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Report on regional criteria and standards for Nitrogen (N) and Phosphorus (P) loads in domestic and industrial wastewater discharges

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INSTITUTE OF MARINE AFFAIRS

ACTIVITY 2 - PRELIMINARY DRAFT REPORT

ESTABLISH REGIONAL CRITERIA AND STANDARDS FOR N AND P LOADS IN DOMESTIC AND INDUSTRIAL WASTEWATER DISCHARGES

SMALL SCALL FUNDING AGREEMENT

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1.0 INTRODUCTION

The objective of this study is to establish regional criteria for Nitrogen (N) and Phosphorus (P) contained in wastewater discharges and other effluents from both domestic and industrial sources. N and P compounds are prevalent in sources of nutrient pollution. Uniformity through the development of regional standards for N and P contributes to establishing a foundation for the protection of the marine environment in the Caribbean.

The outcomes of this study are expected to provide support to the Regional Nutrient Reduction Strategy and Action Plan (RNRSAP). The development of the RNRSAP was initiated by the Cartagena Convention, with one of the goals being establishment of a collaborative framework for the progressive reduction of impacts from excess nutrient loads on priority coastal and marine ecosystems in the Wider Caribbean Region (WCR) (Figure 1). An evaluation of existing regional nutrient (N and P) criteria provides significant information in this effort.

The methodology of this study consisted of a review of existing N and P standards in the WCR and globally. The Regional Activity Centre of the Institute of Marine Affairs (RAC IMA) reviewed existing standards for the English Speaking Caribbean while the Regional Activity Centre of Engineering and Environmental Management of Coasts and Bays in Cuba (RAC CIMAB) provided support by reviewing standards from the Spanish-speaking countries in the WCR. A questionnaire on N and P criteria was distributed to the national focal point of contracting parties to collect information on the national N and P criteria/limits/standards and respective compounds proposed by each country.

A desk study was completed to collate data on N and P limits regionally, to augment the proposal of limits for the region. The results obtained in this sub-regional study will be integrated with a similar one for the Spanish-speaking countries completed by the RAC CIMAB and presented under a single regional report.

This activity was financially supported through a Small Scale Funding Agreement (SSFA) with the United Nations Environment Programme (UNEP) and the Swedish International Development Agency (SIDA).

FIGURE 1: MAP OF THE WIDER CARIBBEAN REGION

2.0 GENERAL STANDARDS AND CRITERIA

Wastewater discharge employs a range of terms to properly identify the qualitative and quantitative technical aspects of related processes and the effects they have on natural water courses. In order to present a collective, which is by no means exhaustive, the common terminology is defined below:

- **Regulations** are mandatory requirements that can apply to individuals, businesses, state or local governments, non-profit institutions, or others (www.epa.gov, USEPA)

- **Criteria** are elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use – (Clean Water Act, 2021 Section 303(c)(2)

- **Load** may be defined as the mass of a substance that passes a particular point of a river (such as a monitoring station on a watershed outlet) in a specified amount of time (e.g., daily, annually). (Meals *et. al*, 2013)

- **Total Maximum Daily Load** is the calculation of the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that particular pollutant (www.epa.gov, USEPA)

- **Domestic wastewater** means all discharges from households, commercial facilities, hotels, septage and any other entity whose discharge includes the following:

  (a) Toilet flushing (black water);

  (b) Discharges from showers, wash basins, kitchens and laundries (grey water); or

  (c) Discharges from small industries, provided their composition and quantity are compatible with treatment in a domestic wastewater system (LBS Protocol, 1999).

3.0 REGULARTORY FRAMEWORKS FOR THE DISCHARGE OF DOMESTIC AND INDUSTRIAL WASTEWATER

Generally, contracting parties of the Cartagena Convention may have legal instruments that prohibit the discharge of wastewater into receiving bodies that may eventually lead to detriment to the public via use or consumption. However, differing wastewater distinction by source and requisite means of discharge exist amongst parties. Furthermore, a number of contracting parties currently have no means of wastewater differentiation i.e. domestic, industrial or limited standards for same.

3.1 COUNTRIES WITH REGULATORY FRAMEWORK FOR WASTEWATER DISCHARGE

3.1.1 ANTIGUA AND BARBUDA

Environment Protection and Management Act (2019)

Schedule VII Water Quality and Criteria Guidelines (Section 64 (2) Schedule VII contains the Water Quality Policy which establishes guidelines for the quality management of water resources in the country with the overarching goal of protecting human health, aquatic life and aesthetic qualities. The Policy deals with maintaining the existing water quality of its classified waters, point and non-point sources of pollution and discharge of wastewater into water bodies.

> *"(7) to the extent practicable, all new point sources of pollution shall not discharge into near-shore or fresh surface waters;*
>
> *(8) all sewage and waste shall receive the degree of treatment necessary to protect the beneficial uses of waters of Antigua and Barbuda before discharge;*
>
> *(11) all waste water from industrial or commercial facilities that are located close to a public sewerage system should be disposed into that system, subject to such quality and flow conditions as the owner of the sewerage system may apply;*
>
> *(12) there shall be no direct or indirect discharge of sewage or other waste into any planned or intended ground or surface source of public drinking water;"*

Furthermore, the Water Use and Classification Criteria within Schedule VII outlines the classification of waters and provides the water quality standards required to maintain the given classifications for ground waters, fresh waters and coastal waters. These standards include water quality criteria for each sub-category of water classification and the respective uses to which they apply.

Each parameter of the water quality criteria includes specific levels or maximum permissible limits. For nutrient pollutants, the maximum permissible limits are concentration levels

outlined for Total Nitrogen and Total Phosphorus that should not be exceeded. In addition, concentration levels for Nitrates and Nitrites are given where parameters are used to determine pollution of water bodies and whether waters can be tested to confirm the level of pollution, i.e. acute or chronic standards. Acute standards are designed to protect against acute effects (e.g., death) resulting from spikes in pollutant concentrations. Chronic standards are designed to protect against sub-lethal effects occurring from elevated pollutant concentrations over a longer four-day period.

3.1.2 BELIZE

Environment Protection Act (2011)

The Act established general provisions for prevention and control of pollution, through the Department of Environment, by prohibiting the discharge of effluents, seemingly including both domestic and industrial sources. This is exemplified in Section 8, Prohibition of Discharge of Pollutants (1) "*No person, installation, factory or plant shall, unless specifically permitted by the Department, emit or discharge any pollutant into the atmosphere in contravention of the permitted levels …"*

In addition, a more specific reference to coastal and marine resources is included in Section 11 (1) "*No person shall emit, import, discharge, deposit, dispose of or dump any waste that might directly or indirectly pollute water resources or damage or destroy marine life."*
Environment Protection (Effluent Limitations) Regulations (2009).

These Regulations supplement the Environmental Protection Act (2011) which is the substantive law that aims to protect Belize's natural and environmental resources, prevent and control pollution, inter alia. These Regulations were originally established in 2003 and amended in 2009 to include an updated definition of industrial effluent. They also adopted the definition of domestic effluent as per the LBS Protocol. Importantly, the Regulations specifically apply to discharges of effluent into any inland waters or the marine environment (Section 3). They also consist of Schedules which outline parameter limits for Specific Industries (Schedule I) and Other Industries and Commercial Activities (Schedule II). The third Schedule refers to Discharges from domestic wastewater treatment systems (sewage and wastewater) into both Class I and Class II waters.

The framework aims to maintain the water quality of classified waters through Section 5A "*Every person who discharges domestic effluent that adversely affects Class I or Class II waters, shall ensure that such Class I or Class II waters are treated by an existing domestic wastewater system whose effluent achieves the effluent limitations set out in Schedule III"*
The responsibility for the treatment of effluent is further designated to those industries in Section 6 (1) "*Every industry which discharges effluent shall ensure that such effluent can be assimilated by the receiving water into which the effluent is discharged."*

Under the Regulations, while discharge is allowed from different industries, it is mandatory that the discharge itself must be within the given type. Substances outside of this are prohibited under Section 10 – "*No person shall discharge or cause or permit the discharge of any of the following substances into any inland waters or into the marine environment: (a) any inflammable liquid; (b) any tar or other related liquids.*"

Lastly, while the discharge arising from domestic waste via waste disposal systems is permissible, industrial or commercial sources of effluent require a licence to permit such activity. Section 14-1 "*no person shall: (a) discharge on or cause or permit the entry into waters, on the ground or into the ground, of any effluent or any poisonous, noxious or polluting matter*;" the modifications of any related infrastructure would also necessitate similar documentation beforehand "*(b) construct, reconstruct or alter any works for the discharge of any effluent or any poisonous, noxious or polluting matter, except under and in accordance with a licence for the purpose granted by the Department under these Regulations."*

3.1.3 GUYANA

Environmental Protection Act (1996)

The Environmental Protection Act (1996) provides for the management, conservation protection and improvement of the environment, the prevention and control of pollution inter alia. Implementation of the Act is overseen by the Environmental Protection Agency Guyana (EPA Guyana). The Act prohibits any activity that is likely to cause pollution to the environment, and more specifically the discharge of any contaminant into the environment in excess of any levels that maybe stipulated by Regulations or the Environmental Protection Agency.

Environmental Protection (Water Quality) Regulations (2000)

Any person operating a facility or engaging in activity that would result in effluent discharge is required to apply to the EPA Guyana for environmental authorisation (permit) under the Water Quality Regulations, Section 4. Subsequently, the discharge without such authorisation is explicitly restricted.

> Section 5. (1) "*No person who engages in any of the activities mentioned in regulation 4 shall discharge or cause or permit the discharge of any effluent in or on any inland or coastal waters or on any land unless that person holds an environmental authorisation."*

It is important to note, pursuant to Schedule I of the Regulations, the preceding restriction does not apply to discharges from domestic households, housing/commercial developments under 30 units and certain industries under particular criteria.

As the environmental statutory body, the EPA Guyana establishes parameter limits for effluents and also determines discharge points for any facility, and similarly prohibits any new or altered points of discharge without requisite approval.

3.1.4 JAMAICA

National Resources Conservation Authority (NRCA) Act (1991)

The Act serves as the main environmental legislative framework and outlines the steps for environment protection and management of Jamaica. The legislation mainly references discharge licences for sewage and trade effluents, as opposed to the explicit prohibition of discharging wastewater into ground or coastal waters.

This is exemplified under the Licences for the discharge of effluents, Section 12 (a) "*no person shall discharge on or cause or permit the entry into waters, on the ground or into the ground, of any sewage or trade effluent or any poisonous, noxious or polluting matter;* (b) "*construct, reconstruct or alter any works for the discharge of any sewage or trade effluent … except under licence granted by the Authority under the Act*"

Natural Resources Conservation (Wastewater and Sludge) Regulations (2013)

The Wastewater and Sludge Regulations adopted the classification of waters under the LBS Protocol and are crafted to protect and manage effluent discharge into coastal waters by explicitly requiring possession a license, in keeping with the overarching legislative framework. These licenses are issued via an application process with the NRCA.

As per Section 5 (2A), any person that wishes to operate a treatment plant for trade or sewage effluent would require such a licence. However, the discharge of domestic wastewater does not require a licence, providing the it is properly treated via soak away pits, absorption or disposal waste system.

> Section 7(1*A) person whose business, industry, manufacturing or trade operations, involve the discharge of trade effluent or sewage effluent or both, as the case may be, from a treatment plant into the environment shall apply to the Authority for a* licence *to discharge such effluent into the environment*

Further to this, Section 7(5) of the Regulations require points of discharge to be designated and clearly identified as a means of warning the public.

3.1.5 TRINIDAD & TOBAGO

Environmental Management Act (2000)

Under this principal legislation, water quality is managed by the Environmental Management Authority (EMA), a statutory body founded under the Act. The law prohibits the release of water pollutants, i.e. the discharge of untreated water that may contain any contaminant

above specified levels. Here water is defined to be all inclusive and refers to any surface water, sea, groundwater, wetlands or marine areas within the environment.

Water Pollution Rules (2019)

The Water Pollution Rules (WPR) specifically serve to maintain the quality of the national water resources by regulation of effluent discharge. Although the legislation does not include explicit definitions for domestic or industrial effluent, those under the LBS Protocol are assumed to be adopted. The WPR outlines all substances or parameters and given levels that would determine them as pollutants (Schedule I – Register of Water Pollutants). Also, end of pipe standards were established (Schedule II – Permissible Levels), which serve as the acceptable levels or conditions of all parameters for any substance that may be discharged via a discrete source into inland, coastal nearshore, marine offshore and environmentally sensitive areas. The WPR furthers the above prohibition of water pollutants initially set in the Act with establishment of a Water Polluters Register. The Register holds the information of persons who intend to or already are discharging pollutants into waters.

> 8 (1) "*Where any person releases a water pollutant into a receiving environment outside the permissible level, that is likely to cause harm to human health or to the environment, the Authority may at any time notify that person to apply for a permit.*"

Conditions of the permit allow for adequate records and management of discharge by the Authority.

> 15 (1) *The Authority shall establish in each permit— (a) the water pollutants authorised to be released; (b) the quantity, conditions and concentrations the permittee may release; (c) the exact location where the sampling of the release shall be performed; and (d) reporting requirements*.

Lastly, Schedule III of the WPR includes the ambient water quality standards for both freshwater and marine environments and represents a detailed outline of parameters that should be met to protect waters for aquatic life and aquatic ecosystems, water supply and recreational use.

3.1.6 UNITED STATES OF AMERICA

Clean Water Act (2021)

Under this legislation, there are multiple statutes contributing to the legal framework prohibiting effluent discharge into the different water classes that exist across the United States. Section 1311, Effluent Limitations, declares that any discharge of pollutants must be in compliance with the law. Any party that is responsible for doing so must ensure the necessary treatment is performed (unless publicly owned treatment facility) to be within

compliance. Additionally, the Limitations are applied to all point sources of discharge. As per Section 1312(A): where water quality is related, "*whenever discharges of pollutants from a point source or group of point sources would interfere with the attainment or maintenance of that water quality in a specific portion of the navigable waters which shall assure protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water, effluent limitations (including alternative effluent control strategies) for such point source or sources shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality*."

Though the overarching legislation requires a permit, a discharging entity must have Certification (Section 1341) from the State that the effluent originates or will originate from as part of the compliance procedure before a permit is duly granted by the EPA.
Under Section 1342, National Pollutant Discharge Elimination System (NPDES) was created to effectively manage point source effluent discharge into US waters. Through the EPA, States can authorize permits which allow a facility to discharge a specified amount of a pollutant into a receiving water under certain conditions. The NPDES permit system is based on the Effluent Limitations and are developed using the required water quality standards in tandem with available technologies for pollutant control with respect to industrial entities as per industrial category.

3.2 COUNTRIES WITHOUT REGULATORY FRAMEWORK FOR WASTEWATER DISCHARGE

The following countries may not have any categorical legislation to treat with the effluent discharge for either or both domestic and industrial sources. However, it is important to note that there are existing fragments within the current legal framework that are considered relative. Though these statutes may in most cases seem broad or general, they do offer a basic level of control.

3.2.1 BAHAMAS

The Environmental Planning and Protection Act (2019) provides general rules for pollution control. Generally, the release of any water pollutant into the environment is prohibited. However, pollutant discharge maybe allowed through the granting of a pollution control permit, which must be in accordance with prescribed standards. The holders of any such permit issued under the Act must be recorded into the Environmental Registry that would also maintain pollutant records.

With respect to discharge into water sources, the Act defines pollution of a water resource and subsequently prohibits the discharge of a pollutant into a water system, waterway or water body and any action that causes water to become non-compliant with any water resource management standards.

3.2.2 BARBADOS

The Marine Pollution Control Act (2000) prohibits the release or cause to release any pollutant into the environment that is in violation of any standards, conditions or requirements applicable and specified under the statute. Further, a Register of Pollutants is maintained as a means of pollution level management and should identify the quantity, conditions or concentrations relevant to the identification of each pollutant.

The Health Service Regulations (1969) deals with the disposal of human waste, decomposing plant and animal matter and prohibits any deposit into any water course or beach. The disposal of same may be approved at particular sites if granted approval by a governmental official. In addition, sewerage effluent into the sea or any other place from a public or private entity is also prohibited unless similar approval is granted to a particular site.

3.2.3 GRENADA

The Water Quality Act (2005) administers all matters related to waters intended for human consumption. The statue refers to natural or treated waters that may or may not be used for commercial activities specifically pertaining to food production. Further to this, the existing subsidiary legislation i.e., Public Health Regulations (1981), prohibits the disposal of excreta into any watercourse, drain or stream. However, deposition of excreta into the sea is unfortunately still allowed under the Regulations.

3.2.4 SAINT LUCIA

The Water and Sewerage Act (2008) makes provision for the management of water resources and the regulation of water supply and sewerage services inter alia. Pursuant to the Act, the Water Resources Management Agency (WRMA) was established to manage water resources. The Act makes two key establishments, a water control area and waste control area. A water control area is defined as an area where the regulation of water use/class of use should be regulated in the public interest based on availability, demand and ecological factors. A waste control area is a defined location where waste can be discharged in order to maintain water quality or protect water resources from pollution. This area maybe land, sewer/drain, bore or any water not limited to surface, groundwater or coastal. The discharge of any waste is prohibited, Section 25 (1) "*A person shall not use water in a water control area or discharge waste or a class of waste in a waste control area, except in accordance with a permit for the purpose granted to that person …*" and is regulated by the requirement of a permit issued by the WRMA.

The Public Health (Water Quality Control) Regulations (1978) aims to maintain water quality by prohibiting any act that would diminish same as stated in Section 3 (1) "*No person shall commit or cause to be committed any act which may impair the quality of water in any river, stream, spring, well, pond reservoir or any other place."* The Regulations also specifically

restrict sewage and broadly encompass industrial discharges in Section 3 (3) "*No person shall discharge or cause to be discharge into any river, stream, watercourse or sea any sewage, industrial or trade waste or any other matter …*". Lastly, under the Water and Sewerage Regulations, the WRMA is mandated to maintain records of any applications and permits issued for waste discharge inclusive of class, volume and proposed location of discharge.

3.3 PHOSPHORUS AND NITROGEN IN DOMESTIC AND INDUSTRIAL WASTEWATER DISCHARGE RULES OR REGULATIONS

Table 1 provides a summary of the existing Regulations (discharge/effluent limitations) of contracting parties. The segregation of effluent discharge into domestic and industrial sources is a task that is executed by few countries in the region. In tabular form, this information illustrates the current disparities between contracting parties and a need for the establishment of basic discharge limits and wastewater classification under the LBS Protocol.

TABLE 1: EXISTING REGULATIONS FOR THE DISCHARGE OF WASTE WATER INTO COASTAL AREAS AND/OR INLAND WATER BODIES (SHOWING NITROGEN AND PHOSPHORUS LIMITS) FOR ENGLISH-SPEAKING CONTRACTING PARTIES

COUNTRY	REGULATIONS	NUTRIENTS INCLUDED	MAXIMUM PERMISSIBLE LIMITS	REFERENCE
ANTIGUA & BARBUDA	Environmental Protection and Management Act, 2019	Nitrate Nitrite Total Nitrogen Total Phosphorus	Nitrate - 50 mg/L Nitrite - 3 mg/L Total Nitrogen - 0.4 mg/L (Class AA,A) 0.8 mg/L (Class B) Total Phosphorus - 0.025 mg/L (Class AA,A) 0.5 mg/L (Class B)	Water Quality standards to protect human health, aquatic life and aesthetic qualities
BELIZE	Effluent Limitation Regulations, 2009	Ammonia Nitrate Phosphate	Nitrate - 10 mg/L Phosphate - 5 mg/L	Garment Industry Battery Manufacturing Poultry Industry Brewery Industry Sugar Industry
			Nitrate - 10 mg/L Phosphate - 30 mg/L	Fish Industry
			Nitrate - 30 mg/L Phosphate - 5 mg/L	Dairy Industry
			Nitrate - 10 mg/L Phosphate - 1 mg/L	Shrimp Processing
			Ammonia - 1 mg/L Nitrate - 3 mg/L Phosphate - 5 mg/L	Other Industries or commercial activities

COUNTRY	REGULATIONS	NUTRIENTS INCLUDED	MAXIMUM PERMISSIBLE LIMITS	REFERENCE
GRENADA	Water Quality Act 2005	Nitrate Nitrite	Nitrate - 50 mg/L Nitrite - 0.50 mg/L	Quality of water intended for human consumption
JAMAICA	NCRA Wastewater and Sludge Regulations, 2013	Ammonia/Ammonium Nitrate Phosphate Total Nitrogen	Nitrate - 30 mg/L Phosphate - 10 mg/L	Sewage Effluent Standards for Existing Plants
			Total Nitrogen - 10 mg/L Phosphates - 4 mg/L	Sewage Effluent Standards for Plants other than Existing Plants
			Ammonium - 1 mg/L Nitrate - 10 mg/L Phosphate - 5 mg/L	Trade Effluent Standards
TRINIDAD AND TOBAGO	Environmental Management Act Water Pollution Rules, 2019	Ammonia Nitrate Total Phosphate	Ammonia - 0.5 mg/L Nitrate - 10 mg/L Total Phosphate - 0.1 mg/L	Protection of Aquatic Life & Aquatic Ecosystems
			Ammonia - 0.5 mg/L Nitrate - 10 mg/L Total Phosphate - 0.5 mg/L	Recreation in Marine Environments
UNITED STATES OF AMERICA	Clean Water Act; Surface Water Quality Standards (Florida)	Total Nitrogen Total Phosphorus Nitrate	Total Nitrogen Total Phosphorus - Numeric interpretations expressed as spatial average (30 days) and applied over a spatial area consistent with derivation	Predominantly Marine Waters
			Nitrate - 10 mg/L	Drinking water

3.4 EVALUATION OF THE REGULATORY FRAMEWORK FOR THE DISCHARGE OF DOMESTIC AND INDUSTRIAL WASTEWATER IN ENGLISH-SPEAKING COUNTRIES

In most instances, the existing regulatory framework throughout the region requires some level of revision. In some cases, modernisation of the basic discharge legislation is required as they are very much antiquated, dating back decades since respective statutes were passed. In addition, they can be legally fragmented as a collection of laws and acts separately address the issues of sewage, domestic and industrial wastewater discharge, if at all. This leads to institutional fragmentation as the responsibility for upholding and enforcing the respective statutes is divided among different statutory bodies and government ministries. Furthermore, current laws should be updated to reflect the disparity of domestic and industrial discharges and the requirements needed to effectively manage pollution in inland and coastal waters.

This may be achieved through the revision of the substantive legal instruments to addition of subsidiary legislation.

3.5 REGULATORY FRAMEWORKS FOR NITROGEN AND PHOSPHORUS DISCHARGES IN OTHER REGIONS

3.5.1 EUROPE

Urban Wastewater Directive

The Directive aims to protect the environment from degradation due to the discharge of urban and industrial wastewater across the European Member States with transboundary watercourses, catchment areas and coastal waters. Urban wastewater is defined as a mixture of domestic, industrial (trade or industry) wastewater and run-off rain water. The legislation mandates that should a population meet a minimum concentration, the urban wastewater must be collected and processed at a wastewater treatment plant before discharge. In general, the level of treatment required is typically based on the location of the treatment plant in relation to catchment areas and/or correlate with the type of receiving waters i.e. sensitive areas would require increased treatment levels as there are more stringent limits. The Directive specifically outlines the discharge requirements for treatment plants where point sources would be designated. The allowed N and P discharges are permissible limits based on a given area's population or a minimum 80% reduction of P and 70-80% for N of collected wastewater to be discharged. This is particularly for sensitives areas, which are susceptible to eutrophication.

4.0 PROPOSALS OR RECOMMENDATIONS OF STANDARDS OR REGIONAL CRITERIA FOR NITROGEN AND PHOSPHORUS IN TERMS OF POLLUTANT LOADS

There are substantial gaps in the current regional standards for substances containing N and P. While there are various challenges shared or unique to each Contracting Party, the issues of effluent discharge and the negative impacts on coastal ecosystems remain. Nevertheless, with the continued collaboration within the WCR progress can be made towards the establishment of criteria for nutrients through the LBS Protocol.

- Contracting parties who have not yet done so should endeavour to update aged legislation, to encompass measures for prevention and control of pollution due to wastewater discharge and the modern challenges faced with nitrogen and phosphorus compounds.

- Existing legislation should also be revised if needed to incorporate basic differentiation of effluent into domestic and industrial sources with relevant standards for each.

- Review of industries in the WCR should be used to establish regional criteria that would be suitable for each contracting party where applicable.

5.0 REFERENCES

Meals, Donald W., Richards1 P.R., and Dressing, S.A., 2013. Pollutant load estimation for water quality monitoring projects. Tech Notes 8, April 2013

Government of Antigua and Barbuda, Environment Protection and Management Act, 2019

Government of Bahamas, Environmental Planning and Protection Act, 2019

Government of Barbados, Health Service Regulations, 1969

Government of Barbados, Marine Pollution Control Act, 2000

Government of Belize, Environment Protection (Effluent Limitations) Regulations, 2009.

Government of Belize, Environment Protection Act, 2011

Government of Grenada, Public Health Regulations, 1981

Government of Grenada, Water Quality Act, 2005

Government of Guyana, Environmental Protection (Water Quality Regulations, 2000

Government of Guyana, Environmental Protection Act, 1996

Government of Jamaica, National Resources Conservation Authority Act, 1991

Government of Jamaica, Natural Resources Conservation (Wastewater and Sludge) Regulations, 2013

Government of Saint Lucia, Public Health (Water Quality Control) Regulations (1978

Government of Saint Lucia, The Water and Sewerage Act (2008)

Government of the United States of America, Clean Water Act, 2021

Government of Trinidad and Tobago, Environmental Management Act, 2000

Government of Trinidad and Tobago, Water Pollution Rules, 2019

The Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol) to the Cartagena Convention, 1999

United States Environment Protection Agency, www.epa.gov

European Union, Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment