Government of the Republic of Trinidad and Tobago

NATIONAL INTEGRATED WATER RESOURCES MANAGEMENT POLICY

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FOREWORD

ACKNOWLEDGEMENTS

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INTRODUCTION

The Government of Trinidad and Tobago in its overarching policy for the improvement of the water sector is committed to "*the management of the water resources of the country, to provide not only a reliable water supply to meet present demands of all but to ensure sustainability of supply and the available water resources of the country to meet the needs of future generations*."

In order to achieve this goal the Government intends to adopt and implement the Integrated Water Resources Management (IWRM) approach which is recognized as the international best practice for management of the water sector.

IWRM is based on three (3) pillars namely:

1. **Enabling Environment** of policies and legislation,
2. **Institutional Framework** to give effect to policies, strategies, and legislation, and
3. **Management Instruments** that include water allocation, assessments, and economic tools. This process will involve actions that are undertaken through wide stakeholder participation.

The first step to implementing these three pillars is the revision of the National Integrated Water Resources Management Policy. This Policy is linked to other national policies, and takes into account the international conventions to which the country is a party.

The intent of the National Integrated Water Resources Policy (NIWRMP) is to unify the various initiatives related to water and provide a strong direction and vision for the effective management of the nation's water resources in an integrated and sustainable manner.

The process to revise the Policy included the following:

1. Establishment of a Cabinet appointed Technical Steering Committee to guide the process
2. Initial comments from key Stakeholders
3. Online survey to obtain comments and suggestions
4. Multi-stakeholder Workshop
5. First Draft Revised Policy
6. Public consultations
7. Second Draft Revised Policy
8. Focus group and consultation workshops
9. Final invitation of public comments (electronic, newspaper, mail)
10. Final Draft Revised Policy

OVERVIEW OF THE STATE OF WATER RESOURCES

Although Trinidad and Tobago has an abundance of freshwater resources, the quantity and quality of the resources are under significant threat due to climate change, pollution, watershed degradation and increasing sectoral demand. In order to address these issues there must be a coordinated and integrated approach to manage and optimise the resources across all sectors. Integrated Water Resource Management (IWRM) is the internationally recognised best practice for guiding the country towards coordinated development and management of water, land and related resources.

Freshwater Availability: Freshwater is a very limited resource, accounting for only 2.5% of the Earth's total water (*UNESCO, 2003)*. The available surface water in Trinidad is estimated at 2800 MCM per year (*GENIVAR, 2008*) and Tobago at 103 MCM per year (*GENIVAR, 2008*). The potential available groundwater in Trinidad is estimated at 211 MCM per year (*WRA 2013*) and for Tobago at 55 MCM per year (*WRA, 2013*). Thus the total water available for consumption in Trinidad and Tobago is estimated at 3,169 MCM per year. Expressed per capita, the surface water availability in Trinidad and Tobago is approximately 2,200 m^3/year per person. The international criterion for water scarcity is less than 1000 m^3/year per person. Thus by international standards, Trinidad and Tobago is not a water scarce country.

Freshwater Abstraction: A total of 342 MCM per year (WRA 2015) of water was abstracted from surface (65%) and groundwater (35%) sources. The three major groups of abstractors WASA (96%), Industrial/commercial (3%) and agriculture (1%).

Public Water Supply: The public water supplied in 2015 was estimated at 382 MCM per year, (*WASA, 2016*) comprising approximately 60% surface water, 23% ground water and 17% desalination.

The domestic sector was the largest single user of water in the country, accounting for approximately 37.3% of consumption (*WASA, 2016)*. Total industrial and commercial consumption accounted for 14.5% (*WASA, 2016)*, with agriculture use at only 0.2%. (*WASA, 2016).*

The area of concern is the very high unaccounted for water (UFW) at approximately 48%. The high level of unaccounted for water, not only affects the supply to customers, but also places a higher expenditure on treatment and pumping costs. Major causes of unaccounted for water are leaks in old and undersized transmission and distribution systems, illegal water connections and metering under-registration. A water demand reduction programme is required.

The demand for water was estimated at 393 MCM/year, inclusive of unaccounted for water, in 2015 (DHV, *1999)*. When the seasonal variation is considered, the deficit is exacerbated during severe dry weather when low surface water flows adversely affect the reliability of the water supply.

Irrigation: Irrigation is now a very small part of water demand in Trinidad and Tobago. However, agriculture is an important economic activity and Trinidad and Tobago's ability to expand its agricultural production will depend in part on the development of new irrigation schemes. If developed, irrigation could account for as much as 41% (*WB 2013*) of the national water demand. The World Bank Data 2013 shows that Trinidad and Tobago has only 10.5% of land under agriculture, the lowest in the Caribbean except for the Bahamas and Belize. Data for 16 Caribbean Countries shows that Haiti (66.8%), Cuba (59.6%), Dominican Republic (48%) and Jamaica (41%) have the largest areas under permanent crop and permanent pastures.

Flooding: Flooding is a significant recurring problem in Trinidad and Tobago that results in serious economic and social costs each year. It occurs frequently in both urban and rural areas leading to substantial losses of property, crop damage, health problems and severe inconvenience to whole communities. Perennial flash floods occur along the foothills of the Northern Range and in the Caparo and South Oropouche basins. The alleviation of flooding in the flood plains of the larger rivers such as

Caroni, Caparo, North Oropouche and South Oropouche may require substantial investments in capital works in the short term. However the long-term solution will require land use control and source control, such as re-afforestation to reduce runoff and the capturing of flood water resources in surface and sub-surface systems.

Watershed Management: Trinidad and Tobago has a long history of watershed protection. The first forest reserve in the Western Hemisphere, the Main Ridge of Tobago, was created in 1765 "for the protection of the rains". Most of Trinidad and Tobago's existing forest reserves protect critical water resources. However, major changes in land use have taken place over the past 40 years. These changes, which are the result of forest fires, indiscriminate quarrying, slash and burn agriculture, demand for land development for residential, industrial and other uses, as well as other inappropriate land-use practices have impacted negatively on the water resources.

The MODIS satellite imagery carried out in 2000 suggests an estimated 44% (2,290 km^2) of forest cover (*NFP, 2011)*. Of this, 6.2% or roughly 140 km^2 is classified as primary forest, the most biodiverse form of forest. Total forested area declined from 256,346 hectares in 1970 to 226,413 hectares in 2010 (*FAO, 2015)*. During the period 1990 and 2000, Trinidad and Tobago lost an average of 7 km^2 of forest per year (*ODPM, 2014*). In total, between 1990 and 2005, Trinidad and Tobago lost 3.8% of its forest cover or around 90 km^2 (*ODPM, 2014)*. Despite their importance and the relevant regulations in place for their protection, mangroves are also being threatened by encroaching development. Like Mangrove swamps, riverine riparian zones (riverbanks) are also important wetland areas by high biodiversity and productivity. Riparian zones provide food and habitat for both aquatic and terrestrial species (*Naiman et al 2005*).

At present, the State owns over 50% of the land and 80% of the forested areas. "Protection forests" cover 79% of the Forest reserves in Trinidad and include all areas above the 90 m contour. All of the Forest Reserves in Tobago are managed as "Protection Forests". Trinidad and Tobago has several legally designated protected areas: Forest Reserves; Wildlife or Game Sanctuaries; Protected Marine Area and Buccoo Reef. The existing and proposed Environmentally Sensitive Areas include Ramsar-designated wetlands: Buccoo Reef; Nariva and Caroni Swamps; the Aripo Savannas and the Main Ridge Forest Reserve (*NFP, 2011*).

Several distinct terrestrial ecosystems exist in Trinidad and Tobago. This country has the highest biodiversity of all the Caribbean Islands, with over 420 species of birds, at least 600 different species of butterflies, over 95 different mammals, 85 different reptiles, 30 amphibians and 54 species of freshwater fishes. There are also over 2,100 different flowering plants, including over 190 species of orchids (*NFP, 2011*)**.**

Water Quality: Trinidad and Tobago has historically enjoyed good potable water quality. However, increasing pollution from sewage and industrial effluents combined with soil erosion and unmitigated development are threatening the quality of raw water while increasing treatment costs for potable water. At the same time, pollution can have significant implications for public health and natural ecosystems.

The quality of the surface water resources is deteriorating in many places, as evident by high levels of biological oxygen demand, bacterial content, turbidity and the presence of chemical pollutants in rivers. The main threats are uncontrolled point waste discharges, in particular from industries and domestic sources, as well as the high level of erosion in the upper reaches of the watercourses. Pollution of surface water not only affects the production of potable water but also the ability of the rivers to provide productive habitats for terrestrial and aquatic species. In-stream problems due to pollution are further exacerbated during periods of low flows when the dilution effect is at its lowest.

Most aquifers in the absence of thick overlying clay layers are very vulnerable to contamination. Although there has been no recent major incident of groundwater contamination, intermittent high levels of nitrates were detected in three sub-aquifers of the Northern Gravel System and increased levels of hydrocarbons

in the Southern Sands. The potential sources of pollution to groundwater systems include hazardous waste dumps, underground fuel storage tanks, untreated sewage and industrial effluents.

Aquifers in Diego Martin and El Soccoro *(Genivar 2008*) are affected by salt water intrusion due to over abstraction. The threat of sea level rise due to global warming, is expected to cause the interface between freshwater and brackish water to move inland. This may have significant impacts on the availability of quality ground water and increase the cost of treatment. Sea level rise will also cause salt water to move further inland, thereby increasing the salinity of estuarine surface water systems. It will also affect the development and life of people in the coastal zones.

Coastal Zone Management: Trinidad and Tobago's coastal areas are subject to competing development demands while experiencing significant natural and human-induced changes. Environmental problems include coastal eutrophication due to inadequate sewage treatment, contamination arising from agricultural pollutants, rising sea levels due to global warming, inappropriate coastal development, sand mining along beaches, contamination from industries and sea vessels, oil spills, over-fishing, degradation of coastal zone and marine species, including mangrove systems and coral reefs.

The coastal zone houses the most biologically diverse ecosystems on the islands. These ecosystems provide a range of provisioning, regulating, cultural, and supporting services that include erosion control, storm protection, flood water retention, water quality maintenance and climate regulation.

Integrated coastal zone management is a means to sustainability manage Trinidad and Tobago's coastal and ocean space, resources and activities.

Climate Variability and Change: Assessments carried out by the Intergovernmental Panel on Climate Change (IPCC) have shown that the emission of greenhouse gases will lead to global warming with an expected increase of the average annual temperature in the range of 1.4^0 C and 5.8^0 C of the earth over the period 1990 to 2100 (*IPCC AR5 2014)*. Effects include a rise in the ocean levels (0.09 m to 0.88 m for the same period) and as a consequence intensification of the global hydrologic cycle (*IPCC AR5 2014)*. With projected decreases in the annual rainfall in Port of Spain by 14% in 2050 and by 21% in 2100 and in combination with increases in potential evaporation of 5% (2050) and 8% (2100), the recharge rates to the aquifers is likely to decrease in the future, if all other factors (catchment permeability and land cover etc.) are unchanged. Therefore the present pumping rates are not likely to be sustainable without introduction of additional measures to combat aquifer salinization *(IDB 2015)*.

On the other extreme, more frequent and intense storm events and hurricane are predicted for the region.

In summary, the effect of climate change could lead, in some areas, to changes in the total amount of precipitation, its seasonal distribution and in frequency and intensity. These conditions, together with changes in evapotranspiration, may affect the magnitude and timing of runoff, and subsequent intensity of flood and droughts.

Climate variability in comparison to climate change is the short term observed fluctuations in climate above or below a long-term average value. The El Niño Southern Oscillation (ENSO), which results in drier and warmer conditions and the La Niña which produces colder and wetter conditions in the Caribbean region are the major Climate variability phenomena. The reduction in rainfall seen in 2015 and early 2016 was directly related to the El Niño. Observed rainfall during the first half of the 2016 Dry Season (January to March) was below average as forecasted by the Trinidad and Tobago Meteorological Service. During these three months, only 50% of the average rainfall occurred in the vicinity of the

country's largest impoundment reservoirs, significantly affecting water users in households, agriculture and tourism.

Institutional Framework: There are a number of agencies and institutions involved in the planning, management and the execution water sector and in the execution of water resources management functions. These include the Environmental Management Authority (EMA), Ministry of Health (MoH), Ministry of Agriculture Land and Fisheries (MoAL&F), Tobago House of Assembly (THA), Town and Country Planning Division (T&CPD), Water and Sewerage Authority (WASA), Drainage Division (DD), Water Resources Agency (WRA) and the Institute of Marine Affairs (IMA). In addition, the primary water resources institution, (the Water Resources Agency) is inappropriately lodged in the Water and Sewerage Authority. This shortcoming is further compounded by the absence of a coordinating agency and coordinating mechanism to facilitate effective water resources management.

Legislative Framework. Water resources issues are addressed directly or incidentally in a substantial body of national legislation and international treaties, which the country has adopted. The major legislative instruments are the Water and Sewerage Act (1980 Revised); the Waterworks and Water Conservation Act (1980 Revised); the Environmental Management Act (2000 Revised); and the Public Health Ordinance (1950).

The Ministry of Health was the sole authority over cleansing and providing water under the Public Health Ordinance until the Water and Sewerage Act came into force. This Act did not take these responsibilities away from the Ministry of Health but instead held the Water and Sewerage Authority "jointly and severally responsible". The Water and Sewerage Act provides for WASA to prevail, where there is a conflict in the exercise of the powers or duties between the two bodies.

There is a need for a new legislative framework to give effect to globally accepted paradigm of integrated water resources management and to clarify the roles and responsibilities of various agencies in the water sector.

1 BACKGROUND

Water is essential to life. Development, health, and the environment all depend inextricably on access to water of sufficient quantity and quality. Water is thus to be preserved and cherished by all – not to be used or exploited solely or primarily for economic gains but to be managed so as to ensure sustainability for current and future generations. It is therefore essential to articulate the overall direction and thrust of water resources management in Trinidad and Tobago. This document presents the Water Resources Management Policy of the Government of the Republic of Trinidad and Tobago.

Article 4 of the Constitution of Trinidad and Tobago declares that every person in Trinidad and Tobago has the fundamental rights of life and enjoyment of property. In this regard, the following basic environmental, health and development principles are interdependent and in harmony with the constitution:

1. Development

Economic and social development are essential to ensure an acceptable living and working environment. Development should be in harmony with environmental principles so that it is sustainable.

2. Health

Health, which is a state of complete physical, mental, and social well-being, and not merely the absence of disease and infirmity, is a fundamental right and the attainment of the highest possible level of health is an important social goal for the country.

3. Environment

Humans have a right to live in an environment of a quality that permits a life of dignity and well-being. We bear solemn responsibility to protect the environment for present and future generations. This responsibility includes the careful planning and management of the natural resources.

According to UNCED, Agenda 21 Chapter 18, water resources development and management should be planned in an integrated manner, taking into account long-term planning needs as well as those with narrower horizons. They should incorporate environmental, economic and social considerations based on the principle of sustainability; include the requirements of all users as well as those relating to the prevention and mitigation of water-related hazards; and constitute an integral part of the socio-economic development planning process.

The management for sustainable use of the scarce but vulnerable resource that is fresh water requires the identification of its full cost of production as an input to planning and development exercises. Planning considerations should reflect benefits investment, environmental protection and operational costs, as well as the opportunity costs reflecting the most valuable alternative use of water.

The goal of the Government of the Republic of Trinidad and Tobago is for the country to attain first world status by 2030 as stated in the Draft National Development Strategy 2016-2030 (Vision 2030). Five strategic themes were identified, which were grounded in the Vision 2020 pillars, the National Policy Framework, and the Global Development Agenda by way of the Sustainable Development Goals. Two of these Development Themes are relevant to Integrated Water Resources Management (IWRM):

1. **Valuing and Enhancing Our Environment,** has been underscored because of the burgeoning impact of climate change and need for renewable energy, as well as Trinidad and Tobago's adoption of the global 2030 Agenda for Sustainable Development and its commitment under various multilateral environmental agreements;

2. **Quality Infrastructure and Transportation** has been given prominence because it is integral to human and economic development, i.e. water and sanitation are fundamental to human sustenance, health and dignity, and by extension, to economic opportunity.

1.1 The challenges, of the current environment within which Trinidad and Tobago is required to manage its water resources are:

1. A growing population, the concomitant increase in housing developments and increased industrial activities have placed a continuous demand for improved water and sewerage services.
2. Degradation of watersheds, soil erosion, landslips and flooding due to indiscrete quarrying operations; deforestation; planned and unplanned development and hillside clearing for agriculture, and poor solid waste disposal practices.
3. Pollution of watercourses due to malfunctioning wastewater treatment plants; pesticides and herbicides; and industrial waste.
4. Degradation of wetlands, coastal ecosystems and habitats.
5. Lack of a proper institutional framework to address water resources management.
6. Threatened watersheds due to inefficiencies in land use planning and limited watershed management.
7. Aging and deteriorating water and wastewater infrastructure.
8. As a small island developing state, Trinidad and Tobago is particularly vulnerable to the adverse impacts of climate change such as those related to temperature increases, changes in precipitation and sea level rise. Climate variability is a related concern.

1.2 Since 1995, Government has undertaken a number of measures to improve the framework for water resources management in Trinidad and Tobago. These measures included:

1. Enactment of the Environmental Management Act 1995 (2000 Revised), which established the Environmental Management Authority (EMA), and a number of rules and standards pursuant to the Environmental Management Act, including the Certificate of Environmental Clearance Rules 2001, the Water Pollution Rules (2001) and Amendments (2006), and the Environmentally Sensitive Areas Rules 2001
2. Enactment of the Regulated Industries Act and establishment of the Regulated Industries Commission (RIC) (1998).
3. Development of a Water Resources Management Strategy (1999).
4. Planning and Facilitation of Development Act (2014).

1.3 This National Integrated Water Resources Management Policy is intended to unify all of these various initiatives and provide a strong direction and vision for the effective management of the nation's water resources in an integrated and sustainable manner.

1.4 There are several national policies and plans that have direct bearing on water resources management policy in Trinidad and Tobago. These policies include:-

1. National Policy and Programmes on Wetland Conservation for Trinidad and Tobago (2001)
2. Sector Policy for Food Production and Marine Resources 2001-2005 (2001)
3. National Environmental Policy (2006)
4. National Action Programme to Combat Land Degradation in Trinidad and Tobago 2006-2020.

5. Development Plan for Tobago 2013-2017)
6. Tobago Regional Physical Development Plan – (1991)
7. Tobago Comprehensive Economic Development Plan
8. National Food Production Action Plan 2012-2015
9. National Programme of Action for the Protection of the Coastal and Marine Environment from Pollution from Land Based Sources and Activities 2008-2013
10. National Action Programme to Combat Land Degradation and to Mitigate the effects of Droughts in Trinidad and Tobago 2013-2017
11. National Tourism Policy
12. Northern Range Hillside Policy (1988)
13. National Physical Development Plan (1984)
14. National Climate Change Policy (2011)
15. National Forest Policy (2011)
16. National Protected Areas Policy (2011)
17. National Wildlife Policy (2013)
18. National Spatial Development Strategy (2014).

1.7 In addition to these policies, there are numerous policy statements contained in legislation and other Government documents and reports. This National Integrated Water Resources Policy is intended to integrate and/or complement the various statements in existing policies. Where conflicts exist with regard to water resources, this National Integrated Water Resources Management Policy will take precedence.

2 POLICY GOALS AND OBJECTIVES

2.1 The national goal for the water sector is to support the socio-economic development of Trinidad and Tobago through the integrated management of the water resources and the water environment (land, air, flora and fauna), satisfying and managing the growing demands for all water users in a sustainable, efficient and effective manner, while maintaining and/or enhancing the quality of the environment and the integrity of ecosystems, and minimizing losses to life and damage to property due to water related disasters.

2.2 The objectives for national integrated water resources management are:

1. To establish an integrated framework for water resources and wastewater management, particularly as it relates to planning, environmental management, pollution control and adaptation to the impacts of climate change and variability.

2. To protect and manage watersheds and wetlands as sources of water; and restore and maintain forests, rivers, wetlands, and coastal areas for current and future generations.

3. To ensure a resilient and water-secure future for Trinidad and Tobago by the development and implementation of a national water resources management plan

4. To minimize, mitigate and manage the impacts of flood, drought, and other water-related emergencies.

5. To ensure the fair and efficient allocation of water among all water users

6. To ensure that charges for water services reflect water's economic value, subject to the principles of equity and affordability.

7. To make available adequate and accessible quantities of water of a defined and acceptable quality that is affordable and meet the growing need for water for all sectors consistent with relevant water quality standards.

8. To develop capacity and tools to collect, analyze and store water-related information to inform the design of hydrologic and hydraulic systems and related fields and to facilitate research and development.

9. To promote public education and awareness, conservation and wise use of water resources

10. To promote joint ownership, partnership and collective responsibility between Government and the people in the management of the nation's water resources.

11. To promote the use of appropriate technologies to facilitate sustainable water resources management.

12. To promote inter and intra – generational equity, an ecosystem based approach and adaptive management

3 BASIC PRINCIPLES

3.1 The Government of Trinidad and Tobago in its draft National Development Strategy (2016-2030), Vision 2030 stated as its goal, the attainment of first world status by 2030. This Vision recognises emerging issues such as climate change; use of renewable resources; and water, food and energy security. It acknowledges that natural resources must be put into optimal use while taking cognizance of environmental issues.

3.2 The International Conference on Water and the Environment, Dublin, Ireland. 1992 gave rise to four principles, known as the Dublin Principles that have been the basis for much of the subsequent water sector reform in Trinidad and Tobago. This formed the basic principle for the 2005 Policy and this revised 2016 Policy.

1. Fresh water is a finite vulnerable resource, essential to sustain life, development and the environment.

2. Water development and management should be based on a participatory approach, involving users, planners, and policy-makers at all levels.

3. Women play a central role in the provision, management and safeguarding of water.

4. Water has an economic value in all its competing uses and should be recognized as an economic good.

3.3 The Third UN Small Island Developing States (SIDS) Summit held in September 2014 offered recommendations from various sector representatives from the three SIDS regions, the Caribbean, Pacific and Africa, Mediterranean and South China Sea (AIMS) on the critical issues affecting them. The outcomes Document, the SAMOA Pathway, highlights the following issues relevant to the water sector:

1. **The need for bold climate change action and commitment**: Trinidad and Tobago, being a small island state, is vulnerable to climate change. Among the most important impacts of climate change will be its effects on the hydrological cycle; impact of sea-level rise; and water-management systems.

2. **Sustainable use of islands' natural resources:** This is of particular significance to Trinidad and Tobago recognizing that healthy marine ecosystems, forests, water, watersheds and biodiversity resources are critical for livelihoods and sustainable development.

3. **Balance private sector interest with a national, people-centered vision for development:** this can increase efficiency in service provision, expand coverage and reduce delivery costs.

3.4 The Government of Trinidad and Tobago has endorsed the new collective vision for the peoples of the world for the next fifteen years: the 2030 Sustainable Development Goals (SDG) and the Paris Agreement that addressed climate change. Within the SDGs there is a dedicated goal for water which aims to ensure access to water and sanitation for all. One of the main target areas is to implement integrated water resources management at all levels.

3.5 In furtherance of these Principles, the following principles will guide water resources management in Trinidad and Tobago.

1. Water resources will include surface water, groundwater, and coastal waters.

2. Water resources will be managed on the basis of river basins in an integrated fashion, with a

continued and deliberate effort to maintain and restore ecosystem functioning within catchments and the coastal and marine ecosystems with which they are connected.

3. Water resources management is intrinsically linked to planning and environmental management. Socio-economic planning, environmental management, and water resources management must be conducted in harmony with each other.

4. Reliable access to sufficient potable water to satisfy basic human needs at reasonable cost is a fundamental human right.

5. Potable water of such quality and quantity as to sustain life should be available to all citizens, irrespective of the citizen's ability to pay. This minimum service is a requirement for reasons of public health and environmental condition.

6. Poor water management hurts the underprivileged most, and in times of shortage they are generally the first to be adversely affected. Consequently, wise water management will be pursued with a focus on poverty alleviation.

7. Although priorities may need to be established, the management of water resources will allow for multiple uses of water.

8. Responsibility for water resources policy, planning, and regulation will be kept distinct and separate from the responsibility for water resource development and distribution.

9. Water resources management will be participatory and responsibility for water resources management will be assigned to local communities and non-governmental entities to the maximum extent practicable.

10. Government has a responsibility to ensure that adequate water and wastewater services are provided. Wherever practicable, however, Government will promote the actual provision of water and wastewater services with the communities and private sector participation.

11. Where practicable, emphasis will be placed on local solutions to minimize inter-basin transfer.

12. The management of water resources will be financially self-sufficient. (Financial Self Sufficiency Principle).

13. There will be a direct linkage between payments made for services and services provided (Accountability Principle).

14. The quality of service provided should meet or exceed established national standards.

15. All inhabitants and institutions will have access to timely and relevant water-related information, allowing them to be aware of the state of water resources so that they may participate meaningfully in the decision-making and management process.

16. Users of the water will have a civic duty to take no more water than they need and to take all reasonable measures to conserve water and eliminate its wastage.

17. Subsidies to ensure equitable access to water and to satisfy other policy priorities will be targeted, explicit, and time-limited.

18. No actions will be taken that will result in degradation of the ecological functioning of a watercourse unless measures are taken to mitigate or compensate for the negative impacts of the action (Stand

Still Principle).

19. The cost of preventing pollution or of minimizing the environmental damage due to pollution will be borne by those responsible for the pollution (Polluter Pays Principle).

20. Priority will be placed on conservation and reuse of water over the development of new water supplies.

21. Efforts to improve water quality will favour pollution prevention over treatment.

22. Water infrastructure will be as simple as practicable, minimizing the need for complex operation and maintenance programmes.

23. If there are threats of serious irreversible damage to human health, ecosystems, aquifers, surface and coastal waters, watersheds, or water supply systems, lack of full scientific certainty will not be used as a reason for postponing preventative or mitigating measures. (Precautionary Principle).

24. All water resources management, including, but not limited to fulfilment of the foregoing principles, will be on the basis of the best available or reasonably attainable scientific information, technical and economic feasibility.

4 ALLOCATION PRIORITIES

Water allocation balances the conflicting needs for security and flexibility in water-use practices. A water allocation system is part of the institutional framework for water resources management that defines right to use the resources.

4.1 Allocation of water will be in accordance with national socio-economic development priorities, with due consideration given to environmental factors. Allocation of water will be according to present and future reasonably anticipated need and will always emphasise long-term sustainability, including the protection of aquifers from contamination, over-abstraction, salt-water intrusion and the sustainable maintenance of natural water systems, including streams, rivers, wetlands, and coastal areas.

4.2 The actual order of these priorities will be determined on a watershed basis. The Government will always seek to establish a fair balance between competing priorities. In cases of short-term states of shortage, droughts or urgency, it is expected that basic human needs will be fulfilled over other uses. The following are priority areas for water resources management in Trinidad and Tobago:

Domestic Use:

Domestic potable water use includes water for households, hospitals, schools and office buildings.

Ecological Use:

Ecology use includes the protection of natural water ecosystems, including streams, rivers, wetlands, and coastal areas.

Industrial and Commercial Use:

Industrial and commercial use includes development for the energy, manufacturing, services, and tourism sectors.

Recreational, Cultural and Religious Use:

These uses include swimming, picnicking, boating, recreational fishing, as well as festivals and other cultural and religious uses.

Agricultural Use:

Agricultural use includes irrigation and drainage for agriculture, as well as water for livestock and aquaculture.

4.3 These priorities for water resource allocation will shape three types of decision-making:

1. The allocation of abstraction licenses, including the terms and conditions therein.
2. The allocation of Government funding for water resource management, including research, management activities, education and infrastructure development.
3. The pricing of water resources management services.

4.4 Where conflicts in allocation exist, Government will make reasonable efforts to resolve these conflicts transparently, objectively, judiciously, and fairly.

4.5 **The Agency/Authority responsible for the allocation of water and abstraction licenses**, will seek to obtain adequate information for understanding the hydrologic systems.

4.6 **The criteria to achieve optimal allocation of water resource will include:**

1. Flexibility in the allocation of supplies.
2. Security of tenure for established users.
3. Real opportunity cost of providing the resource is paid by the users.
4. Predictability of the outcome of allocation process.
5. Equity of the allocation process.
6. Political and public acceptability.

4.7 The water allocation mechanisms will include consideration of marginal cost pricing; public allocation, water markets; and user-based allocation.

5 ISSUES AND POLICY IMPLEMENTATION

There are many aspects to integrated water resources management. This policy addresses the most significant issues.

5.1 Land Use Planning and Management

Land use planning and management focus on the, conservation and restoration of natural systems, while ensuring sustainable development.

5.1.1 Water resources management and land use planning are intrinsically linked. All persons and organisations owning, occupying and developing land are under a duty to use such land with due regard for the wider interests of both present and future of society as a whole. It is Government's duty to take account of all relevant social, economic, ecological and cultural factors so as to ensure that the most efficient, equitable and environmentally sustainable use is made of land in the interests of all people of Trinidad and Tobago.

5.1.2 In this regard, the Agency/Authority designated for land use planning and regulating land development and any other relevant authorities will give due consideration to this Policy, the National Integrated Water Resources Plan, and specific water demand, supply and watershed management issues in the development of the National Spatial Development Strategy (NSDS) 2014 and in granting planning approvals.

5.1.3 Wherever practicable, planning will be conducted on a watershed basis. Planning approvals for new developments will incorporate water resource management concerns, including but not limited to the mitigation of potentially negative impacts on watersheds, the supply of adequate water and sewerage services, the protection of surface and groundwater resources, the provision of adequate storm water drainage systems, and the linkages between land use and water resources.

5.1.4 Control of critical degradation practices such as quarrying, deforestation, fires, unapproved development and informal settlements will be given priority.

5.1.5 Wherever practical, unapproved and unplanned development will be encouraged to conform to the requirements of all land development regulating agencies such as WASA, Drainage Division, THA, Regional Corporations and others.

5.2 Comprehensive Water Resources Assessment

An essential foundation for scientific water resources management is adequate information for understanding the hydrological system and its interaction with other natural and socio-economic systems. This requires an adequate data collection, analysis and storage programmes which include climatic, surface water, groundwater, water use and socio-economic data.

5.2.1 The Government will undertake continuous comprehensive water resources monitoring, surveying, investigations, data collection and analysis research and development, to determine the sources, extent, dependability, and quality of water resources. In this regard the continuing assessment will address:

1. Ongoing monitoring and analysis of the hydrological cycle and the nature of surface water, groundwater, and coastal water with associated environmental data.

2. Enhancement and maintenance of hydrological and meteorological networks, i.e. groundwater, surface water and climate.

3. Establishing and maintaining effective co-operation in water resources assessment and hydrological forecasting activities among national agencies, i.e. Meteorological Service Division, University of the West Indies (UWI), Drainage Division, and Institute of Marine Affairs (IMA).

4. Ongoing monitoring of the natural behavior of water and human-induced variations and alterations to hydrogeological systems.

5. Acquisition of real-time data to enable forecasts and emergency early warnings to be issued to protect life and property against the risk of natural and man-made disasters, i.e. flood monitoring and early warning systems.

6. Analyzing and publishing reports and trends in hydrological variables such as precipitation, river stage and discharge, aquifer levels, capacity and production, water quality, climate trends and sediment transport.

5.3 Water Resources Plan

Water resource planning addresses water problems and opportunities within and across watersheds. Planning is the means by which water related demands and impacts are analysed and appropriate water management strategies formulated.

5.3.1 Government will produce a comprehensive National Integrated Water Resources Master Plan to give effect to this Policy. The Plan will cover a 25-year period and will be revised at least every five (5) years and monitored annually. The Plan will include:

1. A qualitative and quantitative analysis and assessment of water availability in Trinidad and Tobago on a watershed basis.
2. An assessment of the present and projected water demand for the next 25 years on a five year basis.
3. An assessment of the present and projected water balance for the next 25 years on a five year basis.
4. An assessment of trends in water use, quality and availability.
5. An assessment of existing plans and alternatives for population growth, changes in industrial demands, and changes in land use patterns.
6. A clearly articulated strategy for water resources development
7. Targets for increasing the quantity and improving the quality of water resources.
8. Targets for conservation and demand management and new supply development.
9. Programme for water resources protection and proposals for the creation of areas subject to restrictions on water use, with a view to protecting water resources.
10. Response, mitigation and recovery programmes for water-related emergencies.
11. Specific measures to be taken, programmes to be developed, and projects to be implemented for attaining the targets envisioned, including costs, timeframes, and responsibilities.

5.3.2 The Plan will address the dynamics of water consumption from the standpoint of various economic activities (such as housing, industrial, institution and agricultural), as well as current and projected future land use and other environmental aspects.

5.4 Abstraction Licensing

Water is a renewable but finite economic resource. There is a cost of managing the nation's water resources in such a manner as to ensure the availability of this resource on a sustainable basis.

5.4.1 Government will establish an abstraction licensing system in accordance with natural laws to ensure sound management of water resources and to protect the interests of competing water users.

5.4.2 The abstraction of any surface, ground, or coastal nearshore waters will require an abstraction license and such license will include a volume-based fee for abstraction. The award of abstraction licenses will consider the rights of multiple users of the water resource, the protection and sustainable management of the water resource and allocation priorities.

5.4.3 All abstractors shall be required to apply for an abstraction license.

Types of abstraction requiring a license will include:

1. The diversion or impoundment of water from precipitation, runoff, or a water body.
2. The abstraction of water from subterranean and surface water sources.
3. The abstraction of water from coastal nearshore sources.
4. The abstraction of water for the generation of any form of energy.
5. The abstraction of water for cooling or purposes ancillary to a manufacturing process or industrial activity.
6. Any other uses that affect the flow, quantity or quality of any water body.

5.4.4 Abstraction of groundwater and surface water will be managed on a sustained yield basis. However, during periods of emergency, increased abstraction may be permitted on the optimal yield basis, provided that an impact assessment identifies that an acceptable level of risk is involved and that system recovery is reasonably guaranteed through the adoption of appropriate mitigation measures.

5.4.5 The licensing system will provide a legal framework for the abstraction of water under clearly defined conditions, i.e. purpose of use; place of use; point of withdrawal, total quantity of water involved, time pattern of use and conditions of effluent return along with the continuing supervision of the license.

5.4.6 The abstraction fees will be collected through a licensing system to cover the reasonable cost of operating an integrated water resources management programme, including, but not limited to, the costs of research, planning, monitoring, watershed management, water resources assessment, coastal zone management, administrative costs, overheads costs and incident remediation.

5.4.7 Abstraction Fees will be charged on the basis of the allocation, not actual consumption. However, to encourage conservation, systems for credits or rebates and the trading allocation licenses may be established. Credits may also be established for water that is used and returned to its source with no significant alteration in quality.

5.4.8 To encourage local and innovative solutions, Government will establish certain categories of abstractions with insignificant requirements, which will be exempted from abstraction fees. Such categories will include the collection of precipitation, the impoundment of on-property and on-farm runoff, and the use of water resources to meet the needs of poor households, rural communities and small farms. Government will set the guidelines as appropriate and review every five (5) years.

5.4.8 Government will take necessary measures to protect and improve the quality of water sources; however, abstraction licenses will be granted on an "as is" basis, with the abstractor assuming full responsibility for any necessary treatment. Where upstream activities are determined to affect downstream water quality, Government will encourage upstream investments in pollution control and abatement and optimum land uses in lieu of downstream treatment.

5.4.9 Government will develop rates chargeable for abstraction. In determining a reasonable price level, Government will give consideration to the maintenance of its financial viability to execute its co-ordination and regulating role in the management of the water resources of Trinidad and Tobago.

5.4.10 An abstraction license may be partially or entirely suspended or revoked, and/or penalties assessed for failure to comply with the terms of the license. An abstraction license may also be suspended, revoked, or amended in the event of emergency failure to use the allocated amount, failure to pay required fees, excessive wasting of water, or threats to the environment, public health or public welfare

5.5 Pricing and Cost Recovery

Historically, one of the greatest challenges to water resources management in Trinidad and Tobago has been the lack of full cost pricing for water. This has led to distorted price signals, creating inefficient use of water and depriving the system of sufficient funding for necessary operation, maintenance and capital investment.

5.5.1 Government will price water and wastewater management services in a manner so as to establish that water is an economic good, to give the user a sense of its real value, to encourage the rational and efficient use of water, and to provide funding for effective water resources management. In this regard, financial self- sufficiency will be pursued in water resources management and, wherever practical private sector participation in the provision of water and wastewater services will be encouraged to promote efficiency and accountability.

5.5.2 In some circumstances, the pricing necessary for financial self-sufficiency may create certain hardships, exacerbate inequality, or run counter to other Government policy objectives. In such circumstances, Government will consider targeted and explicit subsidies rather than cross-subsidies or other hidden subsidies in an effort to alleviate hardships and to facilitate easy access to water by the poor.

5.5.3 Financial self-sufficiency comes with responsibility and accountability. Therefore, Government will ensure that there is a direct linkage between payments made for services and services provided. Pricing of water should reflect its scarcity, but consideration should also be given to its affordability to the poor.

5.5.4 All fees for water abstraction and for water and wastewater services will be subject to approval and oversight by the Regulated Industries Commission.

5.5.5 Government will ensure a fair and efficient pricing system by metering all customers.

5.6 Designated Uses

Identification of appropriate water uses takes into consideration the usage and value of public water supply, protection of fish, wildlife, recreational waters, agricultural, industrial and navigational water ways. Suitability of a water body is examined for usages based on physical, chemical, and biological characteristics, examination of geographical settings, scenic qualities and economic considerations to determine fitness of designated uses for water bodies.

5.6.1 In collaboration with all relevant national and local authorities, and the interested public, Government will establish designated uses for all significant water bodies in Trinidad and Tobago (e.g. drinking water supply, environmental conservation, irrigation, aquaculture, recreation, cultural use, domestic use other than drinking, and industrial receiving water). In establishing designated uses, consideration will be given to:-

1. The National Integrated Water Resources Plan.
2. Existing uses and the major end use to which the water is targeted.
3. The necessary water quality of the most demanding uses for which the water is targeted.
4. The National Spatial Development Strategy, Regional and Local Area Plans.
5. Environmental factors including but not limited to the designation of Environmentally Sensitive Areas, Environmentally Sensitive Species, Forest Reserves, Wildlife Reserves, Parks and Protected Areas.

5.6.2 Government may designate an entire water body for multiple uses, or portions of the same water body for different uses. Government may also designate water improvement areas and critical catchments.

5.6.3 Water bodies will be managed in a manner consistent with their designated use while ensuring the preservation and enhancement of their ecological function.

5.7 Ambient Water Quality

Ambient water quality standards vary significantly due to different environmental conditions, ecosystems, and intended human uses. Toxic substances and high population of certain microorganisms can present a health hazard for non-drinking purposes such as irrigation, swimming, fishing, rafting, boating, and industrial uses. These conditions may also affect wildlife, which uses the water for drinking or as a habitat.

5.7.1 In collaboration with all relevant national and local authorities, and the interested public, the Government will establish ambient water quality criteria (parameter levels and/ or water quality indices). These criteria will vary by water body on the basis of the designated use of the water body, sound scientific information about the sensitivity of the water body, and technical and economic feasibility. For each water body for which ambient water quality criteria are set, Government will collect baseline data and monitor ambient water quality at specified frequencies to track progress towards achieving the criteria.

5.7.2 In achieving goals for maintaining healthy ecosystems, Government will concentrate primarily on the protection of populations of aquatic and wetland native species and associated habitats. In this regard, development of the Ambient Water Quality Standards will be actively pursued and implemented.

5.7.3 Pursuant to the Environmental Management Act and in consultation with all relevant national and local authorities, and the interested public, the Government will use these ambient water quality criteria in prioritising and establishing terms and conditions for Water Pollution Permits and Certificates of Environmental Clearance.

5.8 Public Water Supply

The public water supply is used for drinking, personal hygiene, and other domestic purposes as well as a wide range of industrial and commercial activities which are important for national development.

5.8.1 The Government will ensure the enhancement of the public water supply system to satisfy the quality and reliability requirements of public water demand. Government will meet this demand through:

1. Continuous assessment of the operations of existing facilities relative to intended performance and seek feasible and cost-effective methods to increase production.
2. Maintenance of current water supply infrastructure to ensure reliability of the supply.
3. Continuous improvement of the efficiency of the transmission and distribution system.
4. Implementation of a universal metering programme.
5. Development of new freshwater sources, including new and enhanced reservoirs and groundwater aquifers.

5.8.2 Government will promote the use of other supplies such as advanced technology systems e.g., desalinisation, water reuse and rain water harvesting where it is economically, technically, and environmentally feasible.

5.9 Reliability Criteria

Reliability Criteria (national performance criteria) describes how likely a system is to fail (reliability), how quickly it recovers from failure (resiliency), and how severe the consequences of failure may be (vulnerability). These criteria can be used to assist in the evaluation and selection of alternative design and operating policies for a wide variety of water resource projects as well as to monitor the performance of the service provider.

5.9.1 In determining reliability, the following criteria will be used:

- Public water supply, including industrial supply:
    1. The percentage of time that demand cannot be satisfied should be 10% or less; and
    2. The average deficit should be less than 10% of the average demand.
- Irrigated agriculture, environmental flows, and other supplies:
    1. The percentage of time that demand cannot be satisfied should be 20% or less; and
    2. The average deficit should be less than 20% of the average demand.

5.9.2 These are general reliability criteria. Specific reliability criteria will be established for specific water bodies and specific uses. For example, it is recognised that in the case of environmental flows, an absolute minimum flow may be necessary to sustain ecological functions. In addition to these criteria, the designated authority will establish flood and drought criteria.

5.10 Public Water Supply Quality

Provisions must be made for continuous monitoring of public water supply quality covering all aspects, i.e. microbiological, biological, chemical and physical aspects.

5.10.1 Government will establish minimum national standards for pipe-borne drinking water. Such standards will be no less stringent than World Health Organisation guidelines, and will address all contaminants that could reasonably be expected to be present in drinking water in Trinidad and Tobago.

In the absence of national standards, the World Health Organisation guidelines or other appropriate international standards will apply.

5.10.2 Government will also establish guidelines for water that is designated for industrial, agricultural, or other non-drinking water use.

5.10.3 All water service providers will have an affirmative duty to ensure that the water received by consumers meets the existing guidelines or standards. These guidelines/standards as appropriate, will be included as service standards in licenses granted to water service providers. The licensing body will have responsibility for monitoring compliance with these standards, and taking enforcement action when they are not met.

5.11 Water Demand Management

Water demand management involves measures that improve efficiency by reducing water use. Water demand can be met by either increasing supply or by reducing demand to postpone or avoid the need to develop new resources. Water demand management can therefore provide an equivalent outcome to supply augmentation.

5.11.1 Water demand can be reduced by introducing an equitable water tariff based on consumption, thereby resulting in a greater financial benefit, a more reliable water supply to customers and benefits to the environment. This has to be facilitated by the installation of universal metering.

5.11.2 Government will implement a comprehensive water loss reduction programme. This will include:

1. A program of leak detection and repair.
2. Pressure management throughout the transmission and distribution networks
3. Public education and incentives for the use of technologies that reduce water use.

5.10.3 Government will establish conservation and demand management targets in licenses for water service providers.

5.10.4 Government will encourage water use efficiency, water re-use and recycling of wastewater by all users.

5.12 Infrastructure

Dams, water treatment plants, canals, drainage works and other physical structures that control the movement of water are the most visible component of a water management system.

5.12.1 Government will continue to prioritize and develop medium to long term water supply projects. Construction of new facilities to meet increasing demand will continue to be pursued where a comprehensive analysis indicates such an option to be the most cost-effective and environmentally sound.

5.12.2 Government will develop and implement a comprehensive asset management programme for effective and efficient maintenance of water and wastewater systems and infrastructure.

5.13 Rainwater Harvesting

Rainwater harvesting is an important water augmentation technique providing an owner operated independent water supply if access to the municipal water supply is disrupted after storms or hurricanes. If enough water is captured and stored during rainy periods, a rainwater supply can also provide water during drought and periods of water restrictions. Rainwater storage can also help mitigate flooding of low-lying areas, reduce hillside erosion and reduce demand on wells which may enable groundwater levels to be sustained.

5.13.1 In recognition of the contribution rainwater harvesting makes to reducing demand on public water supply, Government will encourage the application of rainwater harvesting.

5.13.2 Where using detention basins to serve a single purpose for storm water management, Government will encourage the use of this infrastructure for irrigation purposes without compromising the existing detention capacity.

5.14 Agricultural Water Management

Water together with land, labour and capital are necessary conditions for successful agricultural production: Therefore a pre-condition for eliciting capital investment in agriculture is the assurance of water availability.

5.14.1 Water and wastewater management (drainage and irrigation) is a critical risk-reducing, yield-increasing and production-enhancing strategy in agricultural production. There are significant opportunities in Trinidad and Tobago to increase the value and efficiency of agricultural production through water use efficiency techniques and augmentation of effective agricultural water management such as rainwater harvesting, use of storm water, and water re-use.

5.14.2 The Government will facilitate improved water management for agriculture consistent with national development and water allocation priorities. In this regard, a National Irrigation Plan will be prepared. This plan will include identification of potential irrigable areas, water sources development for irrigation supply, irrigation requirements, institutional strengthening and incentives for investment in irrigation.

5.14.3 The Government will play a role in the development of water management infrastructure on state lands, particularly where a large number of small farmers are the target beneficiaries. The development of irrigated agriculture will be based on demand and with the participation of farmers. In this regard, the development of irrigation projects will be based on feasibility studies, which will include technical, economic, social, environmental and organisation and management considerations.

5.14.4 The Government will provide support for technology innovations, development and diffusion. This will be accomplished through a programme of research and development, assigning particularly high priority to the reduction of the use of pesticides and chemicals.

5.14.5 Where water management infrastructure is intended to serve a large number of small farmers, the local communities will be involved at every stage of development, be it at planning, implementation, and operation and maintenance. Farmer representations will be given due recognition so that the process becomes completely participatory and cost-effective. Project identification and implementation is to be undertaken in a way that is cost-effective, responsive to the real needs of

farmers, and that contributes to the development of farmers' commitment and sense of ownership of the system.

5.14.6 To ensure that the irrigation systems are financially viable, the Government will seek full long-term cost recovery for the capital and operation and maintenance costs of agricultural irrigation and drainage systems. Where Government determines that subsidies are appropriate to assist farmers in meeting these costs, such subsidies will be explicit and targeted. In developing subsidies, Government will favour one-off subsidies for capital investment and start-up costs over on-going subsidies for operation and maintenance.

5.14.7 In addition to irrigation, recognition must be given to other agricultural subsectors that require significant quantities of water including livestock and aquaculture**.** Provision will be made to meet this demand.

5.14.8 Solutions to agricultural wastewater and runoff are needed because of the effect on receiving streams. The Government will promote systems to minimise the impact of agricultural wastewater and runoff on human health and the environment.

5.15 Water Related Emergencies

Water-related emergencies include specific extreme events such as severe floods, storm surges, pollution and its related incidents/accidents and significant infrastructure failure.

5.15.1 The approach to managing these specific extreme events will include prevention (land use planning, zoning, building codes and preventative maintenance programmes)

- Mitigation (education, maintenance of water reserves, drought and flood plain planning, and early detection and warning systems, business continuity plans),
- Response (real-time crisis management, emergency action plans, and emergency relief), and
- Recovery (insurance, capital investment, and redevelopment).

5.15.2 Government will continue to prepare/ update National Disaster Preparedness Plans. Disaster Preparedness Plans will address, natural disaster such as earthquake, hurricane, storm surges, etc., specific issues such as oil and chlorine/chemical spills, terrorism, industrial sabotage, pandemic/ biological hazards and major pollution disaster events. The plan will pay particular attention to the key areas of disaster management: mitigation and preparedness, response, recovery and restoration.

5.15.3 Government will encourage all water and water-related agencies to prepare Business Continuity Plans to ensure a minimum level of service during periods of disaster.

5.15.4 The Government will ensure that adequate routine surveillance inspections, recording of maintenance activities and efficient operation and maintenance are carried out for all major water infrastructures and facilities.

5.16 Integrated Flood Management

Flooding is a natural phenomenon caused by prolonged and/or intense rainfall. It is exacerbated by anthropogenic activities such as deforestation, slash and burn agriculture, urbanization, improper solid waste disposal; squatting and quarrying. Over the past decade the country experienced significant events of flooding leading to property losses and disruption in transportation systems.

5.16.1 Government will develop an integrated flood management programme.to identify flood risk areas and to implement prevention, mitigation and response measures. This programme will include:

1. Restricted development in flood plains.
2. Enhancing of urban drainage systems over the next fifteen years. This will also include a programme of maintenance of existing and proposed systems.
3. Establishment of a flood monitoring network and early warning systems This may include Real Time Monitoring, Early Warning System and Community Based Early Warning System
4. Implementation of a public education campaign
5. Harnessing of flood water to augment water supply.
6. Where feasible, allowing the natural process of riverine flooding to take place to sustain aquatic, riparian and floodplain ecosystem functioning.

5.17 Watershed Management

Watershed management is the process of implementing land use practices and water management practices to protect and improve the quantity and quality of the water and other natural resources within a watershed by managing the use of those lands and water resources in a comprehensive manner.

5.17.1 The Government will create a watershed management programme to:

1. Protect and maintain the total area of land zoned for forest reserve, water reserves, game sanctuaries, environmentally sensitive areas and prohibited areas, and prevent its conversion into other uses such as agriculture, housing, and mining.
2. Maintain protected areas of forest and lands designated for conservation purely for watershed and other conservation purposes.
3. Classify watershed based on source protection, restoration, conservation, flood buffers, slope, intakes, and sediment loads.
4. Establish zoning requirements for all watershed areas, including restrictions on land use on the basis of elevation, degree of slope, riparian rights, proximity to surface and groundwater resources and other factors.
5. Promote the use of ecologically and technologically appropriate agro-forestry, soil conservation, and reforestation to harmonize with local conditions through education, outreach, regulation, and incentives. These initiatives will be carried out with public and private stakeholders.
6. Develop and implement approaches to control all degradation practices such as quarrying, deforestation, fires and uncontrolled development.
7. Control “non-point” sources of pollution from storm water, agricultural runoff, septic systems, and other sources.
8. Establish ecologically appropriate buffer zones along watercourses, around aquifers recharge areas and water intakes, where possible.

5.17.2 Measures will be instituted to address the acquisition of private lands, which are in need of protection, **in the upper watershed.** These and other lands owned by the State will be brought under the forest reservation category.

5.17.3 The Government will implement measures such as the control of effluent discharges, re-afforestation, soil and water conservation and the creation of water protection areas to protect the sources of fresh water in streams, aquifers, reservoirs and coastal areas.

5.17.4 The Government will promote solid waste management practices to address the collection, treatment and disposal of solid waste and their effect on water sources, together with sorting of waste for recycling.

5.18 Water Related Ecology

Water is critical to ecosystem functioning and the preservation and enhancement of the natural environment is critical to the country's sustainable development. Ecosystems are key elements in the preservation of life, the preservation of a healthy environment, and the generation of a safe water supply.

5.18.1 The Government will establish a minimum stream flow level based on scientific assessment and economic and technical feasibility. The minimum flow depends on the specific function awarded to that particular river section, i.e. site specific rules will have to be developed, considering aquifer recharge, environmental needs and other management purposes.

5.18.2 In the absence of an established minimum stream flow level, the water resources will be managed so as to maintain a minimum flow in rivers and streams of at least 20 percent of natural flows, taking into consideration climate change, seasonal and other natural fluctuations.

5.19 Wetland Management

Wetlands, including, but are not limited to mangrove swamps, are transitional between terrestrial and aquatic ecosystems, which by nature, perform critical ecological functions in maintaining environmental equilibrium. These productive systems may protect coastlines from erosion and storm surges, export nutrients to the sea, build land by entrapping sediments and provide nurseries and important habitat for various species. (***NEP, 2005***).

5.19.1 The Government will develop a programme to protect wetlands from pollution; take measures to restore degraded wetlands and develop projects for conserving wetlands for current and future generations.

5.19.2 The Government will promote public awareness and understanding of the wetland resources of Trinidad and Tobago and actively encourage participation of landowners, non-governmental organizations and institutions in wetland conservation. (*NEP, 2005*).

5.19.3 The Government will support and promote scientific research and development of technological expertise needed for wetland conservation. (*NEP, 2005*).

5.19.4 Consistent with the allocation priorities established in this Policy, the Government will ensure adequate flows to wetlands for annual recharge and maintenance.

5.20 Coastal Zone Management

Coastal areas, particularly in small island states, are sensitive and fragile and the sound management is critical to the sustainable development of Small Island Developing States such as Trinidad and Tobago.

5.20.1 The Government will pursue an integrated coastal zone management programme that takes into consideration the combined effects of all activities within and impacting upon coastal areas. In this regard, special emphasis will be placed on integrating watershed and coastal zone management, ensuring developments are in harmony with the aesthetic, environmental and cultural attributes of Trinidad and Tobago

5.20.2 The Government will develop and implement a National Coastal Zone Management Plan that designates uses for various coastal areas and establishes restrictions on use and other requirements therein. The Plan will promote the sustainable use of the coastal zone by implementing policies that maintain and enhance environmental quality while enabling economic development. This Plan will be prepared in accordance with the National Spatial Development Strategy and any other relevant plans. Rehabilitation of damaged or degraded coastal ecosystems and habitats, and establish and effectively manage a system of coastal protected areas. This plan will include:

1. Establishment of clear seat backs for any new coastal developments
2. Measures to control pollution and minimize adverse impacts of solid waste on coastal ecosystems

5.20.3 The Government will facilitate meaningful cooperation, participation, partnership with the private sector and civil society in order to foster co-responsibility in coastal management; and promote public awareness to ensure more effective coastal zone planning and management.

5.21 Climate Variability and Change

Trinidad and Tobago is a ratified signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol and a signatory to the Paris Agreement. Trinidad and Tobago is committed to undertaking a number of initiatives, which include the preparation for adaptation to the impacts of climate change; development and elaboration of appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas affected by drought and floods.

5.21.1 Recognizing that responses to climate change must be multi-sectoral, the Government will take steps to mitigate and adapt to the effect of climate change by integrating key potential impacts from climate variability and climate change into Integrated Water Resource Management (IWRM) Plans, i.e. watershed, wetlands, coastal zones, and agriculture. Water resources will be managed with full consideration of climate variability and climate change.

5.21.2 The Government will include climate variability and change parameters into the design and implementation of all plans identified in this Policy.

5.21.3 The Government will provide support and encourage a climate comprehensive risk management approach within operational practices and infrastructure assets, ensuring reliable and climate-resilient water services.

5.22 Seasonal Variation

Low rainfall during the months January to May and droughts can adversely impact a public water system. Recognizing that seasonal variation is a normal part of the water cycle, the Government will manage the water resources in a proactive, year round manner that plans for this natural seasonal variability. This includes establishing systems for the collection of high wet season flows in storage facilities for dry season use, establishing improved upper watershed management programmes to slow wet season runoff, establishing year-round conservation and demand management programmes, for improving drainage systems

5.22.1 The Government will develop, comprehensive dry season and drought water supply management plans for Trinidad and Tobago to effectively and efficiently manage the raw and potable water supplies for all sectors during periods of low rainfall and drought conditions.

5.22.2 The Government will develop a water security programme for Trinidad and Tobago. This programme will ensure that the water requirements of all users and the environment are adequately satisfied given the threats such as climate change, incidents of pollution and infrastructure failures.

5.22.3 The Government will continue to develop a monitoring programme for predicting local dry spells and droughts.

5.23 Wastewater Management

Wastewater management is essential for human dignity, the protection of human health and the environment.

5.23.1 The Government is committed to improving the quality of wastewater effluent (both domestic and industrial) in the country so that any adverse impacts on the environment are minimised and human health is protected. In this regard, Government will create an effective financially sustainable wastewater sector through an appropriate institutional framework and sound strategic planning.

5.23.2 Government will continue to maintain and upgrade the existing wastewater collection, treatment and disposal systems including rationalizing of private wastewater treatment plants.

5.23.3 Government will continue to pursue the integration of smaller wastewater plants into larger plants and upgrade from secondary to tertiary level treatment.

5.232.4 Government will develop and implement effective strategies and programmes for economic investment and the effective and environmentally sound operation of public and private wastewater systems. To this end, it will also support the implementation of rate structures to ensure that wastewater systems will be financially self-sustaining.

5.23.5 The Government will ensure that all industrial waste producers are identified, industrial waste loads are quantified, standards for industrial waste are established, cleaner production technology is adopted and the polluter-pay- principle is enforced.

5.23.6 Government will pursue the re-use of wastewater as a means of meeting demand for industrial and agricultural water. This initiative will address the appropriate levels of treatment that reflect the different categories and accompanying standards and the involvement of private entrepreneurs.

5.24 National Security

The mission of National Security is to create an environment which ensures public safety and security through the maintenance of law and order and the commitment of resources to the protection of life and property.

5.24.1 Government has a vested interest in ensuring that water is available for national security purposes, particularly for fighting fires, which can threaten human life and lead to significant economic loss**.** Provisions will be made for adequate water supply and pressure to meet fire-fighting needs.

5.24.2 Water service providers will implement appropriate security measures to protect water supplies from contamination, terrorism and sabotage.

5.24.3 Government will implement biosecurity measures to protect against invasive species that negatively impact water resources supply.

5.25 Public Participation and Access to Information

Successful water resources management depends on the full participation of all members of society in promoting public awareness and building capacity among the various water and water-related sector stakeholders.

5.25.1 Government is therefore committed to promoting joint partnerships, collective responsibility, and ownership for water resources, while providing opportunities for the public to have inputs into the entire water resources management process from policy formulation to strategy implementation and co-management.

5.25.2 The Freedom of Information Act establishes a general right to access information in the possession of public authorities. Consistent with that Act, Government will support meaningful and effective public participation in water resources management by providing the public with timely and accurate information about the status and trends of the quality, quantity, and management of the country's water resources. Providing citizens and customers with information empowers then to make decisions and promotes accountability in Government and the private sector.

5.25.3 In support of this and to ensure the widespread and timely dissemination of water resources management information to facilitate stakeholders participation, the Government will require all water service providers to publish and distribute to consumers annual drinking water quality reports. Wastewater service providers will be required to provide effluent performance reports. In addition to this annual information, water and wastewater services suppliers will provide public notification upon discovering any violation of a required standard.

5.25.4 The Government will have responsibility for posting, publishing and otherwise providing clear information to the public about ambient water quality, including instances where water quality presents an imminent human health threat or exceeds standards for the designated uses and other impacts to the water resources**.**

5.25.5 The Government will prepare a "State of the Water Resources Report," every five (5) years. This Report will describe the status and trends of the quality, quantity, and uses of the country's water resources. This report will be presented in Parliament by the Minister responsible for water resources management.

5.26 Gender Equity and Poverty Alleviation

Effective, efficient and equitable management of water can be enhanced when every individual including men, women, the poor and the differently abled are involved in sharing, supplying and protecting the resource. In this regard:-

5.26.1 Government will facilitate the involvement of men, women, children and vulnerable groups in managing the sustainable use of water resources at all levels and in the sharing of benefits.

5.26.2 A gender perspective will be integrated into the design and implementation of water resources management programmes.

5.26.3 The development of water and sanitation infrastructure and services will meet the needs of the poor and be sensitive to gender and the differently abled.

5.26.4 When necessary for reasons of poverty alleviation the Government will provide the basic water requirement for domestic supply.

6 INSTRUMENTS FOR POLICY IMPLEMENTATION

Government will create a legislative and institutional framework for the effective management of the country's water resources.

6.1 Legal Instruments

6.1.1 Government will establish and enforce the necessary legal instruments (laws, regulations, standards, etc.) to implement this policy. The principal piece of new legislation to be developed to implement this policy is the Water Resources Management (WRM) Act. A number of existing laws may need to be amended. Some include: the Water and Sewerage Act; the Waterworks and Water Conservation Act; the Environmental Management Act; the Regulated Industries Commission Act; the Tobago House of Assembly Act; and the Town and Country Planning Act or its replacement, the Planning and Facilitation of Development Act.

6.1.2 The WRM Act will specifically provide for inter-institutional linkages. One of the most important elements of the comprehensive water resources management strategy is effective communication between key stakeholders. The WRM Act will facilitate this communication by establishment of Memoranda of Understanding (MoU) or Agreement (MoA) where appropriate among all water and water related stakeholders.

6.1.3 Where conflicts, overlaps, or gaps exist in legislation, the Government will establish new legislation or make amendments to existing legislation. In all instances, the Government will ensure that all legislation is fully enforced in accordance with due process of law.

6.2 Institutional Framework

6.2.1 Effective management of the country's water resources requires a strong institutional framework. To ensure effective integrated management of the country's water resources, Government will establish a financially autonomous Authority, the Water Resources Management Authority (WRMA), for the management of the country's water resources. Although the Authority will have lead responsibility for managing the country's water resources, many other government and non-government entities have important roles to play in ensuring an integrated approach to water resources management. Government will establish a coherent institutional framework for water resources management in which the roles, responsibilities, and interrelationships among the Municipal and Regional Corporations, as well as various other agencies are made clear. In this regard, particular attention will be paid to the responsibility of the Tobago House of Assembly for water resources management in the island of Tobago provided for under Tobago House of Assembly (THA) Act 1996.

6.2.2 The WRMA will be responsible for the planning, monitoring and regulating water resources, but not for water supply and distribution. Development of the Institutional Framework and Organizational Structure to create the WRMA will be accompanied by a Transition Plan for the separation of water resource regulation and management from water supply and distribution.

6.2.3 The WRMA will have the authority to manage all surface water, ground water and nearshore coastal waters; to regulate water abstraction and use; and establish minimum stream flows for aquifer recharge, environmental needs and other water management purposes in Trinidad and Tobago.

6.3 Inter-Agency Co-ordination and Collaboration

6.3.1 Effective water resources management depends on close co-ordination and collaboration among relevant government entities. WRMA in keeping with established strategies and standards will partner with government, communities and non-government entities through mechanisms such as Memoranda of Understanding or Memoranda of Agreement.

6.4 Planning Instruments

6.4.1 Several policies and plans have been formulated since the publication of the 2005 NIWRM Policy: Integrated Coastal Zone Management Policy Framework 2014; National Protected Areas policy; National Forest Policy, 2011; National Wildlife Policy, 2013; Update of the National Environmental Policy; Trinidad and Tobago Stakeholder Perspectives on a Water Goal and its Implementation, among others. These Plans along with United Nations (UN) sustainable developmental goals and Vision 2030 will be incorporated into the National Spatial Development Strategy and other relevant plans.

6.4.2 Government will develop a National Integrated Water Resources Plan and encourage the establishment and/or updating policies and plans for the various water-related sectors. These plans will be specific in nature, establishing designated uses, objectives, and criteria for monitoring and evaluation.

6.5 Economic Instruments

6.5.1 Market forces play a central role in conserving scarce natural resources, directing those resources to their highest valued uses, and ultimately ensuring adequate productive capacity for the future. There is an opportunity cost to the inefficient pricing and allocation of water resources. Government will use economic instruments to implement this Policy wherever feasible. Examples of economic instruments that may be introduced include:

1. Full marginal cost pricing of water.
2. Progressive pricing schemes that encourage conservation i.e., higher prices for higher consumption.
3. Tax incentives or grants for watershed protection investments (e.g., soil conservation, replanting, conservation, covenants) on private lands.
4. Metering of water connections and volume-based water rates.
5. Rebates, tax incentives, and grants for demand management measures, including beneficial reuse and recycling of water and wastewater.
6. Explicit, targeted subsidies when justified on social or other policy grounds.
7. Pollution charges and other stringent penalties for breaches of the relevant laws.
8. Mandatory flood insurance according to flood risk to properties and assets.

6.5.2 Government will facilitate private sector participation in water development and supply services and to the extent feasible and congruent with national policy.

6.6 Environmental Management Instruments

6.6.1 Water resources management activities may be subject to environmental impact assessment consistent with the Environmental Management Act.

6.6.2 The EMA is the primary government agency responsible for coordinating all environmental

management activities in Trinidad and Tobago. Two enforcement instrument are the Certificate of Environmental Clearance Rules (2001), Water Pollution Rules (2001) and Amendments (2006) and Noise Pollution Control Rules (2001). Other enforcement instruments proposed for enactment are Air Pollution, Water Pollution, Hazardous Waste Rules and the Beverage Container Deposit Bill.

6.7 Participatory Instruments

6.7.1 The Government will take a demand-responsive approach to water resource management that allows stakeholders to guide key management and investment decisions. Specific attention will be paid to the vulnerable groups and the impact of water related issues on their quality of life.

6.7.2 Government will consider providing incentives to upstream stakeholders whose land use practices contribute to downstream improvements in water quantity and quality.

6.7.3 Information is one of the most critical tools for effective stakeholder participation in water resources management. The Government will promote public participation in water resources management by actively disseminating timely and relevant information about the state of water resources; by providing timely and accurate responses to requests for information; and by providing opportunity for the public to have input into this Policy and key water resources management decisions through consultation, public notice and comment procedures, and other appropriate processes.

6.7.4 There are significant opportunities for stakeholders to take direct responsibility for water resource management functions. Such opportunities include:

1. Watershed management projects in which communities and other stakeholders take responsibility for restoring and protecting catchment areas through reforestation, improved agricultural practices, improved waste management practices, and peer education.
2. Water projects in which communities and other stakeholders take responsibility for developing, operating, and maintaining decentralized water supply and wastewater facilities.
3. Disaster management programmes, including community-based flood early warning system.
4. Broader stakeholder participation projects in which individuals implement measures such as water conservation, improved septic system design, construction, maintenance, abandonment, renewal and management. Other measures may include reduced grey water loadings, improved agricultural chemical use, and increased setback of agricultural activity from watercourses.

6.7.5 Government will facilitate the implementation of these and other similar projects by creating specific legal, institutional, and financial mechanisms for stakeholder participation in water resources management. These mechanisms may include granting water abstraction licenses to communities and stakeholder groups; establishing and empowering representative community-based water user associations and watershed committees; providing grants and loans to communities and individuals; providing training and education; and promoting stakeholder participation in monitoring the quantity and quality of the country's water resources.

6.8 Educational Instruments

6.8.1 The Government will establish a comprehensive programme for water resources management education to foster joint ownership, partnership, increased awareness and collective responsibility. The education programme will include non-traditional public awareness approaches, as well as primary and secondary school education to explain the benefits of prudent use of water resources and to promote the conservation, wise use, and preservation of water resources. The programme will also consist of training and tertiary education to build national resources capacity for effective water resources management.

6.8.2 Through its extension and outreach programmes Government via the relevant authorities, will also educate private landowners, farmers, and other interested parties on sound soil conservation and water resource management practices.

6.8.3 Water resources management potentially is directly dependent on the state of related knowledge. Government will consider the establishment of a Training Fund for water resources management. Attention will be focused on technical education and training, education to enhance administrative skills; and enhancement of general awareness of water and water management issues to improve: flood management; hydrological modelling; groundwater modelling; data processing; disaster risk management; artificial recharge of aquifers and communication and transfer of information.

6.9 Research and Information Management Instruments

6.9.1 To advance the knowledge and technology used in water resources management, Government will facilitate and support research in appropriate aspects of water and wastewater management by establishing a Research and Development Fund. This will involve the public and private sectors as well as academic institutions of higher learning.

6.9.2 The Government will establish a standardised, integrated electronic water resources information management system for the collection, processing, storage, analysis and retrieval of information to inform the decision making process. The system will provide continual permanent monitoring of meteorological, hydrological, and hydrogeological parameters, combined with associated spatial and environmental data. The objectives of the system will include:

1. To collect, standardize, and disseminate data and information on the quality and quantity of water resources in Trinidad and Tobago.
2. To update regularly information on the availability and the demand for water resources.
3. To inform the Water Resources Assessment.
4. To provide real time information to support forecasting and emergency management activities.
5. To disseminate information for global usage and assessments of the state of the atmospheric and water resources of the country.

6.9.3 The system will incorporate hydrological, meteorological, hydrogeological, geographical, environmental, social, and economic information and will form the basis for planning and decision-making. It will be capable of integrating with the National Land Information/Geographic Information System (National LIS/GIS. Wherever practicable, Governmental will involve the private sector, the tertiary educational institutions and the general public in the collection and processing of information.

6.9.4 Basic information in the system will be available to the public at a nominal charge. More technical and value-added information will attract an appropriate charge.

6.9.5 Government will obtain baseline information and establish a system for ongoing monitoring and assessment of water resource, meteorological, and climatic conditions.

6.10 Climate Adaptation Instruments

6.10.1 Government will take action to reduce vulnerability and to ensure that economic, social and environmental development in Trinidad and Tobago is safeguarded from the adverse impacts of climate variability and change. These include: resilient infrastructure; water security; and food security.

6.10.2 Consistent with the above, Government will prepare a framework for achieving developments resilient to climate change and variability. As it pertains to the water sector the government will commit to adaptation to the impact of climate change; development of appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas affected by drought and floods.

7. MONITOR AND REVIEW

7.1 This policy will be monitored at regular intervals to assess its impact and the extent to which it has been implemented.-

An effective monitoring and evaluation system ensures that the NIWRM strategy meets its objectives of promoting positive change, and also that the strategy can adapt to evolving needs and conditions.

Annex 2 details the strategic objectives, outlines courses of action for each strategic objective and provides performance indicators to measure progress and success during implementation.

It is essential that baseline indicators be drawn up so that progress can be monitored and priorities can be established for future actions. The performance indicators can be more clearly defined after the baseline indicators have been established.

7.2 This Policy must evolve over time to remain relevant and consistent with other policies. To that end, this policy will be reviewed and revised at least every five years by: -

1. Publishing notices signaling Government's intent to revise the policy
2. Inviting comments from the interested public on suggested revisions
3. Convening of workshops or other consultations
4. Publishing of a revised draft on the basis of input received
5. Submitting the revised draft to public comment for no less than 30 days
6. Finalizing the revised policy on the basis of comments received

8 ASSIGNMENT OF RESPONSIBILITIES FOR IMPLEMENTATION OF THE POLICY

8.1 Responsible Body for Implementation of this Policy

A responsible body will be established as a financially autonomous institution that manages and controls all of the surface water, ground water and coastal nearshore waters of Trinidad and Tobago. Specifically, the functions of this body will include:

1. Administer the abstraction and licensing system for surface, ground and coastal waters;
2. Monitors, analysis and assesses the national water resources;
3. Enforces authority for water quantity violations;
4. Collects and maintains a national water resources information system;
5. Develop and publishes reports on the Nation's water resources, policies and plans for water resources management;
6. Exercises planning and research functions for water resources management;
7. Engages and partners with stakeholders in water resources management; and
8. Carry out an education and public awareness programme.

8.2 Schedule of Responsibilities

8.2.1 Functions of the WRMA

The following describes the main functions of the WRMA and the degree of responsibilities. Annex 3 shows the functions and responsibilities of all the agencies and collaborators in the implementation of this policy.

1. Water Resources Policy and Strategy Development: *Lead Responsibility*
2. Water Resources Assessment - Survey and Monitoring*: Lead Responsibility*
3. Water Resources Assessment - Research and Development*: Lead Responsibility*
4. Water Demand Analysis*: Co-ordinate*
5. Watershed Management: *Co-operate*
6. Master Planning and Allocation*: Lead Responsibility*
7. Pricing of Water - Water Abstraction*: Lead Responsibility*
8. Pricing of Water - Water Delivery*: Consult*
9. Legislation and Enforcement - Water Abstraction Licensing*: Lead Responsibility*
10. Legislation and Enforcement - Water Pollution Permits*: Consult*
11. Legislation and Enforcement - Building/Land-use Permits*: Consult*
12. Demand Management (efficient use)*: Co-ordinate*
13. Water Resources Development and Distribution - Domestic and Industrial water*: Co-ordinate*

14. Water Resources Development and Distribution - Agricultural water*: Co-ordinate*
15. Water Resources Development and Distribution - Multi-purpose dams/reservoirs*: Co-ordinate*
16. Water Resources Development and Distribution - Drainage/flood-control*: Co-ordinate*
17. Water Resources Development and Distribution – Sewerage*: Co-ordinate*
18. Water Resources Development and Distribution - Water treatment*: Co-ordinate*

8.2.2 Responsibilities and Jurisdiction of Relevant Agencies

Annex 3 is a schedule detailing responsibilities and jurisdiction of all relevant agencies and bodies. These include:

1. Ministry of Public Utilities (MPU)
2. The Water and Sewerage Authority (WASA)
3. Ministry of Planning and Development
4. Environmental Management Authority (EMA)
5. Meteorological Services Division (MSD)
6. Drainage Division (DD)
7. Ministry of Agriculture, Lands and Fisheries (MoAL&F)
8. Forestry Division (FD)
9. Institute of Marine Affairs (IMA)
10. Ministry of Health (MoH)
11. Organization of Disaster Preparedness and Management (ODPM)
12. Regulated Industries Commission (RIC)
13. Regional Corporations (RC)
14. Tobago House of Assembly (THA)
15. Town and Country Planning Division (T&CPD)
16. Trinidad and Tobago Bureau of Standards (TTBS)
17. Solid Waste Management Company Limited (SWMCOL)
18. Tertiary Education Institute (TEI)
19. Non-Governmental Organizations (NGOs)
20. Ministry of Energy and Energy Industries (MEEI)
21. Coastal Unit, Ministry of Works and Transport

8.3 Implementation Schedule

Annex 4 provides an implementation Schedule for this Policy. Representatives of the relevant agencies, bodies and interest groups in the water sector will convene at regular intervals, to review the status of the sector and to monitor the implementation of this Policy.

GLOSSARY

ABBREVIATIONS	
Abstraction	The withdrawal of water from a stream, lake, reservoir or aquifer.
Ambient Water Quality	A set of concentrations, specifications, and physical partitions of inorganic on organic substances and the composition and state of aquatic biota found in a water body.
Aquifer	A water-bearing stratum of permeable rock or soil able to hold or transmit much water.
Assessment (Water Resources)	An examination of the aspects of the supply and demand for water and of the factors affecting the management of water resources.
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Catchment Area	The area from which rainfall flows into a river, reservoir or sea.
Climate Change	Any change in climate over time whether due to natural variability or as a result of human activity that alters the composition of the global atmosphere.
Climate Variability	A measure of the departures from the statistical mean which are usually called anomalies. Climate variability is caused by natural occurring internal processes which occur on all time and spatial scales outside of that of individual weather events, and involves many modes of variability involving components of the climate systems such as the atmosphere and the ocean.
Coastal Nearshore	The limit of the coastal nearshore is a distance of three (3) Nautical miles (5.6 kilometres) offshore parallel with the mean high water mark
Coastal Water	Territorial waters or a territorial sea as defined by the 1982 United Nations Convention on the Law of the Sea, is a belt of coastal waters extending at most 12 nautical miles (22.2 km; 13.8 mi) from the baseline (usually the mean low-water mark) of a coastal state.
Coastal Zone (Area)	That area in which development and use are immediately affected by and have immediate effect on the coastal and near shore environment.
Coastal Zone Management	The comprehensive assessment, setting of objectives, planning and management of coastal systems and resources taking into account traditional, cultural and historical perspectives, cumulative impacts, and conflicting interests and uses.
Comprehensive Water Resources	Water resources planning, development and control that incorporate physical, social economic and environmental interdependencies.

Management	
Conservation	The prudent use and the preservation of water resources, most notably in drought the treatment and re-use of water and through proper watershed management.
Cost Effective (Least Cost Combination)	An appraisal and programmes monitoring technique used primarily in social programmes and projects in which benefits cannot be reasonably measured in money terms. The least expensive alternative combination of tangible costs that will realise essentially the same intangible benefit is determined on a present worth basis.
Cost Recovery	Fee structures that cover the cost of providing the service or investment.
Decentralisation	The distribution of responsibilities for decision making and operations to lower levels of government, community organisations, the private sector, and non-governmental organisations (NGOs).
Demand Management	The use of price, quantitative restrictions and other devices to limit the demand for water services.
Designated Uses	Deciding what uses of the water resources are to be protected and with what degree of certainty.
Drought	Drought is defined as an extreme climatic condition that results from an extended period of decrease rainfall that is significantly less than the expected amount for a specific period and is not enough to meet the demands of society activities as well as the environment.
Ecosystem	A complex system formed by the interaction of a community of organisms with its environment.
Effluent	The liquid drainage output that is discharged to an inland, near shore or off shore receiving water body.
EMA	Environmental Management Authority
Environmental Impact Assessment (EIA)	An instrument to identify and assess the potential environmental impacts of a proposed project, evaluate alternatives, and design appropriate mitigation, management and monitoring measures.
Environmental Management	Managing the protected uses of natural resources without reducing their productivity and quality.
Fauna	All of the animals found in a given area.
Financial Self Sufficiency principle (Autonomy)	The ability of an entity to operate and sustain its activities for a long period, based on the revenue it collects from the users of its services.
Flora	All of the plants found in a given area.

Government	The Government of the Republic of Trinidad and Tobago
Hydrological Drought	Hydrological drought refers to deficits in surface and sub-surface water supplies based on measurements of stream flow, lake, reservoir and groundwater levels when rainfall is deficient during an extended period of time.
Hydro-metrological Cycle	The process and pathways involved in the circulation of water from land and water bodies to the atmosphere and back again. The movement or exchange of water between the atmosphere and the earth. It includes the processes of precipitation, interception, surface storage, runoff, infiltration, percolation, evaporation and transpiration.
Institutions	Organisational arrangements and the legal and regulatory framework - the 'enabling environment'– in which organisations operate. More broadly, institutions include entities, processes and linkages between individual entities.
Integrated Flood Management	A process which integrates land and water development in a river basin, within the context of Integrated Water Resources Management (IWRM), with a view to maximizing the efficient use of flood plains and minimizing loss to life.
Integrated Water Resources Management	A process which promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.
IWRM	Integrated Water Resources Management
Land	A delineable portion of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including those of the near-surface climate, the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes and swamps), the near-surface sedimentary layers and associated groundwater and geo-hydrological reserve, the plant and animal populations, the human settlement pattern and the physical result of past and present human activity such as terracing, water storage, drainage structures and roads.
Land-use Planning	An activity aimed at achieving the optimum use of all land. The core tasks are aimed at identifying strategies for the long-term, medium and short-term development of land, allocating land for the various activities and managing land use and land development to achieve optimum use.
m^3	Cubic Meters
MCM	Million Cubic Meters
Metrological Drought	Meteorological drought refers to short-period droughts or dry spells and is based solely on deficiency in rainfall that is far below the expected average (usually the period long term average) over a specific extended period of time, usually a few months, a season, to a few years. It is expressed solely on the basis of the degree of dryness (often in comparison to some "normal" or average amount) and the duration of the dry period.

Mitigation (disaster)	Measures taken to reduce the loss of life, livelihood and property by disasters, either by reducing vulnerability or by modifying the hazard, where possible.
MODIS	Moderate Resolution Imaging Spectroradiometer
MTBE	Methyl Tertiary Butyl Ether
NGO	Non-governmental organisation
NIWRM	National Integrated Water Resource Management
NRW	Non-Revenue Water
NSDS	National Spatial Development Strategy
O & M	Operation and maintenance
Paradigm	A model of reality.
Policy	A declared intention and course of action adopted by government, party or other organisation for the achievement of a goal or objective which may be reviewed and amended from time-to-time.
Polluter Pays Principle	Where the remediation costs of environmental impacts should be done by those responsible for the specific process, project, or activity, rather than by society at large.
Pollution	The introduction by man, directly or indirectly, of substances or energy which result in such deleterious effects as (i) harm to living resources, (ii) hazards to human health, (iii) hindrance to aquatic activities including fishing, (iv) impairment of water quality with respect to its use in agriculture, industrial, economic activities and (v) reduction of amenities.
Pollution **Non-point / Diffuse Sources** **Point Sources**	Pollution input that cannot be related to a single point or a single human activity. Pollution input that can be related to a single outlet.
Potable Water	Water that is clear, colourless, odourless and does not pose any danger to human health.
Precautionary Principle	Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. A greater caution is required to protect the environment when information is uncertain, unreliable or inadequate.
Prevention	Measures taken for the purpose of preventing natural or man-made phenomena from causing or giving rise to disasters or other emergency situations.

Programme	A definite plan of intended procedure. A set of logically related projects within a common goal.
Project	A scheme or undertaking. A linked set of activities, which use resources to generate defined deliverables (outputs) to beneficiaries or customers within defined time, cost and quality parameters.
Protected Area	A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Public Property	Public property is property that is dedicated to public use and is a subset of state property. The State is the custodian of public property.
Receiving Water	A standing or dynamic, inshore or coastal body of water that is the destination of effluents.
Recovery (Disaster)	Activities carried out after a disaster to bring the society back to or above its normal state.
Recurrent Interval	The average interval of time within which the magnitude of an event will be equalled or exceeded.
Reliability (Water Resource System)	The ability of existing and proposed water resource systems to operate satisfactorily under the wide range of possible future demands and hydrologic conditions.
Response (Disaster)	Actions carried out in a disaster situation with the objective of saving lives, alleviating suffering and reducing economic losses.
RIC	Regulated Industries Commission
River Basin	A geographical area determined by the watershed limits of a water system, including surface and underground water, flowing into a common terminus.
Sewage	Liquid refuse or waste matter carried off by sewers.
Sewerage	The removal and disposal of sewage and surface water by sewer systems.
Stakeholder	An organisation or individual that is concerned with or has an interest in water resources and that would be affected by decisions about water resources management.
Stand Still Principle	No actions may be taken that will result in a degradation of the ecological systems. If such actions are unavoidable, then these actions must be combined with measures that mitigate and/or compensate for the negative impacts of the action.
Strategy	A set of chosen short, medium and long-term actions to support the achievement of development goals and to implement water-related policies.
Sustainable	Development that meets the needs of the present without significantly

Development	compromising the ability of future generations to meet their own needs.
Sustained Yield	The annual amount of groundwater abstraction that does not exceed annual recharge, permanently lower the water table to an uneconomic level, or allow intrusion of poor quality groundwater.
Targets	Detailed performance requirements, quantified where practicable, applicable to the organisation or parts thereof that arise from the water resources objectives and the goals to be set and met in order to achieve those objectives.
THA	Tobago House of Assembly
Total Suspended Solids	The portion of total solids retained by a 0.45 micron filter under defined conditions.
Turbidity	The measure of the ability of suspended colloidal material to diminish the penetration of light through the water sample.
UN	United Nations
Uncounted For Water	The volume of water lost through leakage or irregular practices between entering a distribution system and reaching the legitimate users.
WASA	Water and Sewerage Authority
Waste	Unwanted materials left over from an agricultural, commercial, industrial manufacturing, mining or other extraction process. Refuse from places of human or animal habitation.
Wastewater	Water that may contain dissolved or suspended matter, discharged after being used in, or produced by, a process, and which is of no further immediate use or value to that process.
Water Resources	Water which is: - 1. Contained in any spring, river, stream or other watercourse, whether natural or artificial, including any lakes, reservoirs, wetlands, estuaries and the coastal zone. 2. Located under the surface of the ground whatever may be the geological structure in which it is standing or moving.
Water Resources Assessment	The determination of the sources, extent, dependability and quality of water resources, upon which is based an evaluation of the possibilities for their utilisation and control and long-term development.
Water Security	The capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability.
Water Transfer	The transfer of a license to abstract water from one person/entity to another, or the transfer of a licenses to abstract from one location to

(Abstraction)	another. Transfer from one location to another negates the right of the abstractor to access water from the initial location.
Watercourse	A system of surface and underground waters that constitute, by virtue of their physical relationship, a unitary whole and that flow into a common terminus.
Watershed	The line separating waters flowing into different rivers, basins or seas. Often used to mean catchment area or river basin.
Watershed Management	A process of formulating and implementing a course of action that involves a region's natural and human resources taking into account social, political, economic, environmental and institutional factors operating within the watershed, the surrounding river basin, and other relevant regions to achieve desired social objectives.
Wetlands	Areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water less than six metres deep at low tide.
WRA	Water Resources Agency
WRMA	Water Resource Management Authority
WRMS	Water Resources Management Strategy

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ANNEX 1

POLICY FORMULATION COMMITTEES AND CONTRIBUTING ORGANISATIONS

Multi-Stakeholder Workshop

A multi stakeholder workshop was held at the at the WASA Sport Facility, Farm Road St Joseph, Trinidad on October 14th, 2016 under the leadership of the Ministry of Public Utilities (MPU) and the Water Resources Agency (WRA). Participants were from all the Government Agencies involved in the water or water-related sectors. Also participating were members of the Cabinet appointed Technical Steering Committee, and Consultants to the WRA responsible for preparing the draft revised policy, Trinsult Associates Limited

Public Consultations

Public consultations were held at the WASA Sport Facility, Farm Road St Joseph, Trinidad, on October 31st, 2016 and at the Shaw Park Complex in Tobago on November 2nd, 2016. These consultations were held under the leadership of the Ministry of Public Utilities (MPU), and the Water Resources Agency (WRA). Also participating were members of the Cabinet appointed Technical Steering Committee, and Consultants to the WRA responsible for preparing the draft revised policy, Trinsult Associates Limited.

Online Comments

In addition to the public consultation the public also had the option of submitting their comments and concerns online. The Draft revised policy was made available for download on the Ministry of Public Utilities website http://www.mpu.gov.tt/home/node/15 and comments could have been be submitted at niwrmpconsultations@gmail.com.
The consultation was also advertised via social media on the Integrated Water Resources Management Facebook page - https://www.facebook.com/IWRMTT/?fref=ts, which provided links to the draft revised policy.

The Cabinet Appointed Technical Steering Committee

Members of the Cabinet Appointed Technical Steering Committee are:

1. Vishnu Dhanpaul, Ministry of Public Utilities
2. Rajindra Gosine, Water and Sewerage Authority (Water Resources Agency)
3. Eric Lewis, Water and Sewerage Authority (Operations Division)
4. Ryan Jaggernauth, Ministry and Agriculture, Lands and Fisheries (Engineering Unit)
5. Ricardo Ramdin, Ministry of Works and Transport (Drainage Division)
6. Dr. Natalie Boodram, Global Water Partnership – Caribbean
7. Dr. Dave Persaud, Ministry of Planning and Development (Environment, Policy and Planning Division)
8. Daryll Griffith, Council of Presidents for the Environment

Supporting Staff:

1. Sara Jade Govia, Ministry of Public Utilities
2. Keith Meade, Water and Sewerage Authority (Water Resources Agency)
3. Rianna Gonzales, Water and Sewerage Authority (Water Resources Agency)
4. Avernell Wilson, Water and Sewerage Authority (Water Resources Agency)
5. Nikki McIntosh-Millet, Water and Sewerage Authority (Water Resources Agency)
6. David Samm, Water and Sewerage Authority (Water Resources Agency)

ANNEX 2 STRATEGIC OBJECTIVES, COURSE OF ACTION AND PERFORMANCE INDICATORS

ANNEX 3 FUNCTIONS AND RESPONSIBILITIES

ANNEX 4: IMPLEMENTATION PLAN