

Notes to the financial statements  
for the year ended 30 September 2015  
(Expressed in Trinidad and Tobago dollars)

**8. Property, plant and equipment**

	Land \$	Leasehold Improvements \$	Building \$	Furniture and Fittings \$	Office Equipment \$	Motor Vehicles \$	Computer Equipment \$	Specialised Equipment \$	Library/ Information \$	Total \$
<b>Cost / valuation</b>										
Balance as at 1 October 2014	13,729,868	770,467	51,771,725	7,249,634	5,533,410	5,203,778	5,617,950	827,374	332,331	91,036,537
Additions	-	2,838,604	571,152	439,636	279,575	200,000	281,505	2,152,537	-	6,763,379
Balance as at 30 September 2015	13,729,868	3,609,071	52,343,247	7,689,270	5,812,985	5,403,778	5,899,455	2,979,911	332,331	97,799,916
<b>Accumulated depreciation</b>										
Balance as at 1 October 2014	-	12,447	2,805,733	2,995,855	4,073,675	2,233,133	4,232,916	216,558	271,675	16,843,992
Charge for the year	-	266,124	1,143,534	445,250	329,871	792,662	394,624	246,125	6,066	3,624,256
Balance as at 30 September 2015	-	278,571	3,949,267	3,441,105	4,403,546	3,025,795	4,627,540	464,683	277,741	20,468,248
<b>Net book value</b>										
Balance as at 30 September 2015	13,729,868	3,330,500	48,393,980	4,248,165	1,409,439	2,377,983	1,271,915	2,515,228	54,590	77,331,668
Balance as at 30 September 2014	13,729,868	768,020	48,965,992	4,253,779	1,469,735	2,970,645	1,385,034	608,816	60,666	74,192,545



Environmental Management Authority Environmental Trust Fund

Notes to the financial statements  
for the year ended 30 September 2015  
(Expressed in Trinidad and Tobago dollars)

8. Property, plant and equipment (continued)

	Land \$	Leasehold Improvements \$	Building \$	Furniture and Fittings \$	Office Equipment \$	Motor Vehicle \$	Computer Equipment \$	Specialised Equipment \$	Library/ Information \$	Total \$
<b>Cost / valuation</b>										
Balance as at 1 October 2013	13,729,868	-	26,000,000	7,029,447	5,386,837	4,750,199	5,492,368	450,758	332,331	63,181,808
Additions	-	770,467	25,771,725	225,952	388,164	1,330,134	510,315	381,016	-	29,386,873
Disposals	-	-	-	(4,865)	(261,591)	(876,555)	(394,733)	(4,400)	-	(1,532,144)
Balance as at 30 September 2014	13,729,868	770,467	51,771,725	7,249,634	5,533,410	5,203,778	5,617,950	827,374	332,331	91,036,537
<b>Accumulated depreciation</b>										
Balance as at 1 October 2013	-	-	2,139,620	2,537,457	3,963,100	2,334,809	4,234,825	120,576	264,935	15,595,322
Charge for the year	-	12,447	666,113	462,206	347,391	707,325	355,914	99,490	6,740	2,657,626
Disposals	-	-	-	(3,808)	(236,816)	(809,001)	(357,823)	(1,508)	-	(1,408,956)
Balance as at 30 September 2014	-	12,447	2,805,733	2,995,855	4,073,675	2,233,133	4,232,916	218,558	271,675	16,843,992
<b>Net book value</b>										
Balance as at 30 September 2014	13,729,868	758,020	48,965,992	4,253,779	1,459,735	2,970,645	1,385,034	608,816	60,656	74,192,545
Balance as at 30 September 2013	13,729,868	-	23,860,380	4,491,990	1,433,737	2,415,390	1,257,543	330,182	67,396	47,586,486

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

#### 8.1 Property Plant and Equipment (continued)

##### Fair value measurement of The Authority's Building

The Authority's buildings are stated at their revalued amounts, being the fair value at the date of revaluation, less any subsequent accumulated depreciation and subsequent accumulated impairment losses. The buildings were revalued by an independent valuator G. A. Farrell & Associate Limited. The effective date of the valuation was January 4, 2010 and the value of TT\$26 million was determined after consideration and use of one or more of the following approaches: the Direct Sale Comparison Approach; the Income Approach; and the Cost Approach.

Details of the Authority's buildings and information about the fair value hierarchy as at 30 September 2015 and 2014 are as follows:

	Level 1 \$	Level 2 \$	Level 3 \$	Total \$
<b>At 30 September 2015</b>	-	48,393,980	-	48,393,980
<b>At 30 September 2014</b>	-	48,965,992	-	48,965,992

There were no transfers between levels during the year.

If the properties were stated using the historical cost basis, the carrying values would have been as follows:

	2015 \$	2014 \$
<b>Buildings</b>		
Cost	34,361,103	33,789,581
Accumulated depreciation	1,977,741	1,160,954
	<u>32,383,362</u>	<u>32,628,627</u>

#### 9. Accounts payable and accruals

	2015 \$	2014 \$
Accounts payable	1,193,101	2,894,771
Other payables	5,145	3,476
Accruals	2,388,483	2,562,107
Violations payable	8,823,133	7,028,509
Ministry of Public Utilities and the Environment National Forest Inventory Project	412,545	396,736
National Restoration, Carbon Sequestration, Wildlife and Livelihood Projects	17,208,464	3,857,451
Recyclables Solid Waste Collection Project	77,051,237	-
Highway Police Surveillance Bays	2,944,714	4,164,439
Oil Spill Assessment Remediation and Rehabilitation	16,865,637	19,999,997
National Beverage Container Bill Clean Up Project	6,635,156	6,846,630
World Bank loans	1,365,520	-
	<u>134,893,135</u>	<u>47,754,116</u>

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

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#### 10. Fair values

Fair value is the amount for which an asset could be exchanged, or a liability settled between knowledgeable, willing parties in an arm's length transaction. The existence of published price quotation in an active market is the best evidence for fair value. Where market prices are not available, fair values are estimated using various valuation techniques, including using recent arm's length market transactions between knowledgeable, willing parties, if available, current fair value of another financial instrument that is substantially the same and discounted cash flow analysis.

#### *Current assets and liabilities*

The carrying amounts of current assets and liabilities are a reasonable approximation of the fair values because of their short-term nature.

#### 11. Related party transactions

Parties are considered to be related if one party has the ability to control the other party or exercise significant influence over the other party in making financial decisions.

Key management personnel are those persons having the authority and responsibility for planning, directing and controlling the activities of the Authority.

A number of transactions are entered into with related parties in the normal course of business. These transactions were carried out on commercial terms at market rates.

Balances and transactions with related parties and key management personnel during the year were as follows:

	2015 \$	2014 \$
<b>Other expenses</b>		
Directors' fees	673,750	627,000
Directors' expenses	38,834	64,542
<b>Key management compensation</b>		
Short-term benefits	<u>4,304,769</u>	<u>3,528,661</u>

#### 12. Financial risk management

##### Financial risk factor

The Authority's activities are primarily related to the use of financial instruments. The Authority accepts funds mainly from the GORTT and earns interest by investing short term money market instruments.

##### Financial instruments

The following table summarizes the carrying amounts and fair value of the authority's financial assets and liabilities:

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015

(Expressed in Trinidad and Tobago dollars)

#### 12. Financial risk management (continued)

##### Financial risk management categorization

	Financial assets and liabilities \$	Non-financial assets and liabilities \$	Equity \$	Total \$
<b>As at September 30, 2015</b>				
<b>Assets:</b>				
Cash in hand and at bank	135,138,233	-	-	135,138,233
Short-term investments	3,100,021	-	-	3,100,021
Accounts receivable and prepayments	3,333,996	-	-	3,333,996
Property, plant and equipment	-	77,331,668	-	77,331,668
<b>Total</b>	<b>141,572,250</b>	<b>77,331,668</b>	<b>-</b>	<b>218,903,918</b>
<b>Liabilities and funds:</b>				
Accounts payable and accruals	134,893,135	-	-	134,893,135
Funds	-	-	66,028,639	66,028,639
Revaluation surplus	-	-	17,982,144	17,982,144
<b>Total</b>	<b>134,893,135</b>	<b>-</b>	<b>84,010,783</b>	<b>218,903,918</b>
<b>As at September 30, 2014</b>				
<b>Assets:</b>				
Cash in hand and at bank	47,689,365	-	-	47,689,365
Short-term investments	3,068,063	-	-	3,068,063
Accounts receivable and prepayments	7,250,106	-	-	7,250,106
Property, plant and equipment	-	74,192,545	-	74,192,545
<b>Total</b>	<b>58,007,534</b>	<b>74,192,545</b>	<b>-</b>	<b>132,200,079</b>
<b>Liabilities and funds:</b>				
Accounts payable and accruals	47,754,116	-	-	47,754,116
Deferred income	218,725	-	-	218,725
Funds	-	-	66,245,094	66,245,094
Revaluation surplus	-	-	17,982,144	17,982,144
<b>Total</b>	<b>47,972,841</b>	<b>-</b>	<b>84,227,238</b>	<b>132,200,079</b>

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

#### 12. Financial risk management (continued)

The Authority is exposed to interest rate risk, credit risk, liquidity risk, currency risk, operational risk, compliance risk and reputation risk arising from the financial instruments that it holds. The risk management policies employed by the Authority to manage these risks are discussed below:

##### (a) Interest rate risk

Interest rate risk is the risk that the value of financial instruments will fluctuate due to changes in market interest rates. The Authority's income and operating cash flows are substantially independent of changes in market interest rates as the Authority has no significant interest bearing assets. The Authority is only exposed to interest rate risk in relation to its current account held at Republic Bank Limited, RBC Royal Bank (Trinidad and Tobago) Limited, Scotiabank (Trinidad and Tobago) Limited and First Citizens Bank Limited. As the Authority has no significant variable interest-bearing asset, the Authority's income and operating cash flows are substantially independent of changes in market interest rates.

##### (b) Credit risk

Credit risk arises when a failure by counter parties to discharge their obligations could reduce the amount of future cash inflows from financial assets on hand at the reporting date. The Authority has policies in place to ensure that all amounts due are collected within the specified credit period.

Cash balances are held with high credit quality financial institutions and the Authority has policies to limit the amount of exposure to any financial institution.

##### (c) Liquidity risk

Liquidity risk is the risk that arises when the maturity of assets and liabilities does not match. An unmatched position potentially enhances profitability, but can also increase the risk of losses. The Authority has procedures with the objective of minimizing such losses such as maintaining sufficient cash and other highly liquid current assets.

##### Liquidity gap

The Authority's exposure to liquidity risk is summarized in the table below which analyses assets and liabilities based on the remaining period from the reporting date to the contractual maturity date:

	On demand \$	Up to 1 year \$	1 to 5 years \$	Over 5 years \$	Total \$
<b>Financial assets:</b>					
Cash in hand and at bank	135,138,233	-	-	-	135,138,233
Short term investments	3,100,021	-	-	-	3,100,021
Accounts receivable and prepayments	853,843	2,480,153	-	-	3,333,996
	<b>139,092,097</b>	<b>2,480,153</b>	-	-	<b>141,572,250</b>
<b>Financial liabilities</b>					
Accounts payable and accruals	-	(134,893,135)	-	-	(134,893,135)
<b>Net liquidity gap</b>	<b>139,092,097</b>	<b>(132,412,982)</b>	-	-	<b>6,679,115</b>

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

#### 12. Financial risk management (continued)

##### d) Currency risk

Currency risk is the risk that the value of financial instruments will fluctuate due to changes in foreign exchange rates. Currency risk arises when future commercial transactions and recognised assets and liabilities are denominated in a currency that is not the Authority's measurement currency. The Authority is exposed to foreign exchange risk arising from various currency exposures primarily with respect to the United States Dollars. The Authority's management monitors the exchange rate fluctuations on a continuous basis and acts accordingly.

The Company had the following significant currency positions:

##### As at September 30, 2015

	USD (TT\$ equivalent)
<b>Assets</b>	
Cash at bank	1,052,003
<b>total foreign currency assets</b>	<b>1,052,003</b>

##### As at September 30, 2014

	USD (TT\$ equivalent)
<b>Assets</b>	
Cash at bank	836,297
<b>total foreign currency assets</b>	<b>836,297</b>

##### Foreign currency sensitivity analysis

The following table details the sensitivity to a 5% increase and decrease in the Trinidad and Tobago dollar against the US dollar with all other variable held constant. 5% is the sensitivity rates used when reporting foreign currency risk internally to key management personnel and represents management's assessment of the possible change in foreign exchange rates. The sensitivity analysis includes only outstanding foreign currency denominated monetary items.

If the Trinidad and Tobago dollar strengthens or weakens by 5% against the US dollar the effect would be as follows:

	US dollar impact	
	2015	2014
	\$	\$
<b>Effect</b>	<b>52,600</b>	<b>41,815</b>

##### e) Operational risk

Operational risk is the risk derived from deficiencies relating to the Authority's information technology and control systems, as well as the risk of human error and natural disasters. The Authority's systems are evaluated, maintained and upgraded continuously.

## Environmental Management Authority Environmental Trust Fund

### Notes to the financial statements for the year ended 30 September 2015 (Expressed in Trinidad and Tobago dollars)

#### 12. Financial risk management (continued)

##### f) Compliance risk

Compliance risk is the risk of financial loss, including fines and other penalties, which arise from non-compliance with laws and regulations of the state. The risk is limited to the extent of monitoring controls applied by the Authority.

##### g) Reputation risk

The risk of loss of reputation arising from the negative publicity relating to the Authority's operations (whether true or false) may result in a reduction of its clientele, reduction in revenue and legal cases against the Authority. The Authority applies procedures to minimize this risk.

#### 13. Project expenses

Project expenses comprise of general expenses incurred by the different projects managed by the Authority.

Description	2015 \$	2014 \$
National Beverage Containers Bill Clean-up Project.	217,528	3,640,896
IDB Technical Cooperation	11,416	19,125
Finance and Administration Services	220,910	126,000
Information and Communication Services	-	60,540
Legal and Enforcement Services	58,050	-
National Restoration, Carbon Sequestration, Wildlife and Livelihoods Project	6,754,600	2,925,817
Other	123,212	1,793,818
Pollution Prevention and Control	690,934	1,042,757
Recyclable Solid Waste Collection Project	3,210,745	-
National Environmental Assessment Task Force	854,375	-
	<u>12,141,770</u>	<u>9,608,953</u>

#### 14. Commitments and contingencies

##### Leasing arrangements

Operating leases relate to leases of offices and other equipment with lease terms of between 6 months and 5 years. The Company does not have an option to purchase the leased offices at the expiry of the lease periods.

	2015 \$	2014 \$
No later than 1 year	315,313	325,313
Later than 1 year and no later than 5 years	-	-
	<u>315,313</u>	<u>325,313</u>

#### 15. Events after the reporting date

There are no significant events which occurred after the reporting date affecting the financial performance, position or change therein for the reporting period presented in these financial statements.



## **PART D: FINANCIAL ASSISTANCE OR OTHER REPORT**

There are no qualifying activities under section 14 (1d) of the EM Act for the year 2015.