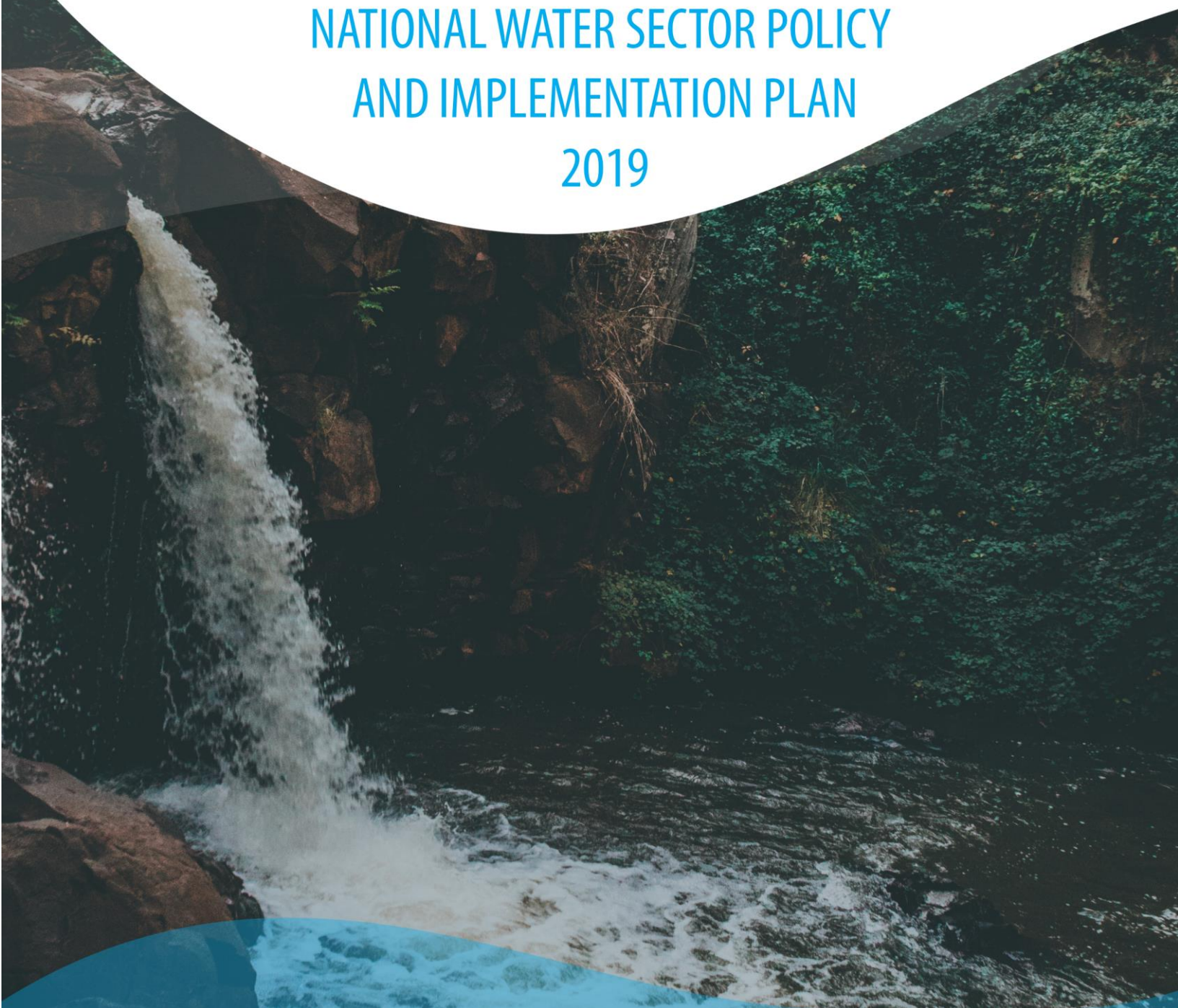
GOVERNMENT OF JAMAICA

MINISTRY OF ECONOMIC GROWTH
AND JOB CREATION

NATIONAL WATER SECTOR POLICY AND IMPLEMENTATION PLAN 2019



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List of Acronyms

BCM—Billion Cubic Metres
CBO—Community Based Organization
ESCO—Energy Service Company
GDP—Gross Domestic Product
GEF—Global Environment Facility
GOJ—Government of Jamaica
GWP—Global Water Partnership
IBC—International Building Code
IPCC—Intergovernmental Panel on Climate Change
IWCAM—Integrating Watershed and Coastal Area Management
IWRM—Integrated Water Resources Management
MCM—Million Cubic Metres
MC—Municipal Corporation
M&E—Monitoring and Evaluation
MOH—Ministry of Health
NEPA—National Environment and Planning Agency
NGO—Non-Governmental Organization
NIC—National Irrigation Commission
NRCA—Natural Resources Conservation Authority
NRW—Non Revenue Water
NWA—National Works Agency
NWC—National Water Commission
NUSAs—Non-Utility Service Areas
NWSP—National Water Supply Plan
OUR—Office of Utilities Regulation
PIOJ—Planning Institute of Jamaica
RWSL—Rural Water Supply Limited
STATIN —Statistical Institute of Jamaica
SWOT—Strengths, Weaknesses, Opportunities, and Threats
UN—United Nations
USAs—Utility Service Areas
WHO—World Health Organization
WP&M—Water Policy and Monitoring
WRA—Water Resources Authority
WRAC— Water Resources Advisory Committee
WMC—Watershed Management Committee
WUAs—Water Users Associations

Acknowledgements

The review of this Policy commenced in 2010 and was led by the Water Directorate in the Ministry with portfolio responsibility for Water. The revised Policy was completed with input from a wide cross-section of stakeholders in the public and private sectors, as well as Non-Government Organizations (NGOs) and Community Based Organizations (CBOs). The Ministry of Economic Growth and Job Creation wishes to acknowledge their contributions and to express its sincere gratitude to all those who have assisted in this policy development process.

The involvement of stakeholders, through consultations, meetings and workshops, ensured that all major issues were thoroughly explored and that the strategic objectives outlined in the Policy would ensure universal access to water for Jamaicans by 2030.

We thank all the various Ministries, Departments and Agencies (MDAs); as well as the Municipal Corporations and members of the public, who reviewed the draft Policy at varying stages and submitted ideas, comments and suggestions. Special thanks also to those persons who participated in the stakeholder, regional and parish consultations. Their comments and suggestions were reviewed and many have been incorporated in this revised policy document.

Special mention must be made of the Global Water Partnership-Caribbean (GWP-C) [an International Non-Government Organization (NGO)], in partnership with the Caribbean Community Climate Change Centre, through its Water Climate and Development Programme for the Caribbean (WACDEP), which provided direct funding for the public consultations through a Technical Co-operation Agreement.

In addition, the Ministry of Economic Growth and Job Creation extends commendation to the members of the Project Steering Committee, chaired by the former Chief Technical Director, Lt. Col. (Ret'd) Oral Khan, which reviewed submissions from the international consultants during the period 2013 – 2015. The Project Steering Committee included representatives from other Ministries, as well as the following Agencies:

- The Water Resources Authority (WRA);
- The National Irrigation Commission (NIC);
- The National Environment and Planning Agency (NEPA);
- The Rural Agricultural Development Authority (RADA);
- The Planning Institute of Jamaica (PIOJ);
- The Rural Water Supply Limited (RWSL); and
- The National Water Commission (NWC)

Definition of Key Terms

Access to water —According to the WHO, access to safe water is measured by the proportion of population with an adequate amount of safe drinking water or an improved drinking water source located within a convenient distance from the user's home. For the purpose of this Policy, everyone should have access to at least 50 litres of water each day, within 500 metres of their home.

Affordability—affordability, in general, refers to how much a good or service costs in relation to available spending power. Water affordability is the measurement of the annual cost of water bills as a percentage of median household income. Any payment for water services has to be based on the principle of equity, ensuring that these services, whether privately or publicly provided, are affordable for all, including socially disadvantaged groups.

Climate change—any long-term significant change in the average weather, typically defined in thirty-year periods. Average weather may include average temperature, precipitation and wind patterns. It involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years.[1] Long-term models can help understand likely future climate trends, but climate change is difficult to predict with precision.

Climate variability—the natural variation in the climate in the short or medium terms. While climate change refers to long-term trends, climate variability refers to fluctuations in average weather over shorter periods, such as one year to the next or one decade to the next. Climate variability can be predicted with a high degree of confidence, based on past trends.

Cost Recovery—a situation in which charges for services reflect all costs of providing the services, including capital costs. This means that charges for services in the water sector should vary in different areas of the country.

Environmental Sustainability—a situation in which water resources are used in a way that does not diminish the potential for future generations to benefit from them.

Equity—a guiding principle of ***Vision 2030***, explained there as, "This guiding principle will facilitate and ensure equality of opportunity and equal rights for all citizens including access to public goods and services and promote the human rights of our people, including the poor, and the most vulnerable."[2]

Financial Sustainability—a situation in which there are consistent and reliable funding sources to cover all costs of service provision, including capital costs, and maintenance and rehabilitation/replacement costs.

[1] Draft Development of a National Water Sector Strategy Adaptation Strategy to Address Climate Change in in Jamaica, 17
[2] Vision 2030, 13

Improved drinking water source—a source for drinking water that "by nature of its construction or through active intervention, is protected from outside contamination, in particular from contamination with faecal matter." It comprises piped water on premises such as piped household water connection located inside the user's home, plot or yard. Other improved drinking water sources include public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs and rainwater collection.[3]

Improved sanitation facility—a facility that "hygienically separates human excreta from human contact".[4]

Integrated Water Resources Management (IWRM)—"a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment."[5]

Least cost—the cheapest method of providing a service that meets the minimum standards of quality for that service. Least cost can refer to methods of service provision (for example, on-site solutions vs. sewerage systems in the sanitation sector) or service provider (for example, public vs. private provision).

Non-Utility Service Area—an area where piped water service is not the least-cost way of providing water supply. The least-cost method of providing water supply or sanitation services will vary for communities in Non-Utility Service Areas. Methods may include rainwater harvesting, piped gravity-fed systems, entombed springs, others, or a combination.

Principle—a statement of general beliefs about the water sector, against which policy in the water sector can be judged.

Redistribution—a situation in which wealth is taken from one group (social class, economic class, or any other social division) and given to another. This happens in service provision when there is unequal access to services that all members of society pay for through taxes, or when some members of society pay different amounts for services that cost the same to provide.

Target—a clear outcome in the water sector that the GOJ aims to achieve.

Unimproved Drinking Water Sources—a source of drinking water that "by the nature of its construction does not adequately protect the source from outside contamination, in particular with faecal matter. Unimproved drinking-water sources include: Unprotected (dug) well; unprotected spring; tanker truck-provided water, surface water (river, dam, lake, pond, stream,

[3] WHO / UNICEF Joint Monitoring Program for Water Supply and Sanitation
[4] WHO / UNICEF Joint Monitoring Program for Water Supply and Sanitation
[5] Global Water Partnership, "What is IWRM." March 3, 2010. http://www.gwp.org/The-Challenge/What-is-IWRM/ (accessed November 30, 2017)

canal, irrigation channel); bottled water (because of potential limits on the quantity of water available to a household through this source, not the quality)".[6]

Unimproved sanitation facilities—Facilities that do not ensure hygienic separation of human excreta from human contact.

Utility Service Area—an area where piped water service is the least-cost way of providing water supply.

Water Shop—physical locations operated by staff who collect fees from users to cover the cost of the provision of water.

[6] WHO / UNICEF Joint Monitoring Program for Water Supply and Sanitation

Message from the Prime Minister

The Most Hon. Andrew Holness, ON, MP
Prime Minister and Minister
Ministry of Economic
Growth and Job Creation

Water supply and sanitation services are critically important to the health and well-being of our citizens, the vitality of our economy, and our prospects for national development and prosperity. Since its first promulgation in 2000, the aim of the Water Sector Policy has been to place attention on the long-term sustainable management of our water resources both in terms of quality and quantity, as well as measures to improve the provision of sanitation in Jamaica.

While Jamaica is blessed with many natural resources, demand on our water supply is growing at an alarming rate. In addition to domestic consumption, every sector demands and utilizes water, including commercial establishments, agriculture, industries, and recreational activities. Great care must, therefore, be taken to manage our water resources and supply network. In this regard, the revised National Water Sector Policy (2019) sets out the Government's approach to the task of providing potable water and sewerage services. It clearly articulates the general improvements in the sector, as well as the constraints, and the general direction and vision for the water sector, including strengthening the nation's infrastructure for storage, treatment, distribution and disposal of water.

My administration is mindful of, not only the urgent demands for improvements and expansions and the many constraints and limitations affecting operations in the water sector, but also of the enormous costs, challenges and threats to the development of systems and infrastructure, including Non-Revenue Water which is a drain on our water resources, supply infrastructure and the major service provider – the National Water Commission (NWC).

The Government is also fully aware of the critical relationship between our water sources and the state of the natural environment, including the critical need to manage our watersheds. Climate change and weather pattern variations also impact our water resources and are likely to be the most consequential for both individual convenience and social development.

The new Policy also considers developments in the water sector, and is guided by the principles of Integrated Water Resources Management. It sets service targets and standards which incorporate universal access to basic services, access to our water resources for economic growth, and improvements to the quality and reliability of services.

I want to thank all the stakeholders who have worked on this Revised Water Sector Policy, including our international partners, the Inter-American Development Bank (IDB), which provided financial support for the Policy review, and the Global Water Partnership-Caribbean

for the financial support provided for the series of public consultations on the draft document. The Government, through its Water Sector Agencies, will implement the plans and monitor the aims outlined in the Policy.

This administration is committed to expanding and improving the potable water supply network throughout the island. As our agencies continue to work to increase the availability of potable water for all Jamaicans to 100 percent by 2030, the Government is also improving the quality of life for all the citizens of this country. Through the policy, we aim to maximize the use of our ample water resources to benefit every Jamaican and truly make Jamaica "the place to live, work, raise families and do business".

The Most Hon. Andrew Holness, ON, MP
Prime Minister and Minister
Ministry of Economic Growth and Job Creation
July 2018

Message from the Minister without Portfolio (Water, Housing and Infrastructure)

Hon. Karl Samuda, CD, MP
Minister without Portfolio
(Water, Housing and
Infrastructure)
Ministry of Economic Growth
and Job Creation

As portfolio Minister with responsibility for water, I am pleased to be associated with the production of this Revised National Water Sector Policy and Implementation Plan.

This revised Policy incorporates the ***Vision 2030*** goals for water and speaks to the strengthening of the infrastructure, storage, treatment and distribution. Additionally, it focuses on a gender responsive approach in the design of water and sanitation systems, with consideration for individuals who are vulnerable, such as the aged, youth and the disabled.

According to the World Health Organisation (WHO), two out of every ten persons have no access to safe drinking water and each year, millions of people die from diseases associated with inadequate water supply, poor sanitation and hygiene.

This Administration is cognisant that, without an efficient and effective water system, sustainable development, economic growth and improvement in the quality of life of our people will never be realised. So, despite the limitations, we are committed to expand our water systems to ensure that our communities will have access to this precious commodity.

The effects of climate change have made it clear that we can no longer predict weather patterns, so alternative means of collecting and storing water, through rainwater harvesting, will continue, along with the implementation of required conservation measures.

This revised Policy has, therefore, set out new service targets and outlines improved activities for the delivery of this essential service. It is guided by the Vision 2030 National Development Plan and recognises the critical role that water resources play as “we make Jamaica the place of choice to live, work, raise families and do business”.

Hon. Karl Samuda, CD, MP
Minister without Portfolio (Water, Housing and Infrastructure)
Ministry of Economic Growth and Job Creation
July 2018

Executive Summary

In 2000, the first Water Sector Policy Strategies, along with the Action Plan was promulgated, with the aim to provide full access to safe potable water by 2005, using various modalities. A full review of the implementation of the Policy was undertaken in 2004, which resulted in a revised Policy document.

Since the promulgation of the Policy, the sector has undergone significant changes in addition to which, operational experiences have highlighted issues that need to be addressed through policy changes. The issues and problems in the water sector include, deterioration and malfunction of municipal supply and sewage treatment infrastructure, management of industrial and toxic waste and their effect on water resources, rapidly increasing water demand in water deficient areas, and the adverse effects of deforestation in watershed areas.

Other problems include:

- High levels of Non-Revenue Water (NRW).
- High energy costs.
- Vulnerability to the existing climate and climate variability.
- Inadequate storage capacity in many parishes to increase the reliable yield and to ensure that there is sufficient supply of water during the dry season.
- Lack of infrastructure to move water from the north draining basins to the south.

The National Water Sector Policy (2019) projects the achievement of universal access to potable water by 2030, in keeping with the Government's **Vision 2030 Jamaica - National Development Plan** goals. The Sector Plan for Water is one of 31 sector plans that would form the foundation for the development of Jamaica 2030 – a 21-year plan designed to put Jamaica in a position to achieve developed country status by 2030.

Principles and Goal of the Water Sector Policy

There are six (6) main principles guiding the Policy. These include: sustainability and intergenerational equity; efficiency; Integrated Water Resources Management (IWRM); universal access; responsiveness to gender and vulnerable groups; and stakeholder participation.

Following these principles, the goal of the Policy is to ensure that Jamaica's water resources are effectively managed so as to provide for our nation's social, economic, and environmental well-being, now and in the future.

The Policy sets new service targets and outlines improved arrangements for service delivery. In some chapters of the Policy, there is a situational analysis, which includes an analysis of strengths, weaknesses, opportunities, and threats (a SWOT Analysis). Strengths and weaknesses are evaluations of the current state of the issue. Opportunities are actions that can be taken to

improve services and management in the water sector, and threats are potential barriers to improvements.

Agencies with Responsibility for Implementing the Policy

The Ministry with portfolio responsibility for Water will oversee the implementation of this Policy, including monitoring and evaluating implementation.

Successful implementation of the Policy and Plan will require the participation of all key stakeholders in the sector, as their activities and inputs are crucial in the achievement of the policy goals.

Policy Measures

The GOJ's policies and strategies in the water sector are summarized below:

Integrated Water Resources Management

The goal of Integrated Water Resources Management (IWRM) is to "promote the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems."[7]

In order to achieve the IWRM goal, the GOJ will:

- Adopt an IWRM approach to managing water resources. This will include institutional co-ordination and stakeholder participation through IWRM Committees. The institutional framework for water resources management will be streamlined to meet the challenges of effective IWRM, and the roles and responsibilities of the different stakeholders will be clearly defined so as to ensure their participation.
- Review relevant existing policy and legislative provisions to remove potential duplications and omissions, and enable effective implementation.

Climate Change Adaptation and Mitigation

Jamaica's water sector is susceptible to multiple risks associated with climate change and climate variability. Climate change risks for Jamaica include changing rainfall levels and patterns, rising temperatures, and more intense hurricanes. The impacts of climate change will therefore require policy shifts. As such, the GOJ will ensure that:

[7] Global Water Partnership and Integrated Water Resources Management Framework, Jamaica. August 2002

- Agencies in the water sector limit greenhouse gas emissions by adopting economically viable energy efficient technologies, and by using renewable energy technologies where they are economically viable.
- Awareness is raised on water and climate change issues.
- Climate change considerations are mainstreamed into water resources management and decision making processes to enhance institutional capacities and to build resilience in the sector.

Energy Efficiency in the Water Sector

Energy efficiency is among the most promising initiatives for reducing greenhouse gas emissions, energy costs, and for seeing improvements in operational efficiencies in the provision of public water supply and irrigation services.

The GOJ will ensure that service providers in the sector adopt energy efficient technologies and techniques, and adopt regulations to reduce energy costs. Energy efficiency can also be increased by adequately maintaining infrastructure.

Private Participation in the Water Sector

The private sector is involved in the water sector through the provision of piped water supply, piped sewerage services, and irrigation services. In many cases, private sector involvement has been effective at increasing the speed of development and delivering essential services to Jamaicans. In other cases, there have been problems, because this development has come at the expense of other GOJ objectives. For example, some private service providers engage in 'cherry picking'—that is, providing piped water and sewerage services only in areas where it is economically viable, resulting in gaps in service provision. To prevent 'cherry picking', private service providers will be required to serve adjoining low-income communities and to charge a fee to ensure universal access. The rate to be paid will be determined by the OUR.

The Government's policy is to:

- Ensure that private participation in the water sector transforms decision making and accountability by aligning the interests of all parties, government and private, with the public interest.

Standards for Access to Potable Water Supply and Improved Sanitation

An improved water supply source is one that is safe for drinking, based on its construction or intervention to protect from contamination. An improved sanitation facility is one that hygienically separates human excreta from human contact. At present, 92 percent of Jamaicans have access to improved water sources and 83 percent have exclusive use of an improved sanitation facility.

The GOJ aims to ensure that all individuals across the island have access to potable water supply by 2030. This means that water supply will be safe, convenient, of sufficient quantity, reliable and affordable.

Cities and major towns will have sewerage services provided by a utility company. Where sewerage service is not possible, all households will have individual access to safe and environmentally friendly sanitation solutions.

Water Supply in Utility and Non-Utility Service Areas

The Policy divides the Country into Utility Service Areas (USAs) and Non-Utility Service Areas (NUSAs). USAs are parts of the country where piped water supply is the least-cost method of providing water, while NUSAs are parts of the country where piped water supply is not the least-cost method of providing water. Approximately 15 percent of Jamaicans live in Non-Utility Service Areas. Differences in environmental and infrastructural conditions in USAs and NUSAs create different obstacles to providing water supply in these two areas. To overcome these obstacles and achieve universal access to potable water, the GOJ will consider different technical solutions and institutional arrangements.

To enable universal access, Government-funded social programmes will assist vulnerable persons to pay for water to meet basic needs. The determination of eligibility will be based on a Beneficiary Identification System to support the provision of social water.

Drought Management

Over the past two (2) decades, the frequency and intensity of drought conditions have risen significantly, and below average rainfall levels across the island have resulted in more frequent water restrictions for domestic and agricultural use. The GOJ will ensure that an effective monitoring programme is in place to provide long term planning and the development of plans and programmes to combat the effects of drought conditions, especially in vulnerable communities and the agricultural sector.

Demand-side water management approaches will be employed, where households will be encouraged to use water efficiently. To curtail water losses and reduce Non-Revenue Water (NRW), the GOJ will:

- Intensify the programme of leak detection and repairs, by strengthening the capability of the regions and assuming a more proactive approach to leak repairs.
- Introduce better monitoring and control systems to reduce overflow and other losses at storage facilities and treatment plants.

Rainwater Harvesting

Fifteen (15) percent of households, including 31 percent of households in NUSAs, use rainwater harvesting as their main source of water supply. However, variations in rainfall levels across the country would suggest that rainwater harvesting may not always be the most reliable option.
The GOJ will:

- Promote rainwater harvesting for households in areas with adequate rainfall and where groundwater and surface sources are inadequate.
- Promote the rehabilitation and maintenance of community catchment tanks, where Municipal Corporations, Local Authorities, or the communities themselves wish to take on the responsibility of maintaining these systems. Water supply from rainwater harvesting will be treated or filtered to meet MOH and WHO standards before it is consumed.

Rainwater harvesting systems that are used as a primary source for household or community water supply will be designed to deliver the most optimal volumes of water. A reliable backup supply, such as trucking, may be necessary.

Wastewater Management in Utility and Non-Utility Service Areas

Eighty-three (83) percent of all Jamaicans have exclusive access to improved sanitation facilities. However, only 22 percent of the population is connected to a sewerage network. Effluent from sewage treatment plants, other types of sanitation facilities, and industrial discharge, pollute the environment and endanger people's health.

The GOJ's policy is that all households will have access to improved sanitation facilities that protect the health of users, community members and the environment by 2030. Different technical solutions and institutional arrangements will be recommended to provide safe sanitation services in USAs and NUSAs.

Irrigation Services

Irrigated agriculture in Jamaica consumes a significant portion of ground and surface water resources and contributes to agricultural production across the country. It contributes about 50 per cent of the national food production and has played a major role in generating employment opportunities in rural areas and providing for the rural poor. Irrigated agriculture also plays an important role as a significant contributor to GDP, rural development, the economies of farm families and rural communities.

By adopting international best practices in irrigation and by continuing to explore diverse financing arrangements for new schemes, irrigation services will be expanded to reach more farmers, while subsidies are reduced.

Flood Water Control and Drainage

Throughout the years, the country has experienced vast destruction of property and infrastructure as a result of rainfall induced flooding. Numerous elements have been cited as major contributing factors to this situation, among which are the lack of integrated and forward planning for adequate drainage networks throughout the island and the lack of maintenance of existing drains and gullies.

The GOJ's policy is to ensure that flood waters are so managed that the risk to loss of life is zero and for property damage, as minimal as possible.

Monitoring and Evaluation

The Water Policy and Monitoring Branch in the Ministry with portfolio responsibility for Water will monitor and evaluate the implementation of this Policy. This process will be mainstreamed into the corporate planning cycle.

	Inputs	Outputs		Outcomes – Impact		
Situation	**What We Invest**	**What We Do**	**Who We Reach**	**Short Term Results**	**Medium Term Goals**	**Ultimate Impacts**
The access, reliability and efficiency of the water services need to be improved, particularly in rural areas. **Conditional Priorities** Improving institutional arrangements for Integrated Water Resources Management (IWRM) Increasing private sector partnership Ensuring effective management of water supply in utility and non-utility service areas Improving efficiency in the management of wastewater Harnessing sufficient water for food security Providing proper management of rain and storm water run-off and floodwater control	**Financing** - Options for funding and fiscal space for the implementation of projects in utility and non-utility service areas - Funding of social programmes that will assist vulnerable groups - Grant funding to individuals to meet infrastructure cost for rainwater harvesting - Low interest loans and cost-sharing grants for community organizations and parish councils to rehabilitate community water supply systems **Technology/Infrastructure** - Adopting economically viable energy efficient technologies, such as renewable energy technology - Extension of piped networks in Utility Service Areas - Utilizing Rainwater Harvesting Systems - Designing and operating water supply and sanitation infrastructure - Utilizing spring entombments and small piped gravity-fed systems **Research** - Physical assessment to confirm the feasibility of proposed priority projects **Institutional Strengthening & Expertise** - Engineers to design infrastructure - Ministry with portfolio responsibility for Water to monitor and evaluate - NWC / RWSL / NIC to manage & maintain systems - Integrated Water Resources Management Committees - Community development officers will work with the various communities in the implementation of the development strategy **Time** - Time to implement the Policy 2017-2030 – Bi-annual Monitoring Report	Provide protection for watersheds and prevent point sources of pollution Limit greenhouse gas emissions by adopting economically viable technologies Encourage private participation in delivering water related services Provide technical assistance to communities to build and maintain water supply and sanitation infrastructure Conduct workshops and meetings Preserve water infrastructure and services Implement projects selected for particular parishes Ensure that effluent from on-site sanitation facilities does not pollute the environment and endanger public health Regulate the abstraction of groundwater	Individuals, businesses, and civic society will all have the opportunity to participate in the decision making process Private citizens and marginalized groups such as women and children Farmers and manufacturers Integrated Water Resources Management Committees Ministries with responsibility for Health, Agriculture, Local Government, Works, Finance, Municipal Corporations and Agencies	**Learning** The public will be aware of the modalities for the provision of safe and clean water in utility and non-utility service areas Communities will be knowledgeable of: - The impact Climate Change has on water supply - Jamaica's water resources Continuation of research and development to achieve continuous improvement in technologies and operational efficiencies in water, sanitation and wastewater systems Rural Water Supply Limited will assist the communities to organize and to do its part of the work	**Actions** Promotion of economic development and food security Adoption of the IWRM approach to manage water resources Development of a National Water Supply Plan Financing arrangements for new water supply, wastewater and irrigation services Prevention of point sources of pollution Encouraging re-use of wastewater **Behavior** - Changing local behavior in conservation practices thereby increasing efficiency in the use of water - Protecting watersheds - Preventing point source and run-off pollution - Greater use of technology to provide clean and safe water - The practice of rain water harvesting **Plans/Policies/Legislations** - Sanitation and Watershed Policy, Drought Management Plan and Flood Control Master Plan to be approved. - Development and adoption of Rainwater Harvesting guidelines - Adaptation of regulations that will promote efficient use of energy - Amendment to the WRA Act and the Floodwater Control Act	**Conditions** Jamaica's water resources will be effectively managed, so as to provide for the nation's social, economic and environmental well-being Jamaica will re-use treated wastewater for agricultural and industrial/commercial purposes where it is safe and economical Infrastructure and services in the water sector will be maintained Everyone will have reliable, safe and affordable potable water by 2030 Cities and major towns will have access to sewerage services by 2030
	Assumptions Assumptions reflect the components that are necessary for the Policy to achieve the desired outcomes			**External Factors** Factors (over which we have little control) such as limited resources, economic instability, climate change impacts and negative public sentiment may adversely affect projected outcomes		

Figure 1.1: Logic Model

1 Introduction

1.1 Background

The initial Water Sector Policy Strategies and Action Plan, which was promulgated in 2000, provided an assessment of the sector and its Agencies, the constraints facing the sector, and the financial resources necessary, to provide universal access to potable water to Jamaicans. A full review of the implementation of the Policy was completed in 2004, which resulted in a revised Policy document. The main constraints to implementation identified from the review, included inadequate financing, difficulty financing social water, inadequate maintenance of infrastructure, and insufficient monitoring and evaluation. Given the constraints identified, the timeline for the implementation of the Policy aim to provide universal access by 2005 was moved to 2010.

This Policy provides an update to the 2004 Water Sector Policy Strategies and Action Plan. It outlines the current situation in the water and wastewater sector, and the principles, objectives and policy directions for the management of the country's water resources in keeping with ***Vision 2030 Jamaica—National Development Plan***. The Sector Plan for Water is one of 31 sector plans that would form the foundation for the development of Jamaica 2030 – a 21-year plan designed to put Jamaica in a position to achieve developed country status by 2030. It is premised on a vision shared by key stakeholders in the water sector (both in the public and private sector), and state the important roles they collectively play in shaping the planning process to 2030. The Plan is being implemented through a series of Medium Term Socio-Economic Policy Frameworks (MTFs), which identify the priority outcomes, strategies and actions for each three-year period from 2009 to 2030. National Outcomes number 9 and 13 specifically speak to strategies to develop infrastructure for the sustainable supply of water and the promotion of sustainable management and use of water resources, respectively.

Many key principles in the revised Policy remain the same, namely, universal access, financial self-sufficiency of providers, diversity of public and community provision and encouraging private sector participation in service delivery. Major additions include a strong commitment to Integrated Water Resources Management (IWRM) and efforts to ensure that the sector adapts to climate change and is resilient to climate variability. A major shift in this Policy is a move away from dividing the country into Rural and Urban areas to Utility and Non-Utility Service Areas.

The Policy sets new service targets and outlines improved arrangements for service delivery. In some chapters of the Policy, there is an analysis of strengths, weaknesses, opportunities, and threats (a SWOT Analysis). Strengths and weaknesses are evaluations of the current state of the issue. Opportunities are actions that can be taken to improve services and management in the water sector, and threats are potential barriers to improvements.

1.2 A Vision for the Water Sector

The GOJ's vision for the management of the water resources is guided by the GOJ's ***Vision 2030 Jamaica—National Development Plan.*** The National Vision is stated as "Jamaica, the place of choice to live, work, raise families and do business". This Policy recognizes the critical role that water resources play in the realization of this Vision and will therefore seek to manage the resources in a sustainable and integrated way.

Vision Statement for the Water Sector Policy

The water resources is managed in a sustainable and integrated manner so as to facilitate the population having universal access to potable water and adequate sanitation by 2030.

1.3 Principles Guiding the Water Sector Policy

Access to water is an essential ingredient to the quality of people's life. Water will be available in the quantity, quality, and in a reliable manner that will sustain life and enable the population to maintain their livelihoods. Additionally, environmental standards must be observed in the treatment and disposal of water-related waste to protect the resource itself and the integrity of the ecosystems, in general.

The Principles guiding the Policy are:

1. **Sustainability and Intergenerational Equity:** Water is the foundation of sustainable development and is critical for socio-economic development, healthy ecosystems and for human survival. Water sustainability will mean that water resources and water services are able to satisfy the changing demand placed on them, now and into the future. Intergenerational equity enables government and other stakeholders to build mutual trust in the development, conservation, and use of water resources. It should permit present generations to use natural resources today, but not at the expense of future generations.

2. **Efficiency:** Water is an economic resource, and water service provision is costly, so services in the water sector must be delivered efficiently, and should be self-financing.

3. **Integrated Water Resources Management:** Integrated Water Resources Management (IWRM) is the coordinated development and management of water, land and related resources in order to maximize economic and social welfare without compromising the sustainability of ecosystems and the environment (Global Water Partnership [GWP], 2000). The relevant policies and strategies are to be unified in order to optimize synergies in the use of natural, physical, human and financial resources and to build resilience to climate change.

4. **Universal Access:** Access to safe water and sanitation is a basic human necessity. Access to safe water must be convenient, reliable, affordable and at established international standards for quantity and quality. No one should go without basic water and sanitation because of an inability to pay. All residents and visitors should have access to water and related services at the standards necessary for maintaining healthy lives, growing our economy, and enhancing prosperity.

5. **Responsiveness to Gender and Vulnerable Groups:** Access to water is differentiated according to gender and class. It is most often women and children who have to walk long distances in order to obtain the water they need for domestic use, while some men carry water for farming purposes. The distance travelled and the time consumed to access water, can be a hindrance to increased productivity and can expose women and children to danger. Gender is to be mainstreamed in all policies, programmes and projects in the water sector. Gender-responsive approaches should be considered in the design of potable water systems and sanitation and wastewater solutions, so that individuals who are vulnerable, including the aged, youth and the disabled, are treated equitably. These approaches should include capacity enhancement of men and women, for the effective, efficient, and equitable solutions to the challenges of water resources management and development.

6. **Stakeholder Participation:** Everyone should have a voice in how the water resources are managed. Various participatory mechanisms are to be used to facilitate stakeholder involvement in the integrated planning, decision making, implementation and monitoring in water resources management.

1.4 The Goal and Objectives of the Water Sector Policy

The GOJ is committed to ensuring that the objectives of the Water Sector are anchored within the ***Vision 2030—National Development Plan***. The Water Sector Policy focuses on the IWRM approach, and the mainstreaming of Climate adaptation initiatives and participatory processes in the sector. This section sets out the goal and objectives of the Policy.

Goal of the Water Sector Policy

To ensure that Jamaica's water resources are effectively managed so as to provide for our nation's social, economic, and environmental well-being, now and in the future.

Objectives of the Water Sector Policy

1. To improve institutional arrangements for integrated water resources management.
2. To protect watershed areas, ecosystems, catchments and networks, and promote effective programmes for water conservation and protection.
3. To include research, adaptation and implementation of scientific and technological innovation to sustain ecosystems services of water.
4. To put in place the policy, programmes and physical structures for climate adaptation and energy efficiency in the water sector.
5. To allow for private sector participation in the water sector.
6. To facilitate and increase investments in the water sector.
7. To ensure economic efficiency by considering pricing and other economic incentives.
8. To effectively manage water supply in Utility and Non-Utility Service Areas by ensuring equitable sharing of the water resources in the twenty-six (26) Watershed Management Units (WMUs).
9. To increase resilience to climatic shocks, such as drought.
10. To encourage rainwater harvesting, both as a primary source of access and as a drought management mechanism.
11. To ensure effective management of wastewater.
12. To provide sufficient water for achieving food security by improving irrigation services.
13. To ensure effective flood water control.

1.5 Institutional Arrangements

The Ministry with portfolio responsibility for Water will oversee the implementation of this Policy, by monitoring and evaluating its execution. Table 1.1 shows the responsibilities other GOJ Agencies and private sector entities have for a range of functions including, service provision, policy making and regulation. Households and communities also have important roles in providing water supply and sanitation for their own use.

Table 1.1: Entities with Responsibilities for Implementing the Water Sector Policy

Agency	Responsibility
Overall Implementation	
Ministry with portfolio responsibility for Water	Implement the Policy nationwide by coordinating Agencies' efforts. The Ministry with portfolio responsibility for Water will also monitor and evaluate implementation efforts.
Other Ministries, Departments and Agencies (MDAs) with policy making and coordinating responsibilities	
Ministry with portfolio responsibility for Agriculture	Coordinate implementation of irrigation services
Climate Change Division	Monitor and coordinate national climate change adaptation efforts, including in the water sector
Ministry of Local Government	Manage minor water supplies, water shops and community catchment tanks
Ministry of Finance and the Public Service	Ensure efficient allocation and facilitate mobilization of financial resources
Cabinet Office	Provide policy directives on major national and sectoral policies
Forestry Department	Protect the forests and forest watersheds on crown lands managed by the Agency
Office of Disaster Preparedness & Emergency Management (ODPEM)	Provide disaster management, to include drought and major meteorological events
Service Providers	
National Water Commission (NWC)	Provide piped water supply in all areas where it is economical to do so, and provide piped sewerage services in all major towns
Rural Water Supply Ltd. (RWSL)	Provide technical assistance to households and communities in rural areas and to build and maintain water supply and sanitation infrastructure
National Irrigation Commission (NIC)	Provide irrigation services
National Works Agency (NWA)	Provide flood water control services around roads, settlements and agricultural lands
Municipal Corporations and Local Authorities	Provide water supply to the public, by operating and maintaining local systems
National Solid Waste Management Authority (NSWMA)	Manage solid waste islandwide
Private Providers	Provide water supply, sanitation, and irrigation services
Regulators	
Water Resources Authority (WRA)	Regulate abstraction of groundwater, use of surface water, and coordinate integrated water resources management. The WRA will also lead the establishment of IWRM Committees in each hydrological basin, along with the NEPA.
National Environment and Planning Agency (NEPA)	Responsibility for conservation, protection and proper use of land, water and other resources, and sets standards for treating and discharging effluent, along with the Ministry of Health.
Ministry of Health (MOH)	Set and monitor standards for potable water supply,

Agency	Responsibility
	sanitation facilities and recreational bathing waters.
Office of Utilities Regulation (OUR)	Set tariffs and regulate service standards for providers of piped water supply and sewerage systems, as well as, recommend licensees, providing policy advice and dispute resolution

2 Situational Analysis

Jamaica's water resources consist of groundwater, captured in both limestone and alluvial aquifers, and surface water from rivers and streams. According to the Water Resources Authority (WRA), average annual rainfall is reported as 21,526 Million Cubic Metres per year (MCM/y). Of this amount, 50 percent (10,703 MCM/y) is lost to evapotranspiration and the remainder or 'effective rainfall' is distributed in approximately equal proportions (25 percent each) as surface water (5,351 MCM/y) and groundwater (5,472 MCM/y). The limestone aquifer captures 97 percent (5,330 MCM/y) of the groundwater and alluvial aquifers three (3) percent (142 MCM/y). The limestone and alluvium aquifers provide 84 percent of Jamaica's freshwater resources, while the remaining 16 percent is provided by surface water. Approximately 25 percent of the water abstracted is used to meet the demand for potable water and the remaining 75 percent is used for irrigation. The water usage is reported as 1512 MCM/y.

The exploitable water resource is estimated at 3930 MCM/y or six (6) percent of the effective rainfall. It is twice the current total demand of 1813 MCM/y (which includes environmental demands), hence is more than adequate to meet all demands.

In 2010, the volume of water resources allocated for industrial and domestic use amounted to 1203.0 MCM and the demand was 910.2 MCM, implying that there is an over-allocation of 292.8 MCM. Of note, is that a portion of the surface water is not exploitable, as flows of 902.6 MCM/y should to be left in the rivers to meet ecological demands. Therefore, the proportion of total exploitable water resources that represented consumption (i.e. demand) in 2010 was 23.2 percent (NEPA, 2011).

Although the current and future demands for water is greatest in the basins along the south coast of the island, most of the available water resources are located within the basins on the northern side of the island. This is because most of the irrigated areas, urban centres and major industries are located on the southern side of the country.

2.1 Access to Water and Sanitation

The National Water Commission (NWC) is the main provider of potable water and sewerage services island-wide. In addition, the Local Government Authority, through the Municipal Corporations, provide potable water in most rural areas, using entombed springs, rainwater catchments and wayside tanks. Private utility providers of water, as well as some private entities, account for only a small portion of potable water produced.

Approximately 70 percent of Jamaica's population is supplied via house connections from the NWC and the remaining 30 percent obtain water from standpipes, water trucks, wayside

tanks, community catchment tanks, rainwater catchment tanks and direct access to rivers and streams. About 30 percent of the population is served by sewerage facilities operated by the NWC. This includes some small sewerage systems, utilizing package plants, which are associated with housing developments in various locations throughout the country. The disposal of the sewage generated in the remainder of the population is by means of various types of on-site systems such as septic tanks, soak-away pits, tile fields, pit latrines or other systems operated by private entities.

According to the 2011 Population Census, 73 percent of households had access to piped water. The majority (56 percent) of which had water piped into the dwelling unit; 16 percent had water piped into the yard, and seven (7) percent received water from a public standpipe. Catchment tanks were the main source of water for 12 percent of households; three (3) percent obtained water from springs or rivers, while trucked water was the main source of water for two (2) percent.

Piped water was the most common source of drinking water for all regions, with the Kingston Metropolitan Area (KMA) having 94 percent access and Other Towns 79 percent. Rural Areas continued to lag in access to piped water, accounting for 47 percent (PIOJ, 2017). Some rural communities obtained their water from minor water supply systems, which consisted of rainwater catchments; wayside tanks filled by water trucks and entombed springs. Most of the entombed springs and rainwater catchments are aged and have not been upgraded to meet the growing needs of the communities they serve.

Public water sources include River/Spring/Pond and Public Standpipe. The use of these sources, and the distance travelled to access them, are often indicative of consumption status and environmental health. Overall, 11 percent of households used a public water source as their main source of drinking water, most of whom used standpipes. Of the total households accessing water from a public source, one third travelled 500 metres or more to obtain water, including 26 percent travelling over 1000 metres, the majority of whom are usually women and children (PIOJ, 2017).

In 2015, there was universal access to an improved sanitation facility. Exclusive use was reported by 82.8 per cent of households. Water closet (77.7 per cent) remained the predominant improved sanitation facility reported, with 20.4 per cent of these connected to a sewerage network. Over the period 2006–2015, the percentage of households reporting connection to a sewerage network remained below 30.0 per cent. About 55 per cent of the households with water closet in the KMA were connected to a sewerage network, compared with 7.9 per cent and 2.5 per cent in Other Towns and Rural Areas, respectively (PIOJ, 2017). The low percentage of households linked to a sewerage system suggests a high use of soil absorption systems. The use of such systems has resulted in the pollution of ground and surface water sources, threatening drinking water sources, especially in densely populated urban areas, as well as in rural areas which are most dependent on unimproved water sources.

2.2 Challenges in the Water Sector

Several problems affect water supply reliability in Jamaica. These include:

- High levels of Non-Revenue Water (NRW) – water that is collected, treated and supplied, but is either wasted due to aging infrastructure or stolen and, therefore, earns no revenue for the NWC or the Government. In the KMA, for example, water theft and widespread illegal connections have limited the revenue earnings for the NWC, and NRW has remained one of the more pressing issues affecting the water service delivery system. As a result, NRW is estimated (due to inadequate metering) to be approximately 65 percent. Similarly, within the irrigated water sector, the largest consumptive user of water in Jamaica, losses in irrigation water are approximately 40 percent.
- High energy consumption - The NWC's energy consumption is high and is approximately 30 percent of total operating costs. The energy/water nexus is a critical one, and these two resources are inextricably and reciprocally linked. The production of energy requires large volumes of water, while the treatment and distribution of water is equally dependent upon readily available low-cost energy.
- Inadequate storage capacity - Many parishes require additional storage to increase the reliable yield, and to ensure that there is sufficient supply of water during the dry season.
- Inadequate infrastructure – Distribution pipelines to move water to the areas where it is needed are inadequate in some parts of the country.

Water supply within the Kingston Metropolitan Area (KMA) is maintained by flows from the Hope, Yallahs/Negro, Moresham, Boar and Wagwater Rivers. During extended dry periods/drought conditions, the KMA experiences water shortages. Implementing rationing, through lock-offs, has been one of the methods utilized by the NWC during periods of scarcity. The severity of these events may be exacerbated by poorly maintained and operated infrastructure, which may not allow the full potential of these sources to be used, even under drought conditions. This situation is unfortunately repeated in other parts of the island.

The water sector is also vulnerable to the existing climate and climate variability. The impacts of climate change on water availability and water quality will affect many sectors, including energy production, infrastructure, human health, agriculture and ecosystems. Changes in weather patterns will affect water supply, resulting in less rain to supply the reservoirs.

Sea level is projected to rise by between 0.18m and 0.59m by the 2090s (IPCC, 2007). Other projections have estimated up to 1.4m over the same period. This increase, with the likely increase in the severity of hurricanes and tropical storms, will lead to an increase in potential storm surge elevations, thus putting the population at risk from coastal flooding. Given the

coastal location of many of Jamaica's wells, sea level rise will increase the vulnerability of these wells to saline intrusion and thus reduce water quality.

Approximately 10 percent of surface water quality and groundwater quality have been negatively affected by poor waste management practices, including inadequate treatment and disposal from domestic, industrial and commercial activities. Nutrient and faecal pollution are major issues that affect the island's ground and surface water resources. Groundwater pollution includes:

- Nitrate contamination of the Liguanea alluvium aquifer, through the use of absorption pits and poorly built and/or maintained septic tanks for sewage disposal;
- Leaching and occasional flood washout from pit latrines in the flood prone areas of the island;
- Discharge of industrial effluent from bauxite/alumina operations into unsealed mined out limestone pits;
- Discharge of dunder from rum distilleries into sinkholes; and
- Over pumping of coastal aquifers, leading to declining groundwater elevations, and increasing saline intrusion.

The island is divided into 26 Watershed Management Units (WMUs), which contain over 100 streams and rivers. These WMUs are essentially composites of river basins that fall within 10 hydrological basins. Four (4) of the 26 WMUs are considered severely degraded and affect both the quantity and quality of underground and surface water sources.

In recent years, deforestation has led to the deterioration of more than a third of Jamaica's watersheds, significantly affecting the government's ability to supply reliable and good quality water to some areas across the island. Deforestation and increased turbidity of streams are a major cause and indicator of watershed degradation. Loss of forest cover has had severe impacts on low-lying areas resulting in an increase in sedimentation, rapid runoff, flooding and altering of river courses. The rapid runoff reduces the infiltration into the aquifers, leading to a reduction in recharge and available water resources (NEPA, 2011).

Technocrats in the water sector, therefore, have to make difficult decisions on water allocation, as they have to apportion diminishing supplies among ever-increasing demands. The traditional fragmented approach is no longer viable and a more holistic approach to water management is essential. This is the rationale for the Integrated Water Resources Management (IWRM) approach that has now been accepted internationally as the way forward for efficient, equitable and the sustainable management of the island's water resources.

Table 2.1: SWOT Analysis of the Jamaican Water Sector

Strengths	Weaknesses
Service Quality ▪ Ninety-two (92) percent of Jamaicans have access to improved sources of drinking water—96 percent of urban residents, and 88 percent of rural residents. ▪ Eighty-three (83) percent of Jamaicans have exclusive access to various modes of improved sanitation facilities. This includes 81 percent of urban residents and 87 percent of rural residents. ▪ Services are generally affordable. Institutional ▪ The Ministry with portfolio responsibility for Water provides clear policy guidelines and coordinated oversight of the sector. ▪ The OUR is an independent regulator with a clear mandate to set tariffs and regulate service standards for providers of piped water supply and sewerage systems, as well as, recommending licences, providing policy advice and dispute resolution. ▪ The Ministry of Health sets and monitors standards for potable water supply, sanitation facilities and recreational bathing waters. ▪ The WRA has a clear mandate to manage water resources ▪ Where they exist, Private Service Providers deliver quality service at affordable prices. ▪ NEPA provides a regulatory framework for the construction and operation of sewage trade effluent facilities, as well as the discharge of effluent; and generally protects Jamaica's physical environment	Service Quality ▪ Eight (8) percent of Jamaicans (13 percent in rural areas) get water from unimproved sources ▪ Public water sources are often far away from homes. Twenty-seven (27) percent of those who obtain water from standpipes in rural areas and towns outside the KMA have to walk more than 500 metres. ▪ The piped water supply and sewerage systems only reach 70 percent and 22 percent of Jamaicans, respectively. ▪ Irrigation methods do not always conform to international best practices, and irrigation is not available in all areas where it would be economical. ▪ Inadequate resilience to climate variability leads to gaps in service delivery. ▪ Inadequate storage capacity and constraints on existing storage. ▪ Inadequate flood water control measures affect roads, settlements, agriculture, water facilities. ▪ Absence of regulation governing drinking water quality ▪ Non-Compliance to existing drinking water guidelines in some areas Institutional ▪ Inadequate focus on maintenance. Assets fail before design life. Non-revenue water is 65 percent for the NWC. ▪ Inadequate cost recovery by the NWC and the NIC. ▪ Limited legislative enforcement provisions by the OUR. ▪ Freshwater resources are not distributed evenly, spatially, and temporally, creating local and regional shortages.
Opportunities	**Threats**
▪ Freshwater is abundant—77 percent of the safe yield is not used. ▪ Shared understanding of service gaps and necessary institutional improvements. ▪ A credible regulator and overall commitment to cost recovery gives Jamaica the potential to fund expansion and improve maintenance of service networks by increasing cost recovery. ▪ IMF backing of GOJ's economic program increases investor confidence. ▪ National commitment to increase resilience to climate change. ▪ The role of private providers can be expanded to improve performance in the water sector. ▪ Rainwater harvesting and flood water retention can increase storage of fresh water. ▪ The low penetration of sewerage infrastructure can attract joint venture and other types of investments.	▪ Climate change could increase external threats to the water sector, especially in the form of: – More frequent droughts – More frequent flooding – More intense hurricanes – Sea level rise and salt water intrusion – Earthquakes ▪ Rising energy costs. ▪ Central and Local Government budget cannot allocate funding to improve services in the water sector because of fiscal constraints. ▪ Assets at risk due to physical security environment.

2.3 Legal Framework in the Water Sector

Currently, there is no industry specific legislation to address the changing future of the Jamaican water industry. However, the sector is governed by the following Legislations and Regulations:

- *Parishes Water Supply Act (1889)* - permits Municipal Corporations to supply water, but does not require them to do so. The Act also allows Municipal Corporations to enter into contracts with independent persons to supply water.
- *Irrigation Act (1949, and amendments)* - allows the GOJ to license an Irrigation Authority as the owner and operator of all public irrigation works. The National Irrigation Commission (NIC) is licensed as the Irrigation Authority under the Act.
- *Flood-Water Control Act (1958)* - gives responsibility for the construction, improvement, repair, and maintenance of works for flood water control. This responsibility is fragmented among a number of agencies.
- *Town and Country Planning Act (1958)* – This Act facilitates the preparation of Development Orders in urban and rural areas. The main objects are: development control; secure sanitation conditions; protect and extend amenities; and conserve and develop amenities.
- *National Water Commission Act (1963, and amendments)* - creates and governs the National Water Commission (NWC). The NWC is the primary provider of potable water supply and also owns and operates wastewater services.
- *Watershed Protection Act (1963)* – Under this Act, the NRCA is responsible for ensuring the proper, efficient and economic utilization of land in watershed areas with a view to promoting the conservation of water resources.
- *Public Health Act (1985)* - sets national standards for the collection and disposal of waste material and assigns the responsibility for monitoring and enforcing these standards to the MOH. The MOH is the primary regulator of drinking water quality.
- *Natural Resources Conservation Authority Act (1991)* – The Act binds the Crown. It provides for a system of permits and licences which assist the NRCA to carry out its functions as set out in section 4 of the Act.
- *Water Resources Act (1995)* - establishes the Water Resources Authority (WRA) to regulate, allocate, conserve and manage water resources. The Act governs the abstraction and use of natural water resources.
- *Office of Utilities Regulation Act (1995) as amended by the Office of Utilities Regulation (amendment) Act (2015)* - creates the Office of Utilities Regulation (OUR) and gives it permission to regulate water supply and sewerage, among other utility services. The Act empowers the OUR to issue licences and determine and monitor service charges, rates, or other fees payable by consumers for utility services.
- *Public Bodies Management and Accountability Act (2001)* - sets out the financial accountability and reporting standards that public bodies must meet. It also sets out processes for auditing public bodies.

2.4 Linkages with Other Policies and Plans

The following policies and plans are inter-linked with the objectives of the National Water Sector Policy:

2.4.1 Vision 2030 Jamaica - National Development Plan

Vision 2030 Jamaica - National Development Plan sets out the national vision that Jamaica will be the "place of choice to live, work, raise families, and do business" by 2030. Achieving this vision includes four national goals:

- Jamaicans are empowered to meet their fullest potential;
- Jamaican society is secure, cohesive and just;
- Jamaica's economy is prosperous; and
- Jamaica has a healthy national environment.

The Plan also specifies objectives for the water sector. The Water Sector Policy will help realize all four national goals. Reliable services for all will help empower Jamaicans to meet their fullest potential, and will also bring about a more just society. Reliable services are also needed to ensure a prosperous economy. Finally, the Water Sector Policy sets out ways to conserve our natural environment and its water resources, even in the face of the global challenge of climate change.

2.4.2 The 2009-2030 Water Sector Plan

The 2009-2030 Water Sector Plan is part of Vision 2030. The Plan's vision is for "Integrated and sustainable water resources management and development; adequate and safe water supply and sanitation sewage to support the social and economic development of Jamaica."

The Plan outlines an updated Implementation Framework and Long-Term Action Plan for the sector to reach its vision statement. The targeted outcomes to reach this goal are outlined in the Long-Term Action Plan as:

- All water and sewage needs are met using modalities that are safe and sustainable;
- Capabilities to address hazards and climate change are improved;
- Stakeholders participate in the planning and managing of the development and use of the island's water resources;
- Capacity enhanced to effectively plan and manage the development and use of the island's water resources; and
- The financial base for future water and sewage needs to be strengthened.

Two key actions identified in the Plan are to:

- Develop and implement a National Water Resources Master Plan; and
- Update the previous Water Sector Policy (2004). This is accomplished through this updated Water Sector Policy.

2.4.3 Medium Term Socio-Economic Policy Framework (MTF) 2015-2018

The MTF 2015-2018 is designed to support the attainment of the country's national goals and outcomes as outlined in the country's national development plans - Vision 2030 Jamaica. The four Medium Term Themes to be addressed under MTF 2015-2018 are:

- Development and Protection of Human Capital;
- National Security and Justice;
- Economic Stability, Growth and Employment; and
- Environmental Sustainability and Climate Change Response.

A range of issues and challenges still remain and need to be addressed to improve the state of the country's natural environment. Some of these include:

- Inadequate management of protected areas, other ecosystems and biodiversity;
- Conflicting socio-economic policies, that cause a negative impact on the natural environment;
- Increasing threats of climate change and climate variability;
- Insufficient integration of environment, social and economic issues at the national level;
- Increasing amounts of land based sources of pollution; and
- Insufficient environmental baseline data/information to support effective analysis and assessment of existing status and efficient management of environmental resources.

The MTF 2015-2018 therefore outlines a package of priorities designed to improve the state of the natural environment, thereby contributing to reduced vulnerabilities and advancing socio-economic development, and will focus on a number of key areas such as:

- Improving the governance structures for waste management;
- developing the frameworks to address unregulated sources of pollution;
- Increasing public awareness and education on environmental issues;
- Increasing the participation of NGOs, CBOs and school groups, and forging partnerships to advance environmental awareness;
- Improving environmental data collection including the frequency of data collection to better guide policy decisions;
- Enhancing private sector involvement in environmental management; and
- Enhancing climate resilience across economic sectors.

2.4.4 National Forest Policy (2016)

The National Forest Policy sets out primary goals and priorities pertaining to the conservation and protection of forests and the sustainable management of forest lands and watersheds. The Forestry Department has the responsibility to protect and preserve Forest Reserves and Forest Management Areas in the upper watersheds around water sources.

The Policy recognises the need for the Forestry Department to work in close collaboration with the relevant water sector agencies to:

- Continue to manage Forest Reserves and Forest Management Areas in upper watersheds in and around water sources across the island;
- Work with the Water Resources Authority to focus on using the best available tools to identify, map, and assess the condition of land around water sources and the banks of major rivers for reforestation potential;
- Work with the National Water Commission and other relevant agencies to prioritise rehabilitation of forests, which are degraded but important for the protection of water sources, and assess the various interventions that can be utilized to protect these areas; and
- Liaise with the National Water Commission, National Environment and Planning Agency and the Water Resources Authority and other relevant agencies to share financial, management, and implementation costs for replanting of degraded watersheds which are near to and surround water sources.

2.4.5 Draft Watershed Policy for Jamaica (2003)

The overall goal of this Policy is to promote an integrated approach to protection, conservation and development of land and water resources for their sustainable use and for the benefit of the nation as a whole. It gives an overview of watershed problems, past interventions and highlights major challenges to be faced in watershed management, as well as key principles and strategies being employed to address these challenges.

2.4.6 National Land Policy (1996)

The goals and objectives of this Policy are to ensure the sustainable, productive and equitable development, use and management of the country's natural resources. The policy identifies the implementation of sustainable strategies, projects and programmes for the use of land resources in Jamaica's agenda for social and economic development.

The Policy acknowledges the important nexus between land use policies and water resource management and identifies the following among the issues affecting watersheds:

(a) The need to preserve and re-afforest watersheds, in particular, the upper watersheds, to ensure recharging of aquifers and to control water flows to reduce problems, such as flooding and turbidity;
(b) Severe watershed degradation;
(c) The lack of a national plan to manage watersheds; and
(d) The lack of adequate co-ordinated efforts to manage watersheds, forests and protected areas.

Policy statements and strategies outlined are consistent with the goals and objectives of the Watershed Policy, which is currently being reviewed.

2.4.7 Agricultural Sector Plan (2009)

Agriculture is the major user of the island's water resources, accounting for 75 percent of annual water consumption, compared to 15 percent for urban domestic water supply, and 10 percent for other uses, including industrial use, rural domestic water supply and tourism. Additionally, approximately 25,000 hectares, or 10 percent of cultivated lands are currently irrigated. Of these irrigated lands, 50 percent is served by public irrigation systems managed by the NIC; the other half are on commercial estates, such as banana, papaya and sugarcane, as well as individual private systems.

The Sector Plan for Agriculture is one of the strategic priority areas of the ***Vision 2030 Jamaica - National Development Plan***. The Agriculture Sector Plan seeks to transform the Jamaican agricultural sector through a sustained, research-oriented, technological, market-driven and private sector-led revolution, which revitalizes rural communities and creates strong linkages with other sectors. The plan recognizes that the widespread application of modern technology outside the traditional export agriculture has been limited. However, efficient and competitive commercial agriculture will require the systematic application of modern technology in all areas of agricultural production including crop development, disease control, irrigation, crop/land yields, security, farm management and marketing. As such, successful practices will be adapted to the Jamaican condition; for example, hydroponics and other water management systems that are not dependent on seasonal rainfall.

2.4.8 Climate Change Policy Framework and Action Plan (2015)

The Climate Change Policy Framework and Action Plan is intended primarily to support the goals of ***Vision 2030*** by reducing the risks posed by climate change to all of Jamaica's sectors and development goals. It outlines the strategies that the country will employ in order to effectively respond to the impacts and challenges of climate change, through measures which are appropriate for varying scales and magnitudes of climate change impacts.

The specific objectives are to:

I. Mainstream climate change considerations into sectoral and financial planning, and build the capacity of sectors to develop and implement their own climate change adaptation and mitigation plans;
II. Support the institutions responsible for research and data collection at the national level on climate change impacts to Jamaica, to improve decision-making and prioritisation of sectoral action planning; and
III. Improve communication of climate change impacts so that decision makers and the general public will be better informed.

2.4.9 National Energy Policy (2009)

The National Energy Policy includes goals for energy conservation and efficiency in the water sector. The Policy identifies public water supply and irrigation as two areas where energy efficiency improvements are needed. The Policy seeks to develop "a specific programme of energy management for the National Water Commission, the single largest consumer of energy in the public sector, focusing on intensification of loss reduction, improvement in pumping efficiency and the introduction of a distributed storage programme which will facilitate better management of pumping operations."

2.4.10 Food and Nutrition Security Policy (2013)

Food security plays a major role in the nutrition status of Jamaica's population. It requires an available and reliable food supply at all times. Therefore, the overall objectives of the Food and Nutrition Security Policy is to ensure that all persons have continued access to sufficient supplies of safe foods for a nutritionally adequate diet, so as to achieve and maintain a healthy and nutritional wellbeing.

The Policy highlights the need for special attention to be given to the adequate provision of water resources by:

- Increasing investment in water infrastructure and supply for the agricultural sector;
- Funding increased water use efficiency across irrigated agriculture;
- Developing sustainable land, water, forest and fishery management systems to address shortages and excessive rainfall, and protect the natural resource base in the face of climate change;
- Providing a holistic water management plan for water allocation in the wet and dry seasons; and
- Providing incentives for increased water harvesting on farms and in the residential sector, and for the provision of retention ponds and adequate drainage to reduce/avoid flood damage.

2.4.11 Draft National Housing Policy (2018)

The National Housing Policy is being developed out of the recognition that housing is inextricably linked to people's physical and emotional survival and security. The policy promotes sustainable and inclusive development of housing in Jamaica to ensure an equitable distribution of land, shelter and services at affordable prices.

As part of its policy on the construction services sector, it will seek to:

- Promote eco-housing, low energy-consuming construction and water efficient services;
- Set clear guidelines regarding regularizing land tenure; and

- Install and upgrade physical infrastructure (roads, water, electricity, drainage, and sewerage).

2.4.12 National Policy for Gender Equality (2011)

The Gender Policy will seek to:

- Ensure that women and girls have access to sanitation and potable water;
- Ensure that housing solutions are equitably distributed;
- Address water and sanitation issues as they impact severely on the capacity of rural women to survive on a daily basis; and
- Disaggregate data on the social sector - national statistics on the basis of urban/rural location, and to ensure that specific health and social needs of men/women (e.g. access to safe water and sanitation) identified are met.

2.4.13 Draft National Building Code

The National Building Code Bill will facilitate the adoption and efficient application of national building standards, to be called the National Building Code of Jamaica, for ensuring safety in the built environment, enhancing amenities and promoting sustainable development. The new National Building Code, based on the International Building Code, considers issues of water resources management, including resistance to floods and hurricanes, and the need for adequate water supply and sewage disposal in newly constructed buildings.

2.4.14 Draft National Spatial Plan

The National Spatial Plan, which is currently being developed, will seek to:

- Identify priorities for the improvement of infrastructure to support long-term development that promotes more sustainable land use;
- Promote development which will help to regenerate communities and enable disadvantaged communities to access opportunities; and
- Address the major challenges of global competition, disaster risk reduction and climate change response, while protecting the environment.

2.4.15 Local Sustainable Development Planning Framework

Local sustainable development requires an integrated view of development in which connections between social, economic and environmental systems are taken into account. Social and economic development must work in harmony with environmental systems within which they exist, and upon which they depend. Achieving sustainable development requires a unifying multi-agency national framework in which local sustainable development can take place. The framework is designed to integrate and harmonize the goals and roles of various stakeholders at national, regional and local levels.

The following goals underline the framework for local sustainable development planning:

- Create an enabling, supportive and responsive environment for local sustainable development planning within and across national state agencies;
- Build a common vision and culture that leads to a shared commitment to the process of sustainable development at all levels;
- Institutionalize opportunities for local government, citizens, business and all other community members to participate in local sustainable development planning and the building of sustainable parishes and communities;
- Integrate local sustainable development planning within official planning processes at parish and community levels; and
- Establish parish-based sustainable development frameworks to guide development interventions in parishes throughout Jamaica.

2.4.16 Draft National Drinking Water Quality Management Programme (2015)

The National Drinking Water Management Plan (NDWMP) is a plan that documents procedures for the provision of safe drinking water through the assessment of water supplies, operational monitoring and verification. It describes actions in both normal operation and during incidents where a loss of control of the system may occur. This plan also outlines the roles and responsibilities of stakeholders and procedures for special circumstances required to ensure safe drinking water for public consumption.

3 Integrated Water Resources Management (IWRM)

3.1 Current Situation

The goal of IWRM is to "promote the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems".[8] IWRM will also provide guidance and advice to decision makers and water managers on how to assess the impacts of climate change on water quality and quantity to determine how to implement appropriate strategies.

The IWRM framework, based on the Global Water Partnership (GWP) toolbox, is a set of "tools" organized under three fundamental elements:

(i) **Enabling environments**; which refer to the policies, legislative framework, financing and incentive structures in place to facilitate the IWRM process.

(ii) **Institutional roles**; which involve creating an organizational framework, and building the capacity of the organization.

(iii) **Management instruments;** which include:

- Water resources assessment for understanding resources and needs;
- Watershed Area Management Mechanism (WAMM) - watershed stakeholders, government agencies, NGOs, funding agencies and ordinary citizens are provided with a simple, practical and flexible method of achieving sustainable watershed management;
- IWRM plans – combining development options, resource use and human interaction;
- Demand management - using water more efficiently;
- Social change instruments;
- Conflict resolution – managing disputes, ensuring sharing of water
- Regulatory instruments – allocation and water use limits;
- Economic instruments – using value and prices for efficiency and equity;
- Information management and exchange – improving knowledge for better water management; and
- Data sharing methods and technologies to increase stakeholder access to information stored.

[8] Global Water Partnership and Integrated Water Resources Management Framework, Jamaica. August 2002

3.1.1 Enabling environments

Work has been done in establishing the enabling environment. These include:

- ***Vision 2030 Jamaica - National Development Plan*** and other policy documents including the Water Sector Policy and draft Watershed Policy.
- The legislative framework which includes:
    - Companies Act (2004);
    - Disaster Preparedness & Emergency Management Act (1993);
    - Floodwater Control Act (1958);
    - Forest Act (1996);
    - Forest Regulations (2001);
    - Irrigation Amendment Act (1999);
    - Local Improvements Act (1914)
    - Main Roads Act (1932);
    - National Water Commission Act (1980);
    - Natural Resources Conservation Authority Act (1991);
    - Office of Utilities Regulation Act (1995);
    - Parishes Water Supply Act (1889);
    - Public Health Act (1985);
    - Town & Country Planning Act (1958);
    - Water Resources Act (1995); and
    - Watershed Protection Act (1963).

3.1.2 Institutional roles

The existing institutional framework for water resources management largely supports the IWRM goal in that the land and water management agencies fall under a single Ministry, which is the Ministry with portfolio responsibility for Water.

From the mid 1990's, a new approach to watershed management in Jamaica emerged. In 1996, the Chairperson of the Natural Resources Conservation Authority (NRCA) and the Senior Advisor to the Prime Minister on Land Policy and Physical Development, convened an ad hoc Watershed Management Committee, which comprised a senior level multi-disciplinary team of persons from the Public and Private Sectors and NGOs. The Committee concluded that because of the widespread incidence of poverty, environmental restoration could be achieved primarily through the sustainable development of watershed communities, and that the pattern of unrelated watershed projects needed to be replaced by an integrated national approach and programme.

In 2000, Cabinet approved the institutional framework for the National Integrated Water Management Programme (NIWMP), including the appointment of the National Integrated Watershed Management Council (NIWMC), in an effort to overcome the constraints to watershed management strategies islandwide. The NIWMC was a multi-disciplinary, multi-sectoral entity, comprising public and private sector, NGOs and educational institutions that

served as a central point of reference for overall planning, co-ordination, implementation and monitoring of watershed projects, programmes and activities; and was the key link between lending agencies that were active in watershed management in Jamaica. The NIWMC reported to Cabinet through the Minister with responsibility for the Environment, who appointed sub-committees to facilitate its work. This entity replaced the former multi-sectoral National Watershed Task Force.

Specifically, the NIWMC's functions were to:

- Co-ordinate and promote an integrated approach to watershed management to allow for the sustainable use of natural resources, and the minimization of undesirable impacts;
- Implement the National Integrated Water Management Programme;
- Design, plan and implement watershed interventions for the benefit of the communities concerned, upstream and downstream, and all sectors; and
- Establish desired operational and governance structures, such as task forces and committees. These included Local Watershed Management Committees that operated in the Great River Watershed and the Rio Grande Watershed; and Local Forest Management Committees that operated in the Pencar/Buff Bay Watershed. With the support of the National Irrigation Commission, Water Users Associations (WUA) were formed to manage the distribution of water, and farmer groups were established in eastern Jamaica, under the Eastern Jamaica Agricultural Support Project to manage farming inputs.

Currently, the major shortcomings to establishing an IWRM approach are:

1) The inactivity of an apex body responsible for policy coordination across the sectors to ensure the IWRM goals are met; and
2) The non-establishment of the Water Resources Advisory Committee (WRAC).

The WRAC is a requirement of the Water Resources Act (1995), with a mandate to advise the Minister primarily on:

(a) Matters of general policy, relating to the management, development, conservation and use of the water resources of Jamaica; and
(b) The Master Plan and Water Quality Control Plans, including any amendments which may be proposed from time to time.

The Act dictates the membership of the WRAC, and it was proposed to amend the Act to include the:

- Chief Medical Officer, Ministry of Health;
- Chief Executive Officer, National Works Agency (NWA); and
- A representative from an Environmental NGO.

The importance of water to public health, and the responsibilities of the NWA with respect to floodwater control justify the additions. A representative from an environmental NGO would strengthen consideration of environmental factors, which are often not sufficiently recognized.

At present, the Water Resources Act (1995) names the Managing Director of the Water Resources Authority (WRA) as the Secretary of the WRAC. It was recommended that an amendment be made to allow the Minister with portfolio responsibility for Water to appoint the Secretary, who would be the National IWRM Coordinator. The amendment would address the current situation where the WRA does not have the authority to interact at a ministerial level, which could lead to difficulties in implementing the IWRM.

3.1.3 Management instruments

There is a proposed management instrument for IWRM in Jamaica, based on a grouping of the instruments in the GWP toolbox. These include:

- Regulatory instruments, which also refer to legislative reform and conflict resolution;
- IWRM Plans, including a demand management plan;
- Water Management plans, which include water resources availability, demand assessments and Watershed Area Management Mechanism; and
- Economic and social change instruments.

Regulatory Instruments, Legislative Reforms and Conflict Resolution

A draft/new legislation to regulate the operation of water supply and sewerage services by public, private and civil society is available, and discussions on the document are far advanced among the Ministry with portfolio responsibility for Water, the OUR and the NWC.

Multilateral Environmental Agreements (MEA) play a critical role in achieving the Sustainable Development Goals. They complement national legislation and bilateral or regional agreements, and form the overarching international legal basis for global efforts to address particular environmental issues and the country's obligations related to IWRM.

In 2003, harmonization of interagency responsibility for water quality was done through the development and signing of the MOU between WRA, ODPEM, NRCA/NEPA and Ministry of Health. A revised MOU was signed by WRA, NRCA/NEPA and the Ministry of Health in 2016.

There is improvement in data and information accessibility, for example, through the Spatial Data Management Division and the WRA's web-based hydrological database. However, there is still a challenge in timely access to meteorological data.

Establishment of the Development Approval System, which is guided by the IWRM principles of social and economic benefits, equity among all stakeholders, and environmental protection, has been effected.

The National Spatial Plan is needed to facilitate a more efficient and effective approval process that will arrest further water resource and watershed degradation, and promote greater growth in the economy.

Legislative gaps identified under the previous IWRM for Jamaica study included:

- Absence of an industry specific legislation for the water sector;
- Absence of a Meteorological Services Act;
- Lack of regulations for the Watersheds Protection Act (1963); and
- Need for legislation to address certain needs in the water sector. These include the:
    - Office of Utilities Regulation Act (1996);
    - National Water Commission Act (1980);
    - Irrigation Amendment Act (1998); and
    - Floodwater Control Act (1958).

3.1.4 The Participatory Approach to IWRM

Currently GOJ agencies already receive and act upon the recommendations of a variety of stakeholders, including businesses and civil society groups, with regards to water resources management. However, many citizens lack opportunities to participate in decision-making on water resources management. In addition, many citizens are unaware of the importance of water resources management. This is particularly true for vulnerable groups, such as women.

Obstacles to scaling up successful models for citizen participation include lack of information on the importance of land and water resources management, or the technical knowledge to make decisions. Further, parties with a vested interest in land and water management, such as farmers or manufacturers, may attempt to dominate IWRM because they have a greater incentive to participate, than private citizens.

3.2 Policy Measures

3.2.1 Enabling Environments

The GOJ will review relevant existing Policy and Legislative provisions to remove potential duplications and omissions and enable effective implementation.

3.2.2 Institutional Roles

The GOJ's policy is to adopt an IWRM approach to managing land, watersheds and water resources. This will include institutional co-ordination and stakeholder participation through IWRM Committees. The Ministry with portfolio responsibility for Land and Water will lead the establishment of the IWRM Committees[9]. A technical committee will be established to give strategic direction to the IWRM approach and ensure coordination of sector policies.

Activation of the Water Resources Advisory Committee (WRAC), as required under the Water Resources Act (1995), will be necessary. This committee will advise the Minister on the Water Resources Strategy and Action Plan, in addition to other statutory responsibilities assigned by the Water Resources Act.

Efforts will be made to synchronize policies and legislation to provide an enabling environment to effectively implement the IWRM approach. A National IWRM Coordinator will be appointed to:

- Coordinate the implementation of the IWRM Framework, water sector strategies and plans;
- Function as the administrative link between WRAC and the Minister with portfolio responsibility for Water; and
- Promote stakeholder participation in land and water resources management.

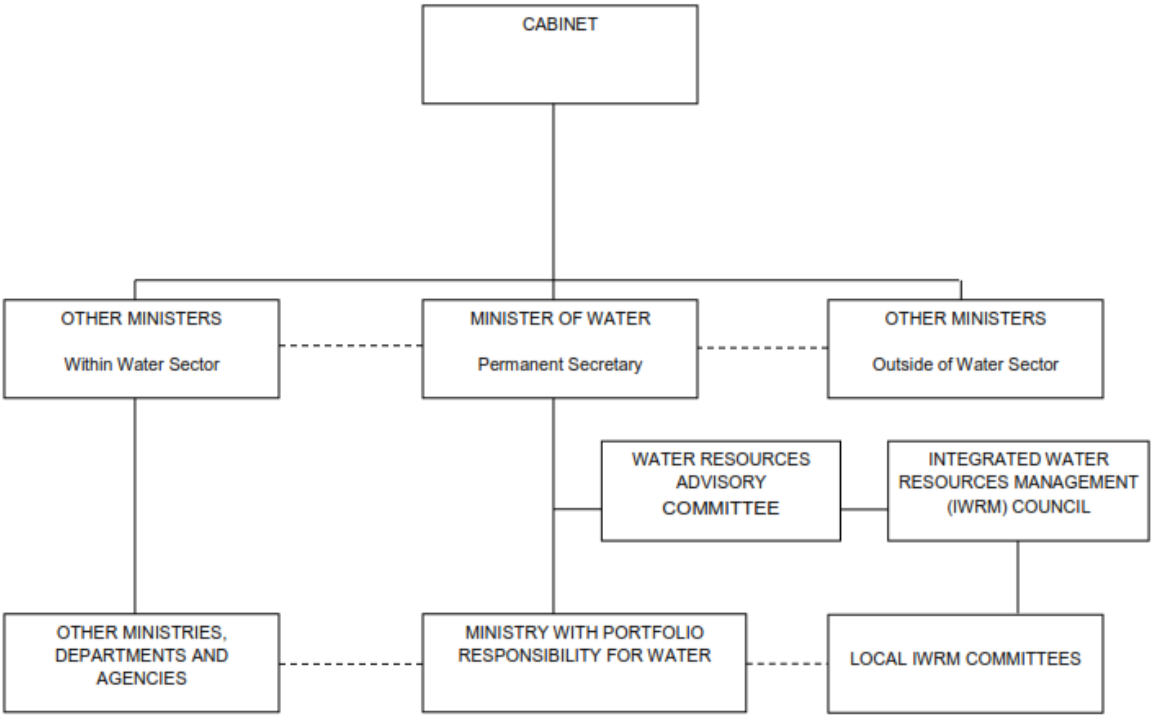
Integrated Water Resources Management Council (IWRMC)

The GOJ will establish the Integrated Water Resources Management Council (IWRMC) by expanding its role to replace the National Integrated Watershed Management Council. The IWRMC will be a multi-disciplinary and multi-sectoral body led by the Ministry with portfolio responsibility for Land and Water and reporting to the Cabinet. It will involve key stakeholders in the land and water sectors.

Structure and Responsibilities of the IWRMC

The IWRMC will take into account GOJ policies, and develop a Terms of Reference (TOR) on their processes for decision-making and reporting (Figure 3.1). The TOR will include specific ways that the IWRMC will involve community members in decision-making.

[9] Where there is separation in portfolios, the Minister with Portfolio responsibility for Water would consult with the other relevant sector Ministers.



- Office of Utilities Regulation
- Ministry of Health
- Local Boards of Health
- Environmental Health Unit
- Office of Disaster Preparedness & Emergency Management
- Municipal Corporations
- Mines & Geology Division

- Water Policy & Monitoring Branch
- Water Resources Authority
- National Water Commission
- Rural Water Supply Limited
- Central Wastewater Treatment Company
- National Irrigation Commission
- Meteorological Service Division
- National Works Agency
- National Environment and Planning Agency
- Forestry Department
- Land Policy & Administration
- Land Administration & Management Programme
- Development Planning Policy & Monitoring
- National Spatial Data Management Division
- Negril Green Island Area Local Planning Authority (NGIALPA)
- Real Estate Board
- Commission of Strata Corporations
- National Land Agency
- Environmental Risk Management Division
- Climate Change Division

Figure 3.1: Institutional Structure

It is recommended that the proposed IWRMC consist of senior level representatives from the:

- Ministry with portfolio responsibility for Water, Land, Environment and Climate Change
- Rural Agricultural Development Agency
- National Irrigation Commission
- Water Resources Authority
- National Water Commission
- Rural Water Supply Limited
- Forestry Department
- National Environment and Planning Agency
- Ministry of Finance and the Public Service
- Ministry of Tourism
- Ministry of Local Government and Community Development
- Ministry of Health
- Municipal Corporations
- Urban Development Corporation
- National Solid Waste Management Authority
- Jamaica Agricultural Society
- Bureau of Gender Affairs
- Planning Institute of Jamaica
- Academia
- Non-Governmental Organizations
- Private sector groups

GOJ agencies will play the following roles in implementing IWRM (Table 3.1):

Table 3.1: Implementing Roles of GOJ Agencies

Agency/Division	Responsibility
The Ministry with portfolio responsibility for Water, Land, Environment and Climate Change	Oversee the implementation and operation of the IWRM process.
WRA	Contribute to the: 1) **Enabling Environment** by (i) Recommending policy/policy change considerations. (ii) Developing and periodically updating the "***Water Resources Development Master Plan.***" 2) **Institutional Support** by: Presenting/informing/disseminating data and information to stakeholder groups for informing decisions at local levels. 3) **Management Instruments:** through its water allocation system being guided by economic, equity and environmental considerations.

Agency/Division	Responsibility
NEPA	Coordinate and implement Integrated watershed management; regulate development; pollution control and wastewater management; ecosystem protection and conservation; public education; policy formulation and legislative review related to resource management.
Environment and Risk Management Division	Develop national environmental policies and programmes, including those related to watersheds management, as the well the promulgation of legislation related to the environment, including regulations governing the management of wastewater and sludge.
Climate Change Division	Coordinate and facilitate the integration of a sustainable mechanism that facilitates the development, coordination, implementation and monitoring of policies, sectoral plans, programmes, strategies, and legislation to mitigate as well as adapt to the impacts of climate change.
National Water Commission (NWC)	Provide piped water supply and sewerage services.
Ministry of Health	Monitor drinking and recreational water quality and promote safety and sanitation by risk reduction of Environmental Health hazards.
The Ministry of Local Government and Municipal Corporations	Manage minor water supplies and community catchment tanks.
Forestry Department	Protect and improve forests and forest watersheds on crown lands managed by the Agency.
Rural Water Supply Ltd. (RWSL)	Assist households and communities in rural areas in obtaining safe drinking water.
National Irrigation Commission (NIC)	Provide agricultural water and drainage services.
National Works Agency	Provide flood water control services around roads, settlements and agricultural lands.
National Solid Waste Management Authority	Manage solid waste in watersheds.

The IWRMC will be responsible for:

- Making recommendations to the Minister for all IWRM related matters.
- Overseeing the preparation of a comprehensive IWRM framework.
- Coordinating the implementation of land and water management plans/programmes at the macro and micro levels. This will eliminate the overlapping of responsibilities of MDAs which often results in conflicting objectives.
- Reviewing, monitoring and evaluating the implementation of the IWRM framework.
- Identifying financial and technical support for projects and programmes.
- Making recommendations for amendments to existing laws and/or the need for new laws.
- Reviewing periodically the development plans within the context of the IWRM framework.

- Liaising with agencies to obtain relevant data to guide decision making.
- Recommending incentives for private sector investment for improving land and water resources in Jamaica.
- Developing criteria and procedures for the establishment of Local Integrated Water Resources Management Committees (LIWRMC), and the integration of existing groups.
- Reviewing and monitoring the institutional capacities and strengthening of the LIWRMC and Governance Mechanisms.
- Preparing and submitting progress reports, through the Ministry with portfolio responsibility for Land and Water, to Cabinet.

A dedicated secretariat will be established to support the work of the IWRMC. The creation of working groups will be recommended to facilitate the execution of the IWRM framework in areas such as public education, financing, and public-private partnerships.

Local Integrated Water Resources Management Committees (LIWRMC)

There are 26 Watershed Management Units (MWUs). Within the WMUs, issues of concern include:

i. Unsustainable water production
ii. High rates of soil erosion/deforestation
iii. Unsuitable agricultural practices
iv. Domestic and industrial pollution
v. Biodiversity issues
vi. Low income levels
vii. Land fragmentation and tenure issues
viii. Re-active rather than proactive enforcement of environmental and planning legislation
ix. Non-existence of Local Water Groups

Watersheds that are severely degraded and that are critical to potable water supply and irrigation will be given priority. LIWRMCs will be first established in these high priority areas.

Structure and Responsibilities of the LIWRMC

To allow for full participation within LIWRMC, public bodies, NGOs, CBOs, PDCs, churches and other social groups, farmers, women and other vulnerable groups, will be included. The LIWMC will:

- Report to and act on the guidance of the IWRMC and participate in decision-making processes.
- Build strategic partnerships, enhancing community involvement and ensure sustainable environmental practices in watershed areas.
- Play a consultative role in decision making on land and water resources management at the local level.

- Take into account GOJ policies, and establish a Memorandum of Understanding (MOU) on their processes for decision-making and issue recommendations. The MOU will include specific ways in which the LIWRMC will involve community members in decision-making.
- Use the development plans as a guide.
- Lobby for funds, for example, the establishment of a water fund which will be used to promote the preservation and restoration of watershed areas. Individuals, businesses, and civic society will have the opportunity to contribute to such a fund.
- Meet regularly at convenient times, and use diverse methods to involve local community members in decision-making processes and to build local capacity. All community members will be welcomed to provide input, and each LIWRMC will establish structures to engage private citizens and ensure that interested individuals do not gain undue influence over decision making processes.
- Make special considerations for the effects of land and water resources management decisions on vulnerable groups, such as women, the poor, the disabled and rural residents, among others. The broadening of stakeholder participation and public education in land and water resources management will be important in bringing about a major change in people's attitude and behaviour.
- Include the participation of members of Local Forest Management Committees, Water Users Associations (WUAs), and all other relevant groups to maximize stakeholder involvement and ensure coordinated decision making.

3.2.3 Financing

There will be financial allocations from the GOJ to ensure that IWRM programmes are developed and implemented for priority watersheds and for specific critical projects.

NGOs, CBOs and the Private Sector will be encouraged to source funding directly and/or provide human resource and other inputs for projects.

3.2.4 Management Instruments

The following management instruments will be necessary for effective IWRM:

- Water resources assessment for understanding resources and needs.
- Watershed Area Management Mechanism (WAMM) - method of achieving sustainable watershed management.
- IWRM plans – combining development options, resources use and human interaction.
- Demand management - using water more efficiently.
- Data sharing and increase stakeholder access to information stored.

Regulatory Instruments, Legislative Reforms and Conflict Resolution

Overlapping jurisdictions and gaps in the legislative framework governing the operations of the institutions that constitute the water resources component of the water sector will be addressed as follows:

- Adopting an industry specific legislation for the water sector.
- Promulgation of a Meteorological Service Act, to give force of law to the establishment of a GOJ institution responsible for the provision of weather, climate and agro-meteorological services in support of safe air and sea transportation, sustainable water resources development, agricultural production, ecological protection, disaster preparedness and mitigation.
- Amendment of the Office of Utilities Regulation Act (1996) and National Water Commission Act (1980), to strengthen the Office of Utilities Regulation's ability to regulate domestic water supply & sewerage services.
- Amendment of the Office of Utilities Regulation (OUR) Act (1996) and Irrigation Amendment Act (1998), to transfer the regulation of irrigation services from the NIC to the OUR.
- Amendment of the Irrigation Amendment Act to provide for operational management of irrigation systems by Water Users Associations.
- Amendment of the Floodwater Control Act (1958) and the Water Resources Act (1995), to transfer regulation of floodwater control to the Water Resources Authority.

IWRM Plans

Pilot programmes that create citizen-based IWRM programmes have been successfully implemented with substantial citizen participation, for example, the GEF/IWCAM Drivers River Watershed, Portland.

Communities must therefore be engaged in land and water resources management and successful pilot programmes must be brought to scale. These efforts to empower vulnerable groups in IWRM can lead to their empowerment.

Water Management Plans

The Government, through the Ministry with portfolio responsibility for Land and Water, will lead the development and implementation of a National Water Supply Plan (NWSP). The NWSP will, among other initiatives, define the methodology for facilitating the transfer of water from areas of surplus supply to areas of deficient supply. It will also seek to address drought situations in the supply network, and explore options for optimal water storage capacity, across the island.

Economic and Social Change Instruments

The GOJ will continue to encourage research and development to achieve continuous improvement in technologies and operational efficiencies in water, sanitation and wastewater systems; and to increase resilience to climate change.

IWRM benefits all users of water resources. The management process for protecting and allocating water resources also has costs. The GOJ's policy is that major abstractors and dischargers pay for the costs of this process, through resource-use fees.

3.2.5 Environment and Ecosystem Protection and Conservation

The GOJ's policy is that Jamaica's water bodies and watersheds, including streams, rivers, ponds and coastal waterways, should support vibrant aquatic ecosystems. Freshwater resources will be managed to allow for water resources to be sustainably available for human use.

These policy goals are supported by the Wild Life Protection Act, the NRCA Act and the Watersheds Protection Act.

Protecting Watersheds

Maintaining healthy watersheds requires protecting animals, as well as plants, since plants and animals in all ecosystems are interdependent. As such, a vibrant watershed ecosystem is not only an important goal, but contributes to healthy watersheds and sustainable water resources.

A key goal of water resources management decisions is to protect watersheds at all points—from ridges and headwaters to the coastal waters that they feed. IWRM means that all stakeholders will be consulted in the decision-making processes. To protect watersheds, it is particularly important that the Forestry Department and Local Forest Management Committees are involved in decisions on protecting the environment and ecosystems**.**

Preventing Point Source Pollution

Point source pollution comes from sewage treatment plants, industrial users, and other sources that discharge improperly treated waste directly into the environment. It is the GOJ's policy that effluent discharged into the environment from sewage treatment plants, industry, and other sources will be treated, so that it does not endanger the environment or people's health. All sewage treatment plants and other dischargers will comply with the Natural Resources Conservation (Wastewater and Sludge) Regulations 2013.

Managing Effluent from Industry and Sewage Treatment Plants

NEPA and the Environmental Health Unit of the Ministry of Health will regulate the quality and quantity of all effluent that is released directly into the environment. To carry out its enforcement duties, regulating bodies must have the necessary resources to monitor and enforce the comprehensive standards.

Consistent with the GOJ's objectives for cost recovery for services in the water sector, the Wastewater and Sludge Regulations (WWSR) 2013 provide a framework for the payment of fees based on pollution loading.

Municipal Corporations and the Ministry of Health play key roles in ensuring that effluent from on-site sanitation facilities does not pollute the environment or endanger people's health.

Trade Influent Rules

Wastewater service providers will set trade influent standards that will allow sewage treatment plants to be in compliance with the standards under the Wastewater and Sludge Regulations 2013.

The trade influent standards will set out what types and concentration of influent may be discharged into a sewer, and how much wastewater service providers will charge. The quality of the influent will impact the quality of the effluent discharged to the environment.

Effluent discharged to the environment is governed under the WWSR. These regulations are based on the polluter-pay principle. Breaches to the WWSR will attract a penalty.

Wastewater Re-use

The GOJ will encourage the re-use of treated effluent where it is safe and economical. Wastewater that is properly treated at sewage treatment plants may be safe for activities such as irrigation and some industrial processes.

To implement this Policy, NEPA and MOH will continue to monitor and enforce standards for irrigation of lawn and specific agricultural applications and to establish standards for other types of wastewater re-use. Those that treat wastewater, including the NWC and industrial facilities, are encouraged to seek buyers for treated wastewater.

Reducing groundwater use

The NIC, private irrigation providers, and industrial facilities will utilize treated wastewater, where possible. When considering applications to abstract groundwater, the WRA will consider whether the applicant has made efforts to re-use treated wastewater.

Any land use development should take into consideration the opportunity to facilitate ground water recharge.

Preventing Non-point Pollution

Non-point pollution comes from diffuse sources, where contaminants (for example, from agricultural fertilizers or urban runoff) infiltrate the soil, and reach the water table. The Ministries with responsibility for Agriculture and Health, as well as the Pesticide Control Authority, in consultation with NEPA, will promulgate formal guidelines on best practices to meet standards in agricultural and urban areas, including measures such as:

- Appropriately managing waste from livestock;
- Periodically adjust grazing intensity for livestock to prevent overgrazing;
- Adopting best practices in efficient irrigation;
- Limiting and managing fertilizer and pesticide use, including the use of natural barriers and organic fertilizers;
- Limiting impervious surfaces in urban areas; and
- Using landscaped areas to filter and infiltrate run-off in urban areas.

Water Quality Standards

The Ministry of Health, NEPA, NWC and WRA, according to their respective legal mandates, will:

- Establish water quality control zones and develop and implement water pollution control programmes;
- Implement a comprehensive water quality monitoring programme in collaboration with various stakeholder agencies;
- Conduct sampling of fresh and marine water sources; and
- Enforce all conditions for permits and licences relating to water quality.

To ensure that potable water is safe for drinking, the Ministry of Health will continue to monitor the service providers, to include packaged water, and enforce the relevant standards.

The regulating agencies monitor and regulate the following water quality parameters:

- Nitrates
- Total Faecal Coliform
- Total Coliform
- Turbidity
- Total Suspended Solids
- Total solids
- Phosphates
- Total Dissolved Solids
- Chemical Oxygen Demand
- Biochemical Oxygen Demand
- Specific conductivity
- Chlorine residual
- Heavy metals
- Aluminium
- Sulphate
- Magnesium
- Calcium
- Nitrites
- Sodium
- Iron
- Fluoride
- Alkalinity
- Silica
- Manganese
- Chloride
- Colour

Health and aesthetics are the main determinants for the safety of water. The GOJ uses the Interim Jamaican Criteria developed from WHO guidelines to set the standards for potable water.

Coordinating Water Resources Management and Land Use Planning

The link between water resources management and land use planning is very important. Planning should address the "what" and the "where" by looking at location and evaluating the characteristics of the water resources of that location, taking into consideration characteristics such as water quality, presence and quality of watersheds, flood potential and water supply or aquifer recharge importance. Proper land use planning would evaluate the types of land uses and what densities or intensities are appropriate at a particular location, given the characteristics of the water resources in the area.

The National Land Policy and the Development Orders will inform the proper spatial and land use planning which may impact upon the water resources.

Performance bonds should be imposed for developments considered to be high risk and which would cause an impact on the quality of water resources. Monies from the bond would be used to mitigate any damage caused.

4 Climate Change Adaptation and Mitigation

4.1 Current Situation

Jamaica's water sector is susceptible to multiple risks associated with climate change and climate variability. Climate change is any long-term significant change in the average weather over a period of thirty-years or more. Climate variability refers to fluctuations in average weather for shorter periods, such as one year to the next or one decade to the next. Average weather includes average temperature, precipitation, and wind patterns. Average weather involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years.[10] Climate change risks for Jamaica include changing rainfall levels and patterns, increasing temperatures, sea level rise, and more intense and frequent hurricanes and droughts.

Rainfall patterns have changed in recent decades. Between 1960 and 2006, the national average rainfall has decreased slightly. Average rainfall increased slightly during the dry season (December to May), and decreased slightly during the rest of the year. Figure 4.1 shows the difference between average annual rainfall for 1992 and average annual rainfall for 2010. Rainfall levels have increased since 1992 in the centre of the island, and they have increased in in the eastern and western Parishes.

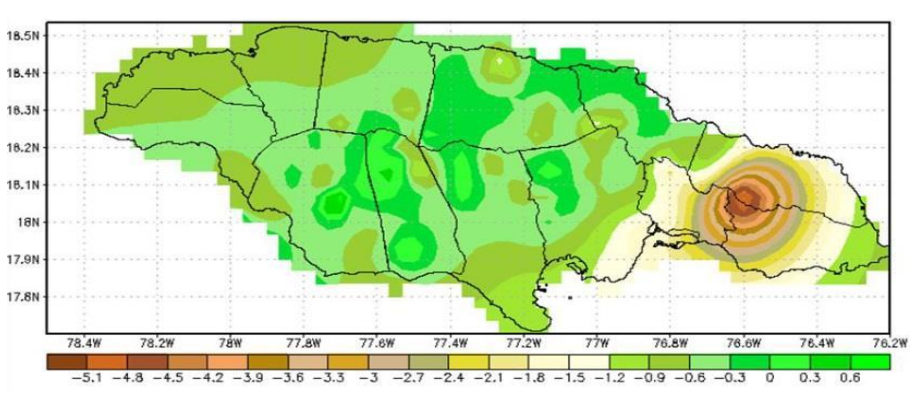


Figure 4.1: Rainfall Trend Slope for 1992-2010

Source: State of the Jamaican Climate Report 2012

Average temperatures have increased in the Caribbean and Jamaica in recent years. Annual mean temperatures across the Caribbean have increased over the last century by about 0.5°C. Between 1960 and 2006, the average temperature in Jamaica increased by 0.27°C per decade. Records also show an increase in the number of very warm days and nights since 1950.[11]

[10] Development of a National Water Sector Adaptation Strategy to Address Climate Change in Jamaica, 2009.
[11] State of the Jamaican Climate Report 2012, 4-8.

For Jamaica, climate models project an increase in mean temperature of between 0.3°C and 1.3°C by the 2030s. Models project a range of possible changes in average rainfall, from a decrease of 32 percent to an increase of 25 percent. The median projects a decrease in average rainfall of three percent (these projections are shown in Table 4.1).[12] A projected decline in overall precipitation levels, together with increased variability in rainfall, suggests the risk of more frequent droughts.[13]

Table 4.1: Predictions for Annual Mean Temperature and Rainfall by 2030 vs. 1970–1999

	Increase in Temperature	Change in Rainfall	
	Range	Range	Median Projection
Jamaica	0.3°C to 1.3°C	-32% to +25%	-2%

Source: State of the Jamaican Climate Report 2012, 6-6.

Tropical cyclones in the North Atlantic have become more frequent and intense since 1995.[14] Much or all of the increase in the frequency of cyclones has been attributed to the Caribbean region being in the positive (warm) phase of the Atlantic multi-decadal oscillation (AMO) and not necessarily to climate change.

While changes in the frequency and intensity of tropical cyclones in the future are hard to predict[15], the UNDP concludes that cyclones are likely to become more intense in the Caribbean region in the future, bringing heavier precipitation, and probably also stronger winds.

These potential changes in Jamaica's climate will likely have an impact on[16]:

- **Flooding regimes**—the increase in frequency of high intensity rainfall events and the intensity of hurricanes could increase the frequency of landslides and floods.

- **Water supply**—increased droughts would endanger the water supply in communities where water supply is already limited, while increased flooding would increase sediment load and demands on water treatment infrastructure.

- **Watershed protection**—increased frequency of more intense rainfall events would accelerate sediment erosion, movement and transport within river basin systems.

[12] State of the Jamaican Climate Report 2012, 6-15
[13] Note that none of these projections take in to account the possible effect of changes in the pattern of tropical cyclones on rainfall
[14] CCSP, 2008, and Webster, 2005
[15] IPCC Fourth Assessment Report. Regional Climate Projections, Small Islands, Tropical Cyclones, 2007; Peilke, 2005, and Webster 2005.
[16] Development of a National Water Sector Adaptation Strategy to Address Climate Change in Jamaica, 2009.

- **Infrastructure**—there is a lack of infrastructure to mitigate the effects of climate change, such as flooding or localized water shortages caused by events associated with climate change.

- **Non-irrigated agriculture**—this is an important sector with respect to food security, but it remains vulnerable to fluctuations in rainfall and temperature.

The watersheds are important features for supplying drinking water and replenishing streams, as well as for supplying areas for agriculture and natural forests. Climate change further contributes to the deterioration of the catchment area and mountain agriculture through direct changes in rainfall patterns and temperature. Knowledge of climate change in the watershed region is important as, for example in the context of a drier climate, it is expected that the groundwater levels will not replenish as quickly as they did in the past, even as water demands are expected to increase by 18 percent by 2030, due to agriculture alone (Selvaraju et. al., 2013). During the same time, the sustainable water yield is expected to decrease by 20 percent across the island (Karanjac, J., Fernandez, B., 2000). A decrease in groundwater levels, coupled with the expected rise in sea levels, would also result in salt water intrusion and a contamination of the ground water supply.

The Climate Change Division is well-positioned to lead national efforts to adapt to climate change. Documents such as the Draft Water Sector Adaptation Strategy to Address Climate Change and the Climate Change Policy Framework and Action Plan have been prepared.

Climate variability, the natural fluctuation in weather patterns across shorter time periods, also threatens the water sector. For instance, years with rainfall that is lower than average can threaten the water supply in some parts of Jamaica. Unlike climate change, climate variability can be predicted with a high degree of confidence, which allows service providers and households to plan for climate variability. For example, investments in storage capacity can ensure adequate water supply during years with rainfall that is lower than average, but within the expected range of climate variability.

Strategic planning and the successful implementation of an adaptive approach to climate change are therefore important planks in the quest for consistent and sustainable national development. The Pilot Programme for Climate Resilience (PPCR) is a part of the Strategic Climate Fund (SCF), which operates under the umbrella of the global Climate Investment Funds (CIFs). The aim of the programme is to facilitate an integration of adaptive strategies into the various economic sectors and societal infrastructures, in order to build a level of resilience to climate change. In light of this, a number of pilot programmes and projects are being conducted and spearheaded by the Planning Institute of Jamaica (PIOJ) under the PPCR.

Table 4.2: SWOT Analysis of Climate Change

Strengths	Weaknesses
▪ There is a dedicated Climate Change Division to lead national efforts to adapt to climate change. ▪ The GOJ is committed to adapting infrastructure and policy to meet challenges expected along with climate change. ▪ There is a comprehensive policy framework for adapting to climate change.	▪ Storage of water supply is often inadequate during the dry periods, which could increase with climate change, including public and household storage. ▪ Drainage infrastructure is insufficient and not sufficiently maintained in many areas.
Opportunities	**Threats**
▪ Finalizing and passing national policies related to climate change adaptation and climate change adaptation in the water sector would result in a comprehensive policy framework for adapting to climate change. ▪ Increasing use of rainwater harvesting with adequate storage will increase resilience to dry periods. ▪ Investments in infrastructure for water supply, irrigation, and drainage can increase service providers' resilience to extreme weather.	▪ Decreased rainfall levels or changing rainfall patterns could threaten water supply and irrigation services in some areas. ▪ A variety of extreme weather conditions, such as hurricanes and intense storms, pose a danger to infrastructure and increase the risk of flooding. ▪ A rise in sea level could result in saline intrusion, which could contaminate groundwater resources which provide 85 percent of the nation's water supply.

4.2 Policy Measures

Goals for Adapting to and Mitigating Climate Change

Jamaica aims to avoid, minimize, or adapt to the negative impacts of climate change and climate variability on its natural environment, including water. In particular, Jamaica aims to preserve infrastructure and services in the water sector that are necessary to ensure that water resources are able to meet human needs, and to promote economic growth.

Agencies in the water sector will limit greenhouse gas emissions by adopting economically viable energy efficient technologies, and by using renewable energy technologies where they are economically viable.

The GOJ will raise awareness of water and climate change issues, and ensure that climate change considerations are mainstreamed into water resources management and decision making processes, to enhance institutional capacities, and to build resilience in the sector.

To achieve this objective, the GOJ will be guided by the following:

- The existing Climate Change Policy Framework and Action Plan.
- The Building Act, 2011, and the enactment of a new National Building Code based on the International Building Code (IBC).
- The Development Orders under the Town and Country Planning Act, take into consideration matters of flooding, sea level rise, and setbacks from waterways and water bodies.

The GOJ will also ensure:

- Rainwater harvesting, with adequate storage, is promoted for households in areas with adequate rainfall and where groundwater and surface sources are not available.
- Enforcement of physical planning laws and regulations.
- Sufficient investment in hydrological and water quality monitoring and adequate dissemination of information to stakeholders and decision-makers on the status of the island's water resources.
- Development of appropriate hydrological and water resources modelling tools in parallel with capacity building within key stakeholder organizations.
- Development of water protection zones, flood bank monitoring, water harvesting farms, reforestation of degraded water catchment areas and establish emergency water supply systems.
- Identification and replication of best practice programmes in local communities and stakeholder engagement, as a vehicle for watershed management and protection.
- Increased efficiency in water delivery systems.
- Planning that includes the effects of climate change and the range of climate variability on infrastructure investments and service delivery methods for each service area and in managing water resources.

The Climate Change Division

The Climate Change Division coordinates national climate change efforts. Consistent with the GOJ's objectives for implementing IWRM and adapting to climate change, the GOJ created the Climate Change Division as part of the Ministry with responsibility for Water. The GOJ's policy is that the Climate Change Division will monitor and coordinate national climate change adaptation efforts, including those within the water sector.

The role of the Climate Change Division is to ensure that:

- Each Agency's role in regard to climate change adaptation is clear.
- Agencies do not engage in redundant climate change efforts.
- All GOJ efforts accord with these and other national policy priorities and plans for climate change adaptation.

5 Energy Efficiency in the Water Sector

5.1 Current Situation

Jamaica's energy sector is characterized by a strong dependence on imported petroleum, high rates of energy use, and inefficient electricity supply systems. Energy efficiency is therefore among the most promising initiatives for reducing greenhouse gas emissions, energy costs and for seeing improvements in operational efficiencies in public water supply and irrigation services.

The NWC is the single largest electricity consumer in Jamaica, with electricity costs accounting for nearly 40 percent of annual revenue. In the process of harnessing, treating and distributing 180 million gallons of water per day across Jamaica, about one quarter of the NWC's operating cost involves high energy costs.

The National Irrigation Commission (NIC), the public authority that provides irrigation services, does not use energy efficiently in at least three ways:

- Its tariffs cover less than half of operating costs. As a result, more energy is used to produce and pump water for irrigation than is efficient.
- It relies on energy intensive pumping to abstract groundwater for eight (8) of its ten (10) systems. The NIC's electricity costs for pumping increased by 145 percent between 2006 and 2012, to a total of $265 Million.
- Water losses are high in in some systems. Water losses were as high as 63 percent in the Mid-Clarendon irrigation system.

Further, the NIC often does not collect data on water production and losses, which makes it difficult to assess or improve efficiency. At 29 of its 73 pump stations, the NIC either does not have production meters or the meters do not work. For four (4) of nine (9) main systems, the NIC did not track water losses in 2011-2012.[17]

High energy costs also hurt the financial performance of the NWC and the NIC. There is no electricity surcharge in water supply or irrigation tariffs, as a result, the NWC and the NIC suffer financially when energy prices rise.

[17] Auditor General's Department, "Performance Audit Report of the National Irrigation Commission." June 2013

Table 5.1: SWOT Analysis of Energy Efficiency in the Water Sector

Strengths	Weaknesses
▪ The NWC has a system of evaluating energy efficiency of water treatment and distribution. ▪ The NIC is taking steps to reduce the energy cost of water by using renewable energy to pump water. ▪ Fifteen (15) percent of households (31 percent of rural households) use rainwater harvesting systems as their primary source of drinking water—these systems do not require continual energy inputs and are therefore extremely energy efficient.	▪ Non-revenue water of 65 percent means that the NWC produces about four times more water than it bills for. ▪ Water losses are high in some irrigation systems. ▪ Eight (8) of ten (10) of the NIC irrigation systems rely on energy-intensive pumping to extract groundwater. ▪ The NIC's tariffs cover less than half of operating costs.
Opportunities	**Threats**
▪ Reducing non-revenue water in water supply and irrigation will reduce energy needs for water production and distribution. ▪ Increasing use of rainwater harvesting in rural areas will expand the use of systems that are not vulnerable to changes in energy costs. ▪ Increasing use of efficient irrigation techniques will decrease water and energy use while maintaining service levels. ▪ Lobby for participation of the water sector in the Wheeling Policy. ▪ Use of Renewable energy efficient technology.	▪ Increases in energy prices negatively affect the NWC's and the NIC's financial performance, since it cannot pass on electricity prices to consumers in most cases. ▪ The NWC requests adjusting tariff rates and set these rates for a 5-year period. This limits the NWC's ability to adjust tariffs to account for volatility in energy prices. ▪ The NIC does not have a comprehensive maintenance plan, which results in more leaks, and therefore higher energy use in irrigation.

5.2 Policy Measures

Entities in the water sector will work to achieve the national goal to "use energy wisely and aggressively pursue opportunities for conservation and efficiency", as stated in the National Energy Policy (2009-2030). In particular, GOJ agencies will be "leaders and models in energy conservation and environmental stewardship in Jamaica".[18]

Goals for Energy Efficiency in the Water Sector

Service Providers in the water sector will adopt energy efficient technologies and techniques to reduce high energy costs and to reduce greenhouse gas emissions. GOJ agencies will adopt regulations that encourage service providers to improve energy efficiency and reduce energy costs.

[18] National Energy Conservation and Efficiency Policy 2010–2030, Ministry of Energy and Mining, October 2010.

5.2.1 Technical

Economical technologies will vary depending on how and where they are used. Some rural water supply systems do not require any energy inputs to operate. The following are examples of some technologies that will often be economical throughout Jamaica:

- **Rainwater harvesting systems**—The GOJ promotes the use of rainwater harvesting in areas where piped water supply is not economical to meet the water demand.
- **Piped gravity-fed water supply systems**—Gravity-fed water systems are constructed where there are naturally occurring springs located in higher elevations than the communities. The community channels the water into a storage tank. The community builds a network of pipes that connect the households to the tank using gravity to deliver water from the tank to the households. Because they are gravity-fed, these systems can deliver reliable water supply to communities without any need for pumping.
- **Renewable Energy Technology**—Renewable energy technology, for example solar energy systems, will be utilized as a source for the delivery of water (either pumps or electro valves), which can significantly decrease energy costs and greenhouse gas emissions.
- **Irrigation hours**—Land owners should irrigate their crops during early mornings or late evenings thereby decreasing evaporation.
- **Weather stations**—Local weather stations can provide rainfall and evaporation information. This data will allow land owners to irrigate using the exact amount of water needed for the crop, thereby reducing waste. These weather stations operate with solar panels.
- **Other efficient irrigation technologies**—Other technologies and methods to improve on farm water use efficiency, such as drip irrigation and fertigation, should be utilised.

The GOJ will also:

- Complete detailed Energy Audits of high energy consuming facilities that will guide the implementation of appropriate energy reduction strategies, and establish appropriate energy monitoring systems.

Energy efficiency can also be increased by adequately maintaining infrastructure. Piped water and irrigation infrastructure should be maintained so that all economical repairs are made. In addition, treated effluent should be used for irrigation to reduce the use of freshwater for agricultural use.

5.2.2 Institutional

Service Providers have the responsibility for adopting economical energy efficient technologies and techniques. The NWC, the NIC, and private service providers should reduce leaks to optimal levels, and should adopt energy efficient technologies. The NWC is the largest electricity

consumer in Jamaica, and much of that electricity could be saved by reducing Non-Revenue Water.

5.2.3 Financial

Service Providers should invest in implementing energy efficient technologies and techniques that will save money in the long term.

6 Private Participation in the Water Sector

6.1 Current Situation

The private sector is involved in the water sector through the provision of piped water supply, piped sewerage services and irrigation services. At present, there are about sixteen (16) private service providers of water and sewerage services in Jamaica. The Office of Utilities Regulation (OUR) makes recommendations to the Minister with portfolio responsibility for Water on licences to be issued. In many cases, private sector involvement has been effective at increasing the rate of development and delivering essential services to Jamaicans.

The present arrangement between the OUR and the Government allows private service providers to focus on small geographic areas and facilities, sized to service their own developments. These areas are commercially attractive with customers, such as hotels and housing developments, located in a small area. The operational zones of the private service providers have excluded low income communities located in the vicinity of their operation. This necessitates the NWC having to provide infrastructure to meet the demands of these communities.

The private service providers, therefore, compete with the NWC for more economically viable customers while ignoring low income communities. This practice is referred to as “cherry picking”. The net effect of this practice is to reduce the viability of the NWC, while the private service providers make windfall profits.

Nonetheless, private sector participation can help the GOJ achieve its objectives in the water sector in at least four important ways:

i) Providing funding when GOJ-owned companies are not able to borrow because of fiscal or balance sheet constraints;
ii) Providing access to improved technology and expertise, which reduces cost and improves service quality for consumers;
iii) If they are properly regulated, they can act on strong incentives to find ways to reduce the costs of service; and
iv) Responding more quickly and nimbly to customer demands for expanded and improved service.

Table 6.1: SWOT Analysis of Private Participation in the Water Sector

Strengths	Weaknesses
▪ Private service providers often provide good service efficiently to their customers. ▪ Private sector participation has allowed for development where it might otherwise have been limited by the lack of a water supply or sewerage connection from The NWC.	▪ 'Cherry picking' has reduced the NWC's ability to make profits in certain communities, undermining its ability to use profits from high-income customers to subsidize tariffs for low-income customers. ▪ Lack of a water supply infrastructure plan for different supply modalities to engage private service providers in water supply development islandwide.
Opportunities	**Threats**
▪ Private service providers may have access to funding when Government-owned companies do not. ▪ Private service providers often have access to cutting-edge technologies and world-class expertise. ▪ Private service providers can provide good service efficiently, when properly regulated. ▪ Often respond quickly and nimbly to customers' needs.	▪ Future private sector participation could lead to further cherry picking. ▪ Lack of clarity in the process and criteria for approving licenses for private service providers could reduce participation, and slow down development, and service expansion in some areas.

6.2 Policy Measures

Policy on Private Participation in the Water Sector

The GOJ's policy is to ensure that private participation in the water sector transforms decision making and accountability by aligning the interests of all parties, government and private, with the public interest.

The GOJ will ensure that private service providers are held accountable for their contribution to water service delivery. The Government may impose performance requirements on private service providers, for example, the construction of a certain amount of new infrastructure, or the repair of old infrastructure. Other requirements related to performance may include increasing service coverage, increasing the percentage of treated wastewater, reducing waste in the system due to leakage and theft, or lowering water fees for consumers. To prevent "cherry picking", private service providers will be required to serve adjoining low-income communities and to charge a fee to ensure universal access. The rate to be paid will be determined by the OUR.

The GOJ will engage and consult with the private service providers to determine the type of improvements they may offer. This will allow the government to determine the structure of the sector, the services, tariffs and subsidies required and the role of each party.

6.2.1 Public-Private Partnerships—GOJ-owned Service Providers Contracting with Private Companies to Improve Services

Appropriate use of public-private partnership models, through joint ventures, will be encouraged. Emphasis will be placed on efficiency and quality of service provided with a strong social commitment that allows inclusivity. Private service providers will be capable of bringing new innovations and technology for effective service delivery.

Entities in public-private partnership arrangements with public agencies will be regulated through contracts, and current private service providers, that provide services directly to customers, will continue to be regulated by the OUR.

The GOJ's policy is to encourage GOJ-owned service providers, such as the NWC and the NIC, to contract with private companies to provide water-related services. These services might range from performing a specific function, such as billing and collections; or operations and maintenance; or up to taking responsibility for building out, financing, and operating infrastructure to supply water and wastewater services. There will be a grandfathering of private service providers, as it is the intention of the Government to corporatize the NWC. However, the GOJ expects the NWC to continue to explore and develop ways to contract with and incentivize private firms to reduce water losses, increase energy efficiency, improve and expand services, meet effluent discharge standards, and improve commercial performance.

Private service providers will be encouraged to produce and provide bulk raw water to the NWC, which would be responsible for distributing potable water to their clients. Build, Own, Operate and Transfer (BOOT) contractual arrangements will be utilized; as well as, "take or pay" contracts; while having the NWC remain as the primary distributor. Private service providers will also be encouraged to provide technical solutions in non-utility service areas as a means to foster growth and economic development.

To allow for transparency, greater community participation among local community members, women, and other vulnerable groups, the public or private partner responsible for the provision of water supply and sewerage facility will engage the local community in the decision making processes. Public communication and consultation will allow for dialogue between the representatives of the community and the utility service provider. Such interaction also allows the public to share their views on a project or a programme that is to be implemented.

6.2.2 Regulation of Private Service Providers

The OUR regulates water quality and coverage for both the Government-owned service providers and private service providers. Government-owned providers will hold private companies, which they contract, accountable for services rendered.

Regulation of public-private partnerships

Where a Government-owned service provider pays any private company for specific services, and the quality of those services will be governed in contracts between the two parties, the rates will be established through a competitive bidding process. The OUR will approve such rates prior to contract signature, provided that the OUR is satisfied that the rates result from a reasonable return on investment.

Where appropriate, government-owned service providers will be allowed to pass on contracted costs to customers in the tariff. This will be appropriate in cases where private firms are investing in expanding service networks; for example, where private firms have contracts to design, build (or rehabilitate), operate, and maintain water or sewerage treatment plants or networks. In such cases, the public service provider should apply to the OUR for approval for cost pass-through before contracting with the private service partner. If the OUR is satisfied that the service offered is likely to serve the public interest and establish reasonable rates, the OUR should approve the application for cost pass-through.

Regulation of Direct Service Providers

Tariffs and service standards of licenced, direct service providers will be regulated by the OUR. Tariffs should allow private service providers to recover reasonable return on investments. Tariffs may differ among providers. The OUR will regulate in accordance with the OUR Act, taking into account these policy objectives.

6.2.3 Financials

Extension of utility services will be largely financed by the NWC. It is estimated that up to 2030, US$3.4 Billion will need to be invested in the rehabilitation and expansion of the NWC's networks islandwide. The NWC tariff allows for the recovery of interest, depreciation, and a return on capital, meaning that the NWC would be financially self-sufficient.

Non-utility service improvements are expected to cost about US$176 Million. The RWSL will develop a Rural Master Plan, through the implementation of the Water Supply Development Strategy for Non-Utility Service Areas, and seek funding to assist in financing projects using appropriate technical solutions.

The GOJ will also:

- Reduce NRW from 65 percent to 45 percent by 2030. This will be done by intensifying the programme of leak detection and repairs and undertaking capital intensive projects for efficiency improvement, inclusive of mains replacement and other NRW reduction activities.

- Raise awareness of water and climate change issues and ensure that climate change considerations are mainstreamed into water resources management and decision making processes to enhance institutional capacities and to build resilience in the sector.

- Utilize renewable energy technology as a source for service delivery in the water and agricultural sectors to significantly decrease high energy costs.

- Develop a National Water Supply Plan to facilitate the transfer of water from areas of surplus supply to areas of deficient supply.

- Establish central sewerage in major towns and increase sewerage coverage in Kingston and St. Andrew from 30% to at least 45% by 2030.

The Government has accumulated significant assets over many years and these assets should be made available to the market for investment, thereby encouraging investment in production, rather than speculative activities.

7 Standards for Access to Potable Water Supply and Improved Sanitation

7.1 Current Situation – Access to Potable Water Supply

An improved water supply source is one that is safe for drinking, based on its construction or intervention to protect from contamination. In 2015, 92 percent of Jamaicans had access to improved water sources (Figure 7.1). Access was higher in urban areas, at 97 percent of the population, while only 88 percent of the rural population had access.

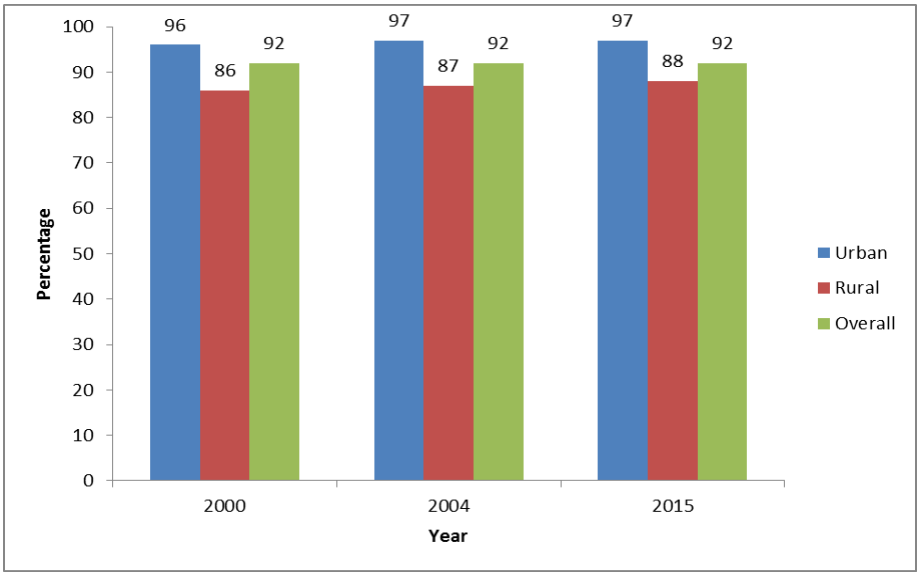


Figure 7.1: Access to Improved Water Sources
Source: Jamaica Survey of Living Conditions

7.2 Policy Measures

This Policy's target for reliable water supply is based on the following:

> *The United Nations makes recommendation in urban areas for a distance of no more than 200 metres from a home to be considered reasonable access. In rural areas, reasonable access implies that a person does not have to spend a disproportionate part of their day fetching water.*

This Policy strives to provide access within this context, utilizing all available means to provide the most convenient access possible, through available modalities, such as home and community solutions.

At this time, the GOJ aims to ensure that individuals, particularly in rural areas, will have access to potable water within 500 metres of their homes.

Service Targets for Water Supply

All households will have access to potable water supply by 2030. This means that water supply will be:

Safe—Potable water will conform to standards set by the MOH and the WHO.

Convenient—Water supply will be delivered to the home, or as close as possible. Water supply should be no more than 500 metres from the home.

Of sufficient quantity—Each person will have access to at least 50 litres per day

Reliable— Water supply will be available 24 hours per day, or otherwise on a predictable schedule.

Affordable—Pricing for water will continue to be arrived at by consultation with stakeholders. No one will be denied access to potable water because of an inability to pay.

These service targets will ensure a common standard of access to potable water for all Jamaicans. Meeting these targets is also essential for ensuring equity for women and other vulnerable groups, who often bear the burden of collecting water. Equity, including gender equity, is one of the guiding principles of the ***Vision 2030-National Development Plan***.

7.3 Current Situation - Access to Improved Sanitation

An improved sanitation facility is one that hygienically separates human excreta from human contact. Eighty-three (83) percent of Jamaicans had exclusive access to an improved sanitation facility in 2015 (Figure 7.2). Access is higher in rural areas, at 89 percent, than it is in urban areas, at 78 percent.

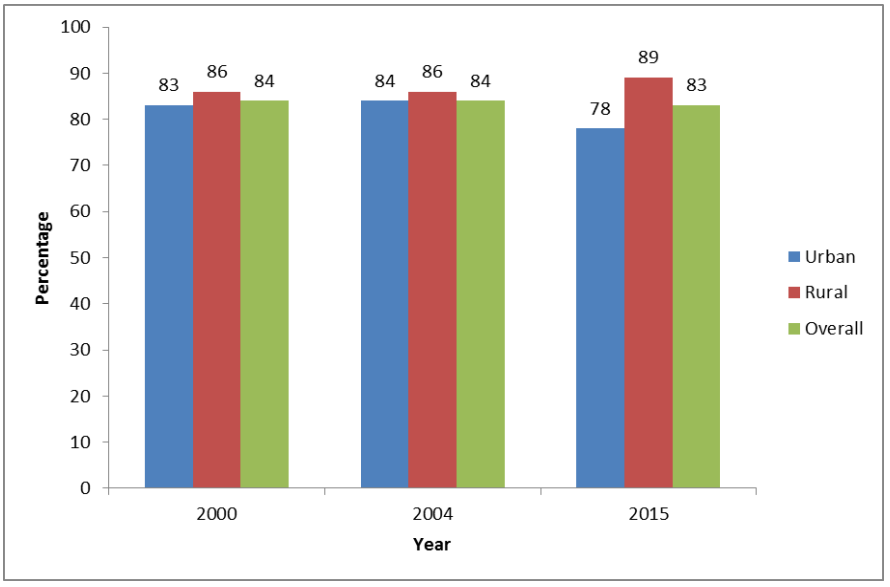


Figure 7.2: Access to Improved Sanitation
Source: Jamaica Survey of Living Conditions

7.4 Policy Measures

Service Targets for Sanitation

Cities and major towns will have sewerage services provided by a utility company. Where sewerage service is not economically feasible, all new developments will have access to safe and environmentally friendly sanitation solutions. These solutions will preserve the privacy and dignity of users. Standards for non-sewerage areas will be established and enforced by the National Building Code, MOH Regulations, stipulations by the Municipal Corporations and Local Authorities, and NEPA guidelines.

8 Water Supply in Utility and Non-Utility Service Areas

8.1 Current Situation

Access to improved sources of drinking water is high in Jamaica—92 percent of residents use improved water sources. Water supply is generally affordable, and tariffs are set by the OUR, an independent regulator. Further, the OUR and MOH set and enforce clear standards for the piped water supply network.

A major service gap is lower access to improved drinking water sources in rural areas, at 87 percent of the population. In addition, the piped water supply network reaches only 70 percent of the population. The NWC has primary responsibility for providing piped water supply throughout the island, but often does not deliver the service quality that its customers would like, and much of its infrastructure is poorly maintained. In addition, the NWC's tariffs do not cover the full cost of service provision; therefore, its ability to invest to expand services and improve service quality is limited.

Opportunities in water supply include a shared understanding of institutional gaps and stakeholders' commitment to the principle of cost recovery in service provision. Governmental budget limitations mean that cost recovery is necessary to expand and improve services. On the other hand, rising energy costs could raise the cost of treating and pumping water. Illegal tapping into the NWC's infrastructure could further damage the piped network.

Table 8.1: SWOT Analysis of Water Supply in Rural and Urban Areas

Strengths	Weaknesses
▪ Ninety two (92) percent of Jamaicans have access to improved sources of drinking water—97 percent of Urban residents, and 87 percent of Rural residents have access to improved sources. ▪ Services are generally affordable. ▪ OUR is an independent regulator with a clear mandate. ▪ OUR and MOH set and enforce clear standards for the piped water supply network.	▪ Access to improved water supply is lower in rural areas, at 87 percent. ▪ The piped water supply network reaches only 70 percent of the population. ▪ The NWC's service is not as reliable as customers would like. ▪ Water supply tariffs do not fully cover the NWC's cost of providing service, limiting its ability to make adequate investments in infrastructure. ▪ NWC assets fail before design life as a result of inadequate focus on maintenance. ▪ Non-revenue water (NRW) is 65 percent for the NWC. ▪ Freshwater resources are not distributed evenly, spatially and temporally, creating local and regional shortages.
Opportunities	**Threats**
▪ Shared understanding of service gaps and necessary institutional improvements. ▪ Commitment to principles of cost recovery and IMF backing of GOJ's economic programme increases investor confidence. ▪ An independent regulator and overall commitment to cost recovery gives Jamaica the potential to fund expansion services in the water sector because of fiscal constraints.	▪ Rising energy costs could raise costs for pumping and treating water and essentially cost to consumers. ▪ Central and Local authorities' budgets cannot allocate funding to upgrade and improve maintenance of service networks by increasing cost recovery. ▪ Assets at risk due to physical security.

8.2 Policy Measures

Differences in environmental and infrastructural conditions in utility and non-utility service areas create different obstacles to providing water supply in these two areas. To overcome these obstacles and achieve universal access to potable water supply, different technical solutions and institutional arrangements are needed.

The Government will provide piped water supply to persons where it is practical to do so. These areas to be served are referred to as Utility Service Areas (USAs). It may be impractical for the Government to provide piped water in areas that are considered remote from existing piped systems, sparsely populated, or on hilly terrain far above reliable water sources. These areas are referred to as Non-utility Service Areas (NUSAs). Other technical solutions, for example, rainwater harvesting systems and spring entombments, will be considered in NUSAs.

Defining Utility Service Areas and Non-Utility Service Areas

In urban areas, other towns and densely populated settlements, piped supply from a water utility service provider is the least-cost way to deliver water service. Such areas are called Utility Service Areas. In other areas of the country, piped water network service is not economical, and a variety of alternative techniques are needed to provide access to a safe and convenient water supply. Such areas are called Non-Utility Service Areas (Figure 8.1).

Utilities are enterprises which serve numerous households, operate electro-mechanical systems such as pumps, and have computerized billing and accounting systems.

The main utility service provider, the NWC, is preparing to expand piped water supply networks, to offer service to all households in Utility Service Areas by 2030. They will work with local authorities and the RWSL in collaborative planning exercises in each Parish. Through these planning exercises, investments in water supply will be finalized for both USAs and NUSAs. The exercises will confirm, or where necessary adjust, the NWC Parish Plans. The Parish Plans were developed to address the challenges and shortcomings of the water supply systems, and to move Jamaica's direct house-to-house water supply coverage to 85 percent.

The joined-up planning exercises, involving the utility service providers, Local Authorities, and the RWSL, will gather more detailed information on the most economical investments in all Parishes that are currently available. As a result, the utility service boundaries, given in Figure 8.1, will change slightly in some areas.

The Government, through the Ministry with portfolio responsibility for Water, will lead the development and implementation of a National Water Supply Plan, to facilitate the transfer of water from areas of surplus supply to areas of deficient supply.

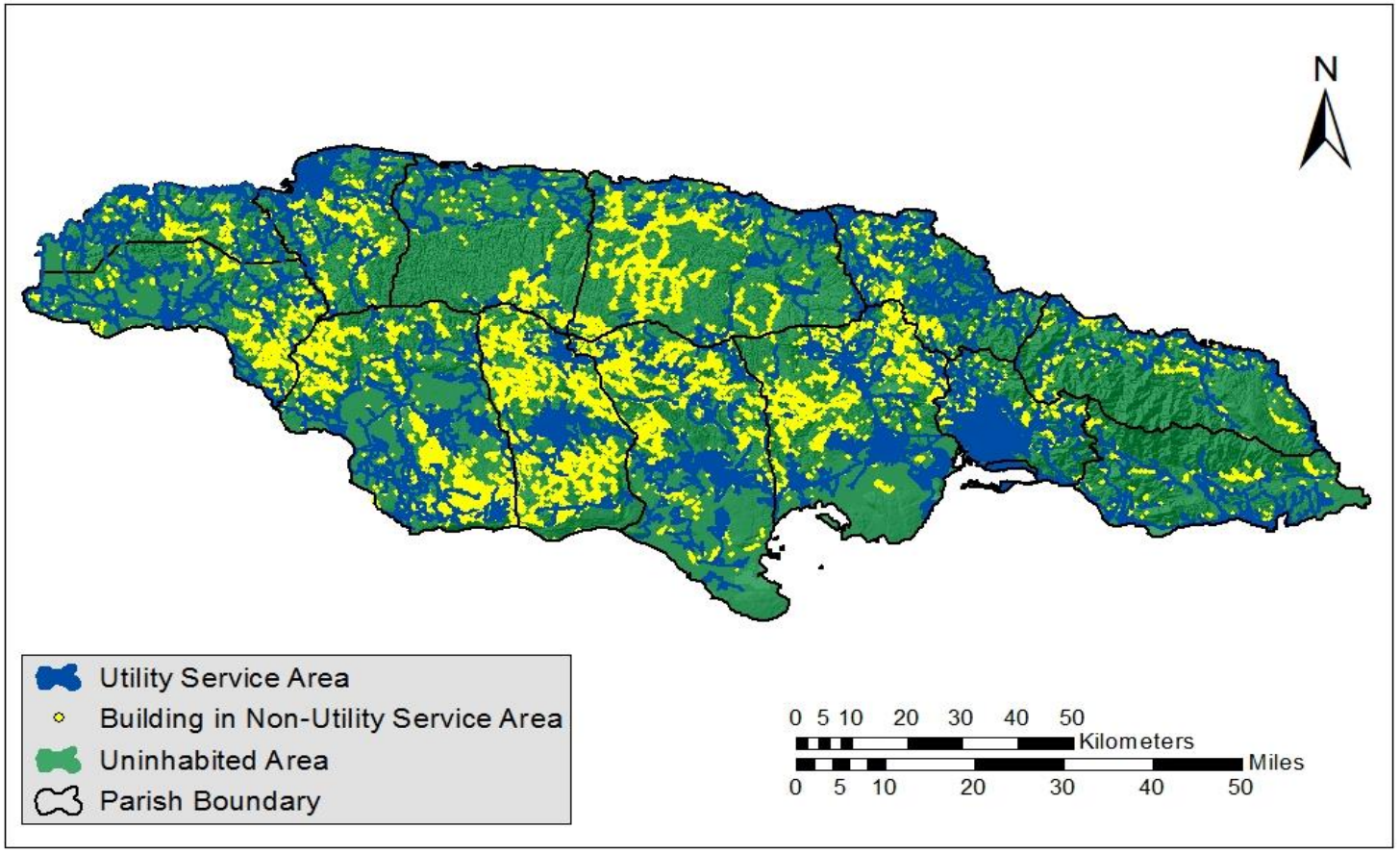


Figure 8.1: Map of Utility Service Areas and Non-Utility Service Areas

8.3 Water Supply in Utility Service Areas

Utility Service Areas are parts of the country where piped water supply by a Utility Service Provider is the least-cost method of providing water supply. Piped water supply only reaches approximately 70 percent of Jamaicans living in Utility Service Areas.

Service Targets for Water Supply in Utility Service Areas

All households in Utility Service Areas will have piped water supply to their residences by 2030, which will meet the service and affordability standards.

8.3.1 Technical

Piped water supply networks will reach all households in Utility Service Areas—about 85 percent of the population—by 2030 (Figure 8.2). Meeting this target will require expanding access from approximately 70 percent to 85 percent by 2030.

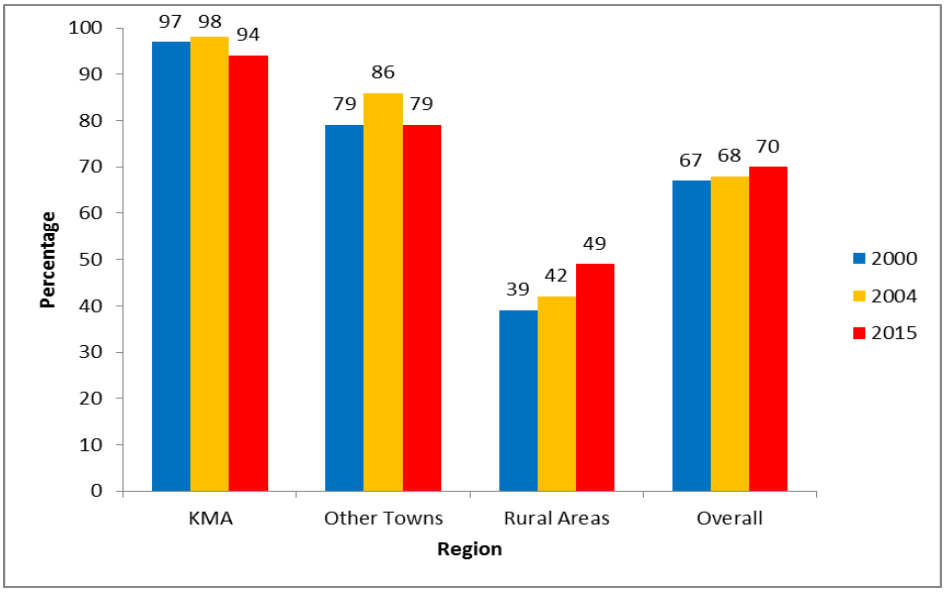


Figure 8.2: Access to Piped Water Supply
Source: Jamaica Survey of Living Conditions

8.3.2 Institutional

The GOJ will encourage a diversity of solutions and providers to effectively provide piped water services. The NWC and other service providers will continue to serve customers, and will expand piped water supply networks to meet national targets for service coverage, water quality, and financial sustainability.

8.3.3 Regulation

The OUR will continue to regulate private service providers, as well as the NWC, and hold them accountable for meeting service standards.

8.3.4 Financial

Cost recovery mechanisms will be used to ensure that the direct beneficiary pays and that the supply of service can be maintained. The tariff for the public supply of water and wastewater services for domestic or industrial use may include, among other things, the following:

(i) a lifeline rate;

(ii) full-cost recovery; and

(iii) differential tariffs, depending on the areas served. The objective will be to reflect in the tariff, the cost of providing the service, while also taking into account social considerations where appropriate.

Tariffs will allow utility service providers to recover reasonable return on prudent investments. The OUR will continue to set tariffs for both the NWC and private service providers in accordance with the OUR Act. The service providers will be responsible for increasing the efficiency of their operations, thus reducing costs to the most efficient levels. Where exceptional circumstances dictate the need for additional funds for systems improvements or rehabilitation, the OUR will take this into account in setting tariffs.

In general, the costs associated with the provision of water, sewerage and sewage disposal services may be categorized into:

a. Working Capital - financing required to support daily operational obligations.

b. Capital Works - financing required for capital renewal or system upgrade or expansions.

8.3.4.1 Working Capital Support

For operational or working capital support financing, this is usually of a short-term nature and usually arranged through the utility's financial institutions. Such arrangements are dictated by the financial health of the utility, as well as the prevailing market conditions, but generally come at a high cost to the utility.

8.3.4.2 Capital Works

The financing of a water utility's major capital works should be considered based on the useful life of the asset being considered for financing. The life of a certain asset is a key factor that determines the annual amortized asset expense (depreciation). Typically, water and

wastewater treatments are considered long term fixed assets, with a useful life of fifty to one hundred years. The financing modalities for assets renewal, as well as financing required for new and expanded water utility assets to address underserved demands, are listed below:

a. **Special Capital Improvement Fund** - the water utility regulator is very critical to service expansion, which invariably involves capital works implementation. The concept of a special capital fund on existing customers' monthly bills is an innovative approach to raise capital financing, which can be utilized to incrementally improve and expand utility works in a sustainable manner. The advantages are:

    i. High consuming customers (usually the wealthiest) would be financing improvement works to those with low or no service from the utility.

    ii. Better planning and prioritization on a predictable source of funds.

    iii. The utility may be able to advance the investment in capital works using such a predictable source of funding as collateral.

b. **Public Private Partnerships (PPPs)** - PPPs is a very popular approach to financing water utilities and have proven to be an important tool in improving utility performance and leveraging finance, which results in rapid development of the systems. It should be noted that a PPP transaction can take varying formats. The resultant transaction depends on the objectives for the private sector engagement. Some examples are:

    i. 100% divestment of the entire water utility to the private sector to capitalize and operate.

    ii. Divestment of certain capital works expansion to the private sector to construct and operate for a specific period. Both capital cost and operation and maintenance cost will be agreed and paid for over the life of the arrangement. This arrangement could also be applied to a specific section of an operational area, where the private sector takes over and operates.

    iii. Divestment through share offerings on the stock exchange to raise capital for the utility to undertake its capital expansion plans.

c. **Water Utility Floating Bonds -** Bonds are a very attractive financing modality for water utilities for the following reasons:

    i. Bonds are long-term financing, preferably 20-40 year bond. These types of bonds support the long-term fix assets. These assets earning maturity

are usually 15 years after installations, which means such assets can support the repayment of the greatest portion of the bond during their serviceable life.

ii. They are ideally suitable for pension funds and other investments requiring long term investment instruments.

iii. They allow for better debt servicing planning, especially where such bonds are issued in local currency, the utility would have mitigated the risk exposure of foreign exchange movements.

d. Issuing of Preference Shares - this is another option that could be considered by the engagement of targeted investors to participate in such an investment. Depending on negotiations, investors may require a specific rate of return. A very useful financing option for:

i. Refinancing existing debt as a debt management tool

ii. Financing specific asset installation that have demonstrated positive rate of return should the investment proceed.

e. Existing Assets as Collaterals - the use of the water utilities existing assets as collaterals to finance its capital works expansion activities. While this may limit the finance that can be raised, it does offer some alternative to the utility, by avoiding government guarantees. The financing provided may however be at a higher interest rate, to mitigate the risk of the asset not being maintained at the initial value, or to ensure maintaining the value of the collateral.

8.3.4.3 Financing Infrastructure for New Housing or Other Developments

In new developments, the developer will be required to meet all on-site infrastructural costs. The developer should be able to recover these costs through the sale price of the units. Where off-site infrastructure is undertaken to benefit a clearly identified new housing development, industrial park, or individual residence exclusively, the capital cost will be met by the developer. These costs should be recovered in the sale price of the units. The cost of off-site infrastructure, which serves new or existing developments, as well as other neighbouring communities, will be recovered via normal tariffs. Having regard to the administrative implications of applying the above approach to funding and cost recovery with respect to major projects, the areas requiring attention will be identified, and the appropriate funding and method of cost recovery prescribed ahead of time. Private sector involvement in sourcing the necessary funds and carrying out the project may then be solicited.

8.4 Water Supply in Non-Utility Service Areas

Non-Utility Service Areas are parts of the country where piped water supply is not the least-cost method of providing water supply by a Utility Service Provider. Approximately 15 percent of Jamaicans live in Non-Utility Service Areas.

Service Targets for Water Supply in Non-Utility Service Areas

The GOJ's policy is that everyone in Non-Utility Service Areas will have access to potable water by 2030. The Water Supply Development Strategy for Non-Utility Service Areas, details how the GOJ will achieve this target, including the technical options, institutional responsibilities, and financing mechanisms that will be used.

Meeting this target is especially important for achieving equality and improving the livelihoods of women and other vulnerable groups, who often bear the burden of collecting water for the family.

8.4.1 Technical

Various modalities will be used to provide water supply in Non-Utility Service Areas. The appropriate method will depend on the area being served, and be determined by the community or household that will benefit from the water supply system. Technologies used will include spring entombments, small piped gravity-fed or solar powered systems, and community or individual rainwater harvesting (catchment tanks) systems.

The technology chosen for each community will depend on water resource availability. Where reliable springs are available in proximity to a community, they will be used. Elsewhere, rainwater harvesting will often be the most suitable option to access water.

Institutional arrangements will also affect technology choices. Community systems can be used where there are strong community organizations or local authorities with the funds and expertise to maintain them, and to ensure water is used efficiently. Where these conditions are not in place, individual rainwater harvesting systems will often be the best solution.

All systems will be designed with trucking of water as a back-up option in the event of drought conditions.

8.4.2 Institutional

Institutional roles in Non-Utility Service Areas include roles in building and maintaining rural water supply infrastructure and roles in the Rural Water Planning Process.

- **Building and maintaining rural water supply systems** – Households and communities have traditionally satisfied their own water supply needs and are best-placed to meet local challenges. In some cases, the GOJ, through local authorities and community groups, will provide technical, institutional or financial assistance to meet their needs.

- **Local Authorities** – provide water supply to the public by operating and maintaining minor water supply schemes. However, some Municipal Corporations lack the resources needed. Municipal Corporations that intend to rehabilitate existing systems will be encouraged to do so and maintain the systems. The same principle will apply to Municipal Corporations that require the construction of new systems. They will need to show that they have the organizational and financial capacity to do so, if the RWSL is to offer assistance.

  Where Municipal Corporations provide water supply, the concept of water shops (physical locations operated by staff who collect fees from users to cover the cost of provision) – may be an option.

  Consistent with the Parishes Water Supply Act (1889), Municipal Corporations will have the right, but not the obligation, to supply water. Where they are not able to provide water, communities and households outside the Utility Service Areas may organize to meet their own needs, with assistance from the RWSL.

- **Community groups (such as Benevolent Societies)** – may be Water Service Providers. These community groups may already be operating systems, or may be formed for the purpose of developing and operating new schemes. Community groups may take over schemes that Municipal Corporations no longer choose to operate.

The Ministry with portfolio responsibility for Water will enter into a Memorandum of Understanding (MOU) with the Rural Water Supply Limited (RWSL) to assist in meeting the national objectives for water supply in Non-Utility Service Areas. Where necessary, RWSL will provide technical and institutional support to communities and households. RWSL will also play a monitoring role, subject to the availability of funding, in keeping track of past projects to ensure that they continue to deliver target levels of service for their beneficiaries.

In responding to requests for assistance, the RWSL will prioritize areas that require assistance according to the urgency of the need. RWSL will work with communities and households to identify problems, needs, and ideas to improve service. Communities and households will be able to request assistance from the RWSL through the Municipal Corporations or other appropriate means.

The RWSL will develop a Master Plan for the supply of potable water. This Plan will propose solutions, taking into consideration the projected demand, the status of existing systems, water resource availability and the socio-economic profile of the communities. All solutions must be institutionally sustainable, where RWSL will work with local authorities, communities and households, to set up long-term and participatory local structures that will ensure that new

water supply systems are adequately maintained. These structures will be set up in accordance with the guidelines in the Water Supply Development Strategy for Non-Utility Service Areas.

The Parish Health Departments shall monitor all rural water systems, including those in which the RWSL is not involved, to ensure that they meet national health standards.

8.4.3 Financial

To assist households, community organizations and Municipal Corporations, the GOJ will consider options for funding. The Policy envisages the creation of a Water Access Fund. This would be a revolving fund under the aegis of the Ministry with portfolio responsibility for Water. Funding will be sought from the GOJ for the initial financing of the Fund. The funding options considered by the GOJ will provide finance, on a loan or grant basis, to non-utility projects recommended and managed by the RWSL as part of the Water Supply Development Strategy for Non-Utility Service Areas. Given the wide range of projects and providers, this funding will offer a diversity of financing options, including:

- Loans to households for individual rain-water harvesting systems. These loans could be administered through co-operative banks, farm-stores, or on a micro-finance basis, with community responsibility for repayment.
- Grants to households toward part of the cost of individual rain-water harvesting systems. These grants could provide part-payment for tanks to improve rainwater harvesting for houses in a single community, or in the form of vouchers, which can be used as part-payment for tanks from hardware providers.
- Loans to community organizations for rehabilitation or construction of small community water supply schemes. These loans would be on concessional terms, based on the ability of the community to service the loan.
- Loans to Municipal Corporations for rehabilitation or construction of small community water supply schemes, such as community catchment tanks, and gravity-operated, spring-fed piped systems.

Eligibility for financial assistance from these funding options would include an assessment by the RWSL that:

- The design is technically sound
- Construction will be properly supervised
- The facility is likely to be maintained by its owner, and
- Adequate capacity exists to monitor water quality

Administration of disbursements and collection would be contracted out to a financial entity with the relevant experience, and a network of operations in Non-Utility Service Areas throughout Jamaica. The Ministry with portfolio responsibility for Water will seek partnership with a multi-lateral development bank to rapidly create and capitalize the considered funding options.

Projects in Non-Utility Service Areas identified through the Water Planning Process would be eligible for finance from the funding options considered by the GOJ. Each project will need to be identified in community consultations, designed, and assessed for cost and viability.

Since communities and households will mostly provide these services themselves, they will also need to maintain systems that they establish. Community schemes will be able to charge cost-recovery tariffs approved by the OUR.

8.5 Social Water

Social water refers to the provision of minimal levels of water and sewerage services to persons who cannot afford to pay the full cost. This definition is also expanded to include water supplied to the public in circumstances where collecting payment from the user is impractical.

Some households in Utility Service Areas cannot afford the full cost of piped water service. Households in Non-Utility Service Areas rely on sources such as catchment tanks, standpipes and trucking. These sources must provide the minimum standards for the sustenance of life and good public health, irrespective of the citizen's ability to pay.

The Government's policy is that minimum standards of water and sanitation services will be made available to all at an affordable price. To implement this Policy, the following Ministries/Agencies will work together to determine the minimum standards of service for social water:

- Ministry with portfolio responsibility for Water;
- Ministry of Local Government and Community Development;
- Ministry with portfolio responsibility for Health;
- National Water Commission;
- Planning Institute of Jamaica;
- Office of Utilities Regulation; and
- Consumer Affairs Commission.

This group will recommend the appropriate levels of service necessary for households. They will also consult with the Ministry with portfolio responsibility for Finance, to determine the appropriate mix of revenue sources to cover the cost of the recommended levels of social water. The following sources of revenue will be considered:

- Tariffs and user fees, and
- Cross-subsidies *(this means that some customers will pay more than the cost of the service provided, so that other customers can receive service at below cost).*

In quantifying the social water commitment, the GOJ will utilize a:

- Multi-tiered lifeline rate, which is designed to promote universal access. Lifeline rates are targeted subsidies, based on the consumption level of households; that is subsidized rates for a first block of consumption, which is enough to cover basic needs for water, for example, 50 litres per day. This consists of using consumption volume as a

targeting mechanism, and provides an easy quantitative target as to what and how much to subsidize. This is considered as an instrument of social policy, and as a way to increase the purchasing power of the poor.

- Beneficiary Identification System, similar to that used by the Programme for Advancement through Health and Education (PATH) to support the provision of social water. This will ensure that the neediest households receive the assistance they require to meet basic needs.

The GOJ will also implement more stringent measures and take legal action against households deemed as having the ability to pay, to ensure revenue stability of utility service providers.

9 Drought Management

9.1 Current Situation

Jamaica has a bimodal rainfall pattern with two (2) peak periods. The primary peak occurs in October/November and the secondary peak in May/June of each year. The December to April and July to September periods are low rainfall periods or the dry season. The lowest rainfall occurs in February to March and July each year. The southern coast experiences much less annual rainfall levels than in the north. The rainfall pattern for the island is shown in **Figure 9.1**, which represents the thirty-year mean rainfall for the period 1971 to 2000.

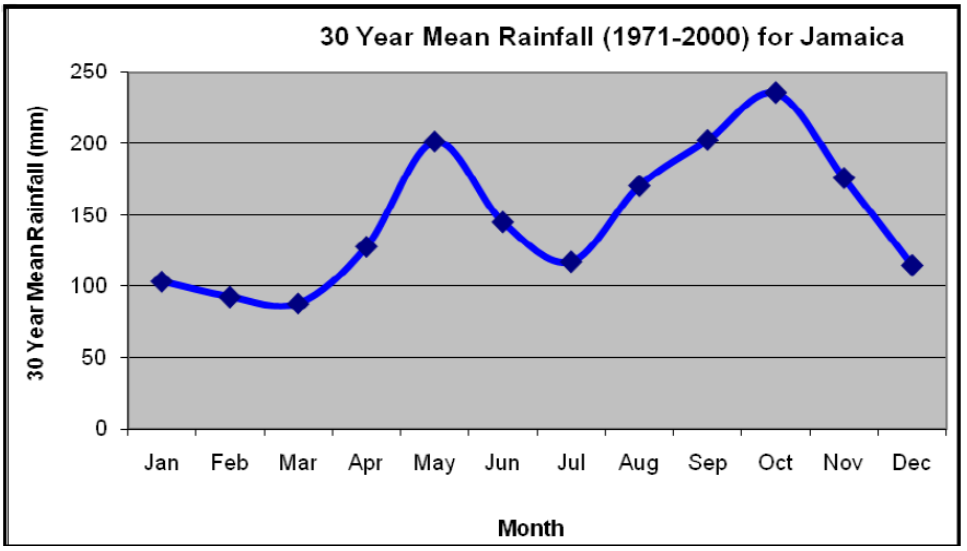


Figure 9.1: Precipitation Pattern for Jamaica, 1971-2000
Source: Meteorological Service of Jamaica (2015)

Annually, the country receives an average of 21,080 MCM of rainfall. Approximately 50 percent or 10,051 MCM return to the atmosphere via evapotranspiration; 6,530 MCM go to surface runoff, via overland flow and rivers, and 4,499 MCM go to groundwater aquifers as recharge. From the 4,999 MCM going to groundwater aquifers, 97 percent goes to the limestone aquifers and three (3) percent to the alluvium (sand and gravel) aquifers. In June 2015, the island received rainfall averaging 40mm, which corresponds to 72 percent below the 30 year (1971-2000) mean. This was 7mm less than that received in June 2014. When the two rainy seasons fail to provide sufficient rainfall, rivers dry up, leaving a shortage of water, resulting in drought conditions.

In 2015, all parishes recorded below normal rainfall. The Meteorological Service of Jamaica reported that, for the month of June 2015, St. Mary and St. Thomas recorded the lowest rainfall levels, accounting for eight (8) percent of their 30 year (1971-2000) normal or 10mm and 13mm, respectively. This was followed by Clarendon, with nine (9) percent or 8mm. Data for the other parishes for the period are: Kingston and St. Andrew – 15 percent or 15mm;

Manchester – 18 percent or 20mm; Trelawny – 21 percent or 19mm; St. Elizabeth – 26 percent or 33mm; St. Ann – 29 percent or 27mm; St. Catherine – 34 percent or 37mm; Portland – 35 percent or 73mm; St. James – 38 percent or 61mm; Hanover – 39 percent or 111mm; and Westmoreland – 43 percent or 93mm.

Below average rainfall levels have resulted in persistent drought conditions across the island. Over the past two (2) decades, the frequency and intensity of drought conditions have risen significantly. Persistent droughts have been associated with extreme warm temperatures related to the El Nino phenomena. While drought conditions affect a wide section of the population, resulting in frequent restrictions in water supply for domestic and agricultural uses, rain-fed agriculture is accepted as being the most affected.

A National Drought Management Committee was established to play a proactive role in mitigating the impacts of drought on the economy. The Committee assessed and formulated short and medium term measures to mitigate the drought situation facing the country.

Table 9.1: SWOT Analysis of Drought Management

Strengths	Weaknesses
▪ Institutional capacity to monitor and analyse trends in areas of disaster management. ▪ Establishment of a Drought Management Committee. ▪ Seventy seven (77) percent of the current reliable and safe yield or 3,165 Million Cubic Metres of water is available for development. ▪ Short and medium term interventions are in place to combat the current and future drought conditions.	▪ The lack of finances, in the short term, to immediately provide solutions that require capital. ▪ Lack of long term planning strategies. ▪ Limited/poor water storage systems. ▪ Lack of Infrastructure to transfer water from areas of surplus to areas with demand shortages. ▪ Groundwater deficit in the south due to contamination of aquifers.
Opportunities	**Threats**
▪ Revise National Drought Management Plan. ▪ Development of a Rainwater Harvesting Guidelines and strategies to encourage sufficient storage. ▪ Construction of individual storage systems to mitigate against local water shortages and reduce the need for national infrastructure. ▪ Implementation of a National Water Supply Plan to facilitate the north to south transfer of water. ▪ Commitment to undertake research to improve storage and to implement long-term projects, for example Artificial Groundwater Recharge. ▪ Increase public education initiatives to improve water conservation.	▪ Significant adverse effects of climate change on the quality and quantity of the water resources. ▪ Population growth increases the demand for domestic water. ▪ Vulnerability to drought due to heavy reliance on agriculture. ▪ Freshwater resources are not distributed evenly spatially and temporally, creating local and regional shortages.

9.2 Policy Measures

Due to the detrimental effects of drought, the GOJ is committed to developing strategies to ensure minimal impacts on the socio-economic situation of the country.

Service Targets for Drought Management and Mitigation

The GOJ will revise the National Drought Management Plan to mitigate against the impact of drought conditions.

The GOJ will ensure that projection models and an effective monitoring programme is in place to provide long term planning, development of plans and programmes, and the sourcing of financing to implement the plans and programmes designed to combat the effects of drought on the country, in particular, vulnerable communities and the agricultural sector.

Proactive risk management measures and preparedness plans will also be in place to increase coping capabilities, as well as effective emergency response programmes to reduce the impact of drought.

The Components of the Drought Preparedness and Mitigation Plans include:

I. **Projection**–Climate studies, projection models and awareness of water storage levels and facilities to help in the formulation of prediction models.
II. **Monitoring**–The monitoring of rainfall patterns and weather conditions. Data collection will assist with planning for the severity and long term impact on the country by drought and other hazards.
III. **Impact Assessment**–Impact assessments should be completed through the use of surveys on community vulnerability and the strength of the agricultural sector to withstand the impact of hazards.
IV. **Response**–The response capability should provide for improved monitoring of water and crop management, and public education programmes to encourage water conservation and safe use practices.

The GOJ, through the National Water Commission, will encourage Demand Side Management approaches and place emphasis on reducing Non-Revenue Water (NRW). The key activities to be pursued under these areas are as follows:

9.2.1 Demand Side Management

Demand-side water management is generally presented as part of an integrated approach to water resources management. It is a set of coordinated measures to improve water, energy or other environmental services by inducing changes at the point of consumption. It is an accessible tool which will mitigate the effects of drought caused by climate change and our stressed water storage facilities. To incorporate this approach, the GOJ will:

- Encourage water reuse and recycling, where it is safe to do so.

- Provide incentives to encourage home owners, businesses, institutions and private service providers to invest in water efficient technologies.
- Create a water efficiency criterion, using technologies such as showerheads, faucet aerators and toilets.
- Implement a public education programme to inform users of the importance and benefits of water conservation and water efficiency through efficient technologies.
- Encourage and support water saving entrepreneurship through the agencies, by promoting initiatives to reduce water consumption and improve efficiency.
- Implement programmes to encourage the teaching of water conservation in schools.
- Encourage water use efficiency through appropriate legislation, building codes and tariffs.

9.2.2 Reduction of Non-Revenue Water

Non-Revenue Water (NRW) includes leaks, overflow of tanks, estimated meter reading, theft, bypass and other illegal connections. Non-Revenue Water is currently about 65 percent of the water produced by the NWC. To reduce NRW from 65 per cent to 45 per cent by 2030, the GOJ will:

- Intensify the programme of leak detection and repairs, by strengthening the capability of the Regions and assuming a more proactive approach to leak repairs.
- Undertake capital intensive projects for efficiency improvement, inclusive of mains replacement and other NRW reduction activities.
- Introduce better monitoring and control systems to reduce overflow and other losses at storage facilities and treatment plants.
- Complete metering of production sources to ensure more accuracy in measuring NRW.
- Provide institutional strengthening to support the NRW reduction effort.
- Use private sector entities, under incentive based contracts, to provide the acceleration of NRW reduction, through cutting edge technologies and training.

9.2.3 Increased Storage Capacity

In addition to preventing losses, the NWC will develop new sources, new storage and increased ability to transfer water from areas of surplus to water deficient areas. Where NWC is unable to provide a sustained supply of water due to drought conditions, trucking of water will continue, with priority given to hospitals, health centres, schools, public institutions and communities. Households will also be encouraged to harvest and use rainwater to augment the public supply.

The GOJ will also bring more wells into operation and increase the treatment of water from wells for distribution.

More artificial limestone aquifer recharge projects will be considered. The artificial recharge work comprises the establishment of facilities to increase the groundwater potential in the limestone aquifer, by treating and discharging surplus surface water into sinkholes and wells, in order to sustain abstraction from wells.

9.2.4 Agricultural Efficiency

The Agricultural sector relies heavily on rainfall in sufficient amounts. Longer periods of drought will incur higher water and production costs for food production, as well as, affect the quantity and variety of agricultural produce available for consumption.

The GOJ will therefore:

- Mainstream climate change issues into agricultural management.
- Use modelling approaches and tools to assess the impacts of climate change on crops.
- Train farmers and other stakeholders in efficient water and land management practices; in efficient and economical irrigation systems, such as, drip irrigation systems. The use of small portable pumps and tanks for water storage will also be encouraged.
- Encourage farmers to plant seeds in trays, instead of direct seeding, in order to use available water more efficiently.
- Encourage farmers to plant drought-tolerant crops that are able to withstand increasing temperatures, such as cassava, pineapple, sweet potato, gungo peas and ginger.
- Encourage research on alternative crops that can be grown in greenhouses.
- Encourage the use of rainwater harvesting systems and other appropriate technologies on small farms.
- Explore the rehabilitation of existing permanent water tanks in communities across the island.
- Strengthen the multi-sectoral approach to disaster risk management.

10 Rainwater Harvesting

10.1 Current Situation

Rainwater harvesting is a technique of collection and storage of rainwater into natural reservoirs or tanks, or the infiltration of surface water into subsurface aquifers. If executed properly, rainwater harvesting can be a cost-effective means of augmenting water demands. It remains an attractive option to meet shortfalls in supplies, particularly during periods of drought conditions. Rainwater harvesting is also necessary for enhancing water security following natural disasters, such as tropical storms and hurricanes, where water supply distribution infrastructure may be damaged and remain out of commission for extended periods. It may decrease peak flows, as well as, reduce flooding and damage resulting from flooding. The system can serve individual households or communities. Household systems typically use the roof to catch water, in an elevated storage tank, and may include a system of pipes to deliver water to indoor taps. Community systems collect rainwater from a large concrete or metal catchment area and transfer it through pipes to a large storage tank. Rainwater harvesting may also be utilized in other sectors, such as agriculture, construction and tourism.

Rainwater harvesting is currently used by approximately 15 percent of households as their main source of water supply, including 31 percent of households in NUSAs. There are 353 community rainwater harvesting tanks that serve NUSAs. Maintaining rainwater harvesting systems is low-cost and does not require advanced technical knowledge. In many parts of the country, it is the least-cost method of delivering reliable water supply, combined with a reliable backup option, such as trucking. Backup supply is most often necessary during periods of drought conditions.

Average annual rainfall across the island is very high at 1,981mm per year. Figure 10.1 shows that the eastern and western parts of the country have high levels of rainfall—often 2,000mm or more per year. Rainwater harvesting is likely to be an attractive water supply option in these areas. In other areas, such as the southern parts of St. Catherine and Clarendon, rainfall levels are below 700mm annually.

Climate variability results in variations of rainfall levels across the country. As such, rainwater harvesting is not always the most sustainable option. However, the loss of some traditional water sources (catchments have dried up), along with increasing competition for water from domestic, manufacturing, agriculture, industrial and commercial users, have further highlighted the urgency to incorporate rainwater harvesting practices in the development approval process, by developing a set of guidelines. These guidelines would provide information to the public, developers and the Planning Authorities on standards and requirements for establishing rainwater harvesting systems.

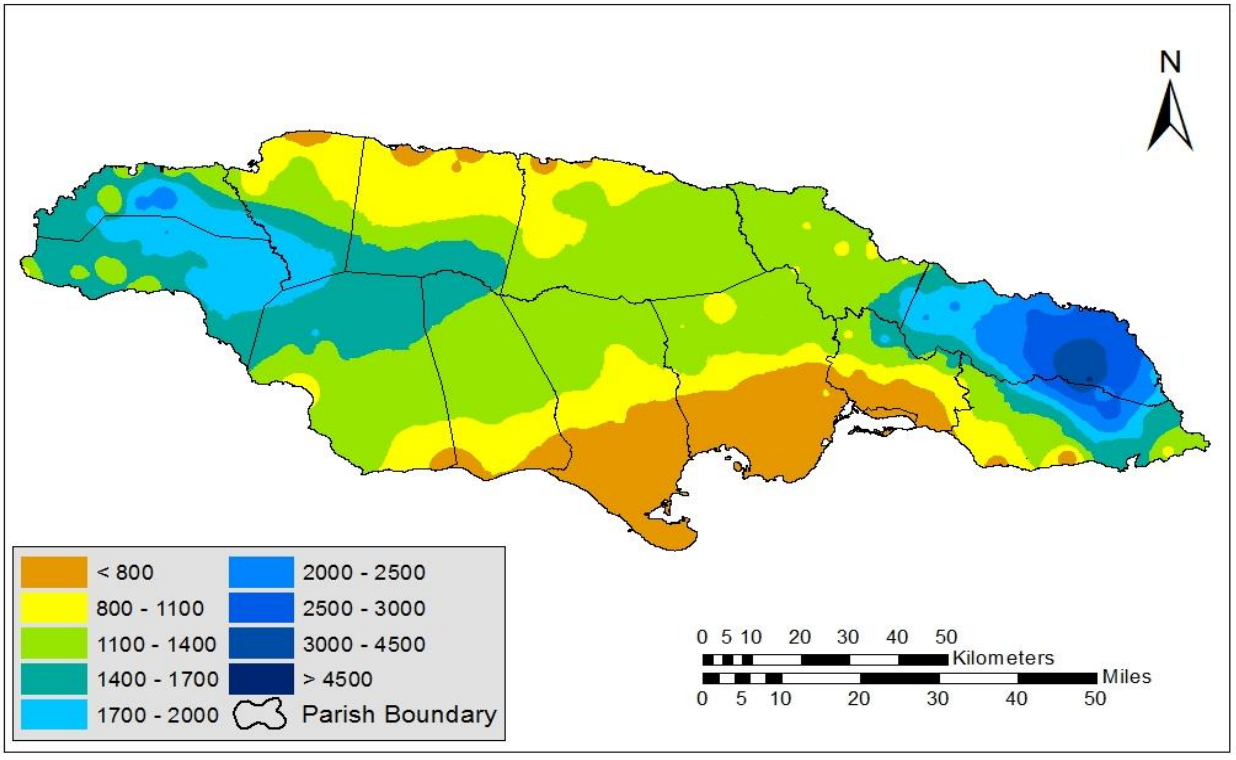


Figure 10.1: Rainfall Levels in Jamaica
Source: Water Resources Authority

Expanding rainwater harvesting, especially at the household level, is a good option to increase access to potable water in parts of the country that lack access to groundwater or surface water sources.

In most households, women and children are the ones who collect water. Rainwater harvesting systems are usually installed at or near the home, thus reducing the time spent collecting water outside the home. Although they are inexpensive to maintain, upfront costs for rainwater harvesting systems may be too high for some households. As such, some households may require financial assistance.

Existing community catchment tanks may also be rehabilitated in many communities as a low-cost method of providing reliable water supply.

Table 10.1: SWOT Analysis of Rainwater Harvesting

Strengths	Weaknesses
▪ Fifteen (15) percent of Jamaicans (31 percent of rural Jamaicans) use rainwater harvesting as their primary source of water supply. ▪ Rainwater harvesting systems requires minimal treatment, such as a small amount of household bleach. ▪ Maintenance costs for rainwater harvesting systems are low, and little technical expertise is needed.	▪ Low rainfall in some areas means large storage/catchment facilities are needed in those areas. ▪ Many rainwater harvesting systems, especially community systems, have fallen into disrepair, reducing security of water supply. ▪ Many rainwater harvesting systems are not sufficiently reliable due to inadequate storage, meaning that costly back-up systems such as water trucking are needed too often.
Opportunities	**Threats**
▪ Rainwater harvesting can be used in areas without access to groundwater or reliable surface sources. ▪ Households can manage their own rainwater harvesting systems, and control their own water supply. ▪ Rehabilitating existing community catchment tanks is a low-cost way to increase water supply security in many rural communities.	▪ Rainwater harvesting may reduce the rate of groundwater recharge. ▪ Capital costs for new systems are high relative to households' ability to pay. ▪ Financing for new systems may be difficult to obtain, and public funds to subsidize new systems could be limited.

10.2 Policy Measures

The GOJ recognizes the importance of rainwater harvesting in providing potable water for households, and the potential to expand access to potable water through rainwater harvesting systems. For these reasons, the GOJ will develop and adopt a Rainwater Harvesting Guideline.

Policy on Rainwater Harvesting

The GOJ will encourage and strengthen the capacity of households and entities to utilize rainwater harvesting systems to augment water supply. A special incentives regime will be developed to offset the cost of investment in rainwater harvesting systems for households and businesses requiring assistance. This incentive regime will be developed around water conservation and other demand side management approaches that would reward good practitioners and penalize abusers.

The GOJ will also promote the rehabilitation and maintenance of community catchment tanks, where Municipal Corporations, Local Authorities, or communities themselves wish to take on the responsibility of maintaining these systems. Drinking water supply from rainwater harvesting systems should be treated or filtered to meet MOH and WHO standards before it is consumed.

Rainwater harvesting systems that are used as a primary source for household or community water supply will be designed to deliver the most optimal volumes of water. A reliable backup supply, such as trucking may be necessary.

10.2.1 Technical

Households and businesses with a rainwater harvesting system are dependent on the amounts and frequency of rainfall for their water supply. The frequency and quantity of rainfall is, to some extent, unpredictable and may provide insufficient water to meet individual needs at times. Systems should be able to supply water for at least 90 percent of the year to be adequately resistant to drought. When implementing and rehabilitating rainwater harvesting systems, the following will be used to ensure reliable supply:

(i) **Increasing the size of the catchment area** to increase the amount of water harvested. This is done by adding metal extensions to the roof of a household, or on the sloped catchment area of a community catchment tank.

(ii) **Increasing water storage capacity** can ensure that sufficient amounts of water are stored during times of rainfall to meet the needs of households during times of drought conditions. Increasing storage capacity is done by increasing the number of tanks or the size of the tanks used to store water.

(iii) **Ensuring reliable back-up supply**: Regardless of the modifications that households undertake to ensure that rainwater harvesting systems supply sufficient water, there is a possibility that households may face water shortages due to irregular weather patterns. Households can ensure continual access to water by supplementing harvested rainwater with water delivered by trucks. Trucking of water by private providers will be regulated to ensure that they meet the required safety standards of the MOH.

(iv) **Ensure water quality monitoring**: Monitoring of harvested rainwater quality will be conducted, particularly for drinking purposes. Minimum standards for rainwater harvesting systems, to ensure safe supplies, will be according to MOH requirements.

(v) **Incentivizing rainwater harvesting through value creation**: To create value for harvested rainwater, the GOJ will implement and create a marketplace in which harvested rainwater can be bought and sold to enable revenue generation. This will be done by creating an accessible online marketplace to buy and sell excess rainwater harvested by users and providers, and utilizing water trucks managed by the Municipal Corporations for distribution.

While trucking water is expensive, it is a good back-up option for long periods with no rainfall, when storage capacity runs dry. Household rainwater harvesting systems can be designed to limit periods when storage runs dry; therefore, trucked water would only be needed to fill storage tanks about five (5) to ten (10) percent of the time.

10.2.2 Institutional

Different maintenance and water management arrangements are appropriate for household rainwater harvesting systems and community catchment tanks. Households will maintain their own household rainwater harvesting systems and manage their own water use. This is appropriate, since households directly benefit from their own system. Communities will share the responsibility of maintaining community catchment tanks and managing water. Communities should organize to manage catchment tanks directly; or Municipal Corporations or Local Authorities should maintain them.

For communities and households that need help, the RWSL will provide technical assistance to install rainwater harvesting systems, or to upgrade existing systems to meet GOJ safety and reliability standards.

10.2.3 Financial

Households and communities will have the responsibility for payment and maintenance of their own rainwater harvesting systems. Financial assistance will be provided for households and communities who are unable to do so, through the options for funding considered by the GOJ. Special incentives and creative financing options will be utilized.

11 Wastewater Management in Utility and Non-Utility Service Areas

11.1 Current Situation

Eighty-three (83) percent of all Jamaicans have exclusive access to improved sanitation facilities. However, only 22 percent of the population is connected to a sewerage network. In urban centres, households traditionally construct onsite sewage disposal systems, and the positioning of such systems make connecting to the NWC sewerage network costly.

The legal framework clearly defines the roles and responsibilities of Ministries/Agencies with respect to wastewater management. The Public Health Act sets national standards for the collection and disposal of waste material and assigns the responsibility for monitoring and enforcing these standards to the MOH. The Natural Resources Conservation Authority (NRCA) (Permits and Licenses) Regulations implements a system of permits for waste disposal. The National Environment & Planning Agency (NEPA) monitors the health of the environment and the Office of Utilities Regulation (OUR) engages in setting and enforcing quality of service standards for sewerage networks.

Effluent from sewage treatment plants, other types of sanitation facilities, and industrial discharge, pollute the environment and endanger ecosystem and human health. For example, 75 percent of sewage waste disposal systems are soak-away systems, which have the potential to contaminate groundwater sources, especially in densely populated areas. The NWC operates the national sewerage network, but recovers approximately 64 percent of the average cost of service.

Increasing the level of access to the sewerage network would serve as an incentive for the NWC to increase wastewater treatment capacity, by improving the capacity of existing treatment facilities or creating new treatment facilities. The NEPA is monitoring current levels of environmental contamination and may advocate for increased sewerage network access and wastewater treatment capacity, if environmental conditions deteriorate.

The forgoing problems in wastewater management threaten the environment and the health of citizens in several ways. Run-off and overflow from pit latrines or septic tanks damage the environment and, especially in areas with high population density, create risks to human health. The lack of wastewater treatment capacity creates a potential for faecal matter to enter the environment and contaminate both coastal waters and freshwater sources. Thirty-six (36) percent of freshwater sources show increased levels of faecal matter or faecal bacteria. Only 52 percent[19] of municipal sewage treatment plants nationally, comply with Faecal Coliform standards.

[19] Ministry of Health Wastewater Treatment Plant Assessment Project, 2010

Table 11.1: SWOT Analysis of Management of Wastewater in USAs and NUSAs

Strengths	Weaknesses
▪ Eighty three (83) percent of Jamaicans have access to various modes of improved sanitation facilities—81 percent of Urban residents, and 87 percent of Rural residents have access to improved sanitation. ▪ Clear legal framework assigns responsibility for service provision. ▪ Services are generally affordable. ▪ OUR is an independent regulator with a clear mandate to set and enforce quality of service standards for sewerage networks. ▪ NEPA monitors the quantities of wastewater produced, the capacity of the wastewater treatment facilities, and the environmental contamination caused by untreated wastewater. ▪ MOH monitors effluent water quality and plant compliance to regulations.	▪ Only 22 percent of the Jamaican population is connected to the sewerage network. ▪ Seventy five (75) percent of sewage waste is disposed through soak away systems, which have the potential to contaminate aquifers[20]. ▪ Fees collected for wastewater services recover approximately 64 percent of the average cost of service provision. ▪ Sewage reaching various sewage treatment plants exceed the plant design capacity. ▪ Non-compliance rate for sewage effluent quality standards is high.
Opportunities	**Threats**
▪ Private service providers can be engaged to improve wastewater treatment services. ▪ Increased sewage treatment is expected to improve water quality and minimize environmental damage.	▪ Inadequate investment in wastewater management. ▪ Approved tariffs may limit the recovery of the cost of service provision. ▪ Population growth has outstripped the capacity of some sewage treatment plants. ▪ Weak economic environment results in poor plant maintenance.

11.2 Policy Measures

Various technical solutions and institutional arrangements are needed to provide safe sanitation services in rural and urban areas.[21] This is because differences in population densities threaten the environment and the health of citizens.

Policy on Wastewater Management in Utility and Non-Utility Service Areas

The GOJ's policy is that all households will have access to sanitation facilities that protect the health of users and the environment by 2030. The MOH sets and enforces standards for sanitation facilities. Municipal Corporations and Local Authorities will assist in enforcing standards in Non-Utility Service Areas.

[20] NEPA, State of the Environment Report 2010.
[21] Vision 2030, p. 287

11.3 Wastewater Policy in Utility Service Areas

Wastewater Service Targets for Utility Service Areas

The GOJ's policy is that sewerage networks will be extended to all USAs by 2030.

11.3.1 Technical

Piped sewerage services will reach all Jamaicans in the Kingston Metropolitan Area (KMA) and other towns by 2030 (Figure 11.1). Meeting this target will require expanding access from 20 percent of the population in 2015 to about 56 percent in 2030. About three (3) percent of persons in NUSAs have access to piped sewerage networks, and will continue to be served. However, the GOJ's policy is that new developments within the KMA and urban centres will be encouraged to construct onsite sewage disposal where a sewerage network connection will be easily accessible, once sewerage networks are in place. New developments outside the piped sewerage network will continue to use MOH approved on-site sanitation facilities.

The GOJ will encourage the use of emerging technology such as, the adoption of nanotechnology and advanced microbiological processes, improvements in nutrient capture from wastewater, and likely improvements over time in energy efficiency and energy recovery.

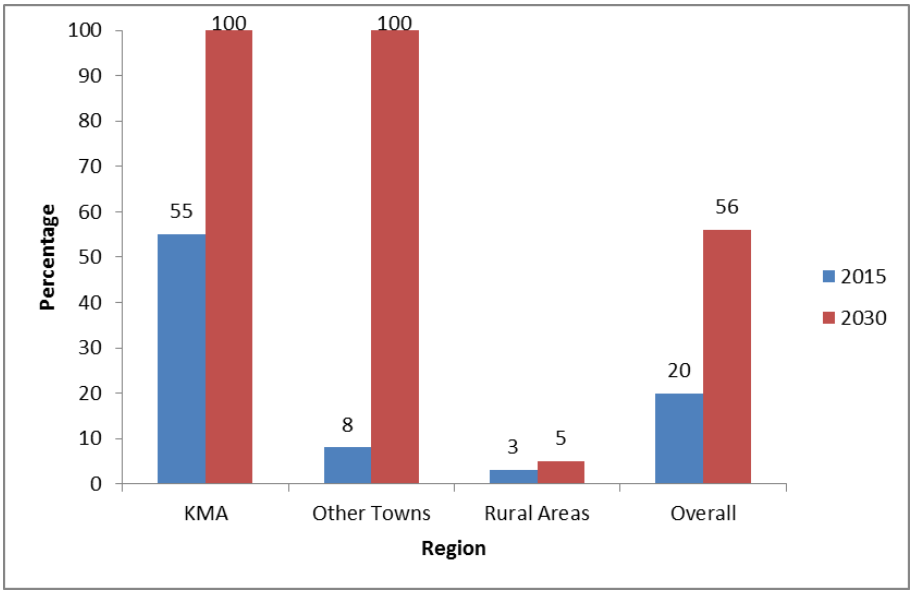


Figure 11.1: Access to Piped Sewerage Service
Source: Jamaica Survey of Living Conditions

11.3.2 Institutional

The GOJ will encourage the provision of piped sewerage services by the NWC and by community and private service providers. The NWC will continue to improve and upgrade their facilities across the island, continue to serve existing customers on the piped sewerage networks, and will expand piped sewerage networks to meet national targets for service coverage and financial sustainability. In general, the NWC is best placed to plan, coordinate and implement the expansion of the sewerage network. In providing sanitation services, the NWC will operate accountably, with commercial autonomy, and in a financially sustainable way.

The NWC will involve the private sector in expanding sewerage networks, consistent with the policy principles for private sector participation in the water sector. In particular, the NWC will issue tenders for private companies to design, build, finance, operate, and maintain expansions to the sewerage system.

Regulation

The OUR will continue to regulate private and public service providers (including the NWC), and hold them accountable for meeting service standards, including those related to the environment and public health. The NWC will ensure that private service providers, contracted to expand central sewerage networks, comply with these standards.

11.3.3 Financial

Sewerage tariffs will allow service providers to recover reasonable costs for providing sewerage services. Tariffs may differ between regions, if justified by cost differences.

The OUR will continue to set tariffs for both the NWC and private service providers in accordance with the OUR Act, taking into account these policy objectives.

11.4 Wastewater Policy in Non-Utility Service Areas

Non-Utility Service Areas are predominantly rural areas. In general, persons living in these areas will be best served by on-site sanitation facilities.

Service Targets for Wastewater in Non-Utility Service Areas

The GOJ's policy is that all households have exclusive access to sanitation facilities that protect the health of users and the environment. Such facilities will be on-site and will meet the standards for safety set by the NEPA and the MOH.

11.4.1 Technical

In NUSAs, diverse on-site sanitation facilities will be used to meet the policy objectives, without contaminating groundwater sources. On-site sanitation facilities are built to safely treat effluent

and human excreta at the point of use. Ideally, each household will have its own sanitation facility, and communal facilities may be necessary in some cases.

The best supply method will depend on the area being served, and be determined by the community or household that will benefit from the facility. For example, conditions and solutions will be different for formal sector houses and developments, traditional rural houses and communities, and squatter settlements.

- **Formal sector houses and developments**—In NUSAs, the MOH approved system will be the appropriate solution. As a condition of planning, permission for subdivision of land for development, or construction of a new home, it is a requirement that adequate sanitation facilities be provided.
- **Traditional houses and communities in NUSAs**—A number of communities in NUSAs have been developed in an unplanned manner. While some persons in these communities have indoor flush toilets, this cannot be made a requirement for every household, as some households will not be able to afford such systems, while others lack the land space in which to install these systems. For such households, other MOH approved on-site sanitation solutions are needed.
- **Squatter communities**—Squatter communities are home to many Jamaican households and their unplanned growth cannot be ignored. These communities, and their informal waste disposal systems, should not be allowed in areas where it is likely to severely impact water resources. Zoning rules should, therefore, restrict housing development in these areas, as well as squatter settlements situated in areas vulnerable to natural disasters.

  The GOJ will set clear guidelines regarding regularizing land tenure in these areas and take active steps in upgrading infrastructure. An integrated approach to providing all basic services will be needed. For some squatter settlements, communal hygiene blocks may be appropriate. In some cases, flush toilets connected to a sewerage system will be possible.

11.4.2 Institutional

In NUSAs households and communities will have the primary responsibility for providing safe sanitation services. Some households and communities will need financial, technical, and institutional assistance. As in water supply, the RWSL will provide technical and institutional assistance to households and communities that require it. The RWSL will provide this assistance to meet policy objectives for sanitation services in NUSAs.

Combining outreach on water and sanitation in NUSAs is expected to have significant synergies, not only in terms of reducing cost, but also in increasing effectiveness. As such, the RWSL will

identify communities that need assistance to improve their sanitation facilities as part of the rural water planning process.

The Ministry with responsibility for Water, in collaboration with the Ministry responsible for Health, will work with communities to promote hand washing and other good hygiene habits, as well as ensuring that adequate water and sanitation facilities are in place. International experience shows this is an effective way to build healthier communities.

Regulation

The NEPA and the MOH will have the responsibility for setting and enforcing standards for on-site sanitation facilities. These standards will take into account the density of settlement and vulnerability for groundwater, and balance cost against environmental protection to achieve an economic optimum. The MOH will continue to establish guidelines for the different types of sanitation facilities that are permitted.

The relevant planning authorities will require new buildings to comply with these standards, as a condition of planning approval. The NEPA and the MOH will monitor sanitation facilities in NUSAs to ensure that the national guidelines are being followed and are effective.

To ensure safe disposal of septage, haulers must dispose of it in sewage treatment plants operated by the NWC or other licensed sewage treatment providers. All sewage treatment plants that accept septage must have adequate facilities to provide treatment, and associated fees should fully recover operating costs.

Inspecting sanitation facilities is the responsibility of the MOH, under the Public Health Act. The local board of health (Municipal Corporations) and the MOH will work together to achieve this objective.

11.4.3 Financial

Since communities and households will mostly provide sanitation services for themselves, they will need to maintain the systems that they establish. In the case of community solutions, the community organizations will recover costs from community members. Where necessary, the GOJ will assist with grants or loans for construction or rehabilitation costs for on-site facilities. The GOJ will also consider other available funding options for financial assistance.

12 Irrigation Services

12.1 Current Situation

Over the last five decades, irrigated agriculture has contributed to the growth in agricultural productivity. Globally, irrigation accounts for about 70 percent of the fresh water consumed. Irrigated agriculture in Jamaica consumes a significant portion of ground and surface water resources and contributes to agricultural production across the country. It is estimated to contribute 50 percent to national food production, and has played a major role in generating employment opportunities in rural areas, and providing for the rural poor. Irrigated agriculture also plays an important role as a significant contributor to the Gross Domestic Product (GDP), rural development, the economies of farm families and rural communities.

Fifty percent of irrigated lands in Jamaica use public irrigation systems operated by the National Irrigation Commission Limited (NIC), a public entity which obtains its authority from the Irrigation Amendment Act (1999). The other half, comprises commercial estates and private operators. Water demand is, therefore, split between public and private users. Public irrigation supply for 2014/15 was 60 Million Cubic Metres (MCM) and this represented 80 percent of total demand on public irrigation schemes. Therefore, the total demand for agriculture nationally was approximately 150MCM for 2014/15. Sugar cane is the largest user of irrigation water and accounts for 70 percent of total irrigated lands.

The OUR regulates some irrigation providers, and sets guaranteed and overall standards for service quality.

The main weaknesses in the public irrigation sector are:

- The low cost recovery of the NIC
- Challenges in the efficient delivery of service provision
- Lack of services in areas where irrigation would be economical
- Reduction in annual subsidies from the GOJ
- High energy costs

The OUR has emphasized cost recovery in recent tariff reviews, but existing tariffs do not cover operational and administrative costs, and if they did, some farms would likely not be able to sustain operations. The GOJ has maintained the growth momentum of agriculture by keeping input costs at a minimum.

The sector is vulnerable to the impacts of climate change, therefore, climate adaptation is critical and actions must be taken in this regard to mitigate against these impacts. At present the effects of climate change is being felt, as some aquifers are being depleted. The impacts of climate variability, as well as the weaknesses highlighted in Table 12.1 will determine whether

or not the goal of the National Irrigation Development Plan (NIDP), to realize the demand of 1Billion Cubic Metres per year (BCM/YR) by 2030, will be met.

Table 12.1: SWOT Analysis of Irrigation Services

Strengths	Weaknesses
▪ Irrigation contributes significantly to agricultural productivity. ▪ OUR sets guaranteed and overall standards for service quality. ▪ Adequate water availability in most areas. ▪ Extensive public and private irrigation infrastructure. ▪ Existing irrigation development master plan.	▪ Some areas where irrigation would be economical are not served. ▪ High cost of energy. ▪ NIC depends on GOJ subsidies for 64 percent of its revenue, which is not financially sustainable. ▪ Existing irrigation schemes do not recover operating or capital costs. ▪ Inadequate resources to facilitate best practices in conveyance and distribution for efficient service provision. ▪ Financing is often not available for economical investments to expand irrigation. ▪ Users often do not employ best practices in efficient use of water. ▪ Lack of access to funding for investments in efficient irrigation technologies. ▪ Inadequate resources for proper systems maintenance. ▪ Inordinate delays in public irrigation project implementation. ▪ Lack of available data on private irrigation schemes.
Opportunities	**Threats**
▪ Services can be expanded through diverse financing mechanisms, including PPPs, without spending scarce public funds. ▪ Taking advantage of efficient irrigation technologies and techniques can improve efficiency and reduce prices. ▪ OUR has emphasized the importance of recovering operation and maintenance costs in recent tariff decisions. ▪ The proliferation and buy-in for alternative energy sources. ▪ Exploration of the diversification of water sources to optimize supply. ▪ GOJ economic growth policy has been tied to agriculture therefore there is the opportunity for expansion of irrigated agriculture.	▪ Certain crop patterns are not economically viable if the true cost of water were borne by the farmer. ▪ By-products of agricultural production such as pesticides and fertilizer runoff can contaminate water sources and cause environmental damage. ▪ Limited water storage capacity on farms may cause farmers to go without water resulting in crop damage in critical times. ▪ Impact of Climate Change. ▪ Water loss. ▪ Vulnerability of infrastructure to theft and vandalism. ▪ Low Farmer productivity. ▪ Competing demand for the use of agricultural lands.

12.2 Policy Measures

The role of irrigation and water management in increasing food production is essential, and will require expansion of irrigated areas and improved management of existing water supplies. These factors will not prove easy, and will require institutional and policy reforms. Failure to meet food production needs, through efficient expansion and intensification of irrigated agriculture, would put pressure on land resources and hasten the process of environmental degradation. International best practices in irrigation technologies should be focused on providing the capacity to capture, develop and promote new irrigation practices and management systems to optimize food production.

Service Targets for Irrigation

Irrigation services will continue to contribute to a competitive and productive agricultural sector. To promote economic development and food security, all lands where irrigation is economically viable should be irrigated. The NIDP will guide the support and development of hillside irrigated agriculture. Priority should be given to high production areas that are not currently irrigated.

Each irrigation scheme provider will define its service offering to users, typically including the quantities of water that will be available, as well as, the times and places it will be available, in a contract with its customers.

Least-cost irrigation schemes will be developed for all areas to ensure that the cost of irrigation is not prohibitive. Synergistic projects will be developed to enhance the viability of new projects. These synergies will involve energy, water production and distribution.

Over time, irrigation tariffs will cover, at least, operations and maintenance costs, and will also cover capital costs, where it is possible to do so.

12.2.1 Technical

Irrigation schemes will utilize the most economical irrigation method that achieves the desired results, while at the same time ensuring activities which support due consideration for health, the environment and industry standards. Ministries/Agencies in the irrigation sector, Water Users Associations (WUAs), and farmers, will explore a diversity of modern irrigation techniques to reduce costs and increase energy efficiency, conveyance, distribution and water-use efficiency.

To ensure that appropriate measures are adopted, irrigation providers will monitor and minimize water and energy use as much as possible. Public irrigation systems will be designed to utilise renewable energy technology, such as wind, solar and hydro, to reduce operating costs and dependence on GOJ subsidies, with a view to cost reduction for farmers.

Irrigation providers and users will consider, where possible, but are not limited to, the following technologies and techniques:

- **Drip irrigation** – A technique that saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone. This technique can increase yields compared to traditional flood irrigation.
- **Fertigation** – Applying fertilizers through irrigation systems.
- **Rainwater harvesting** – Harvesting rainwater for use in irrigation. Consideration will be given to revitalizing the farm tank programme for irrigation purposes.
- **Soil-moisture-based irrigation controls** – This method involves measuring the amount of moisture in soil, allowing for irrigation only when plants need water.
- **Weather-based irrigation controls** – This method uses historical and/or current weather information to allow irrigation only when plants need water.
- **Wastewater Re-use** – Exploring opportunities for the reuse of waste water for irrigation purposes, especially for high water demand crops, within the bounds of sanitation, quality control and management, along with published guidelines and the requisite professionals for the management of these requirements. The precursor to this re-use is effective collaboration with other entities and a major education campaign for public and cultural acceptance by stakeholders, followed by investments in new infrastructure.
- **Conservation & Storage** – In an effort to capture seasonal flood run-off, which would normally go to the sea, storage of this and other short term surplus will assist in drought mitigation, reducing deficits during drought conditions, and reduce the dependency on energy-intensive groundwater. Existing storage capacities and storage sites contained in the NIDP should be explored and, where possible, improved or developed.
- **Watershed Management** – Irrigation providers will collaborate with other stakeholders in promoting best practices for sustainable watershed management. Degradation of the watersheds can significantly impact irrigation water supply from both surface and groundwater sources. Inequitable distribution of water has the potential to degrade ecosystems and aquifer productivity. Therefore, the balance of distribution between irrigation, domestic and environmental services should be revisited for each watershed, especially for the Yallahs, Rio Cobre and Rio Minho watersheds.
- **Water Quality Monitoring Programme** – This will provide useful information to farmers and allow irrigation providers, with the assistance of other stakeholders, to mitigate degradation of water quality.

All Irrigation water supply should meet irrigation water quality standards set by the NEPA, the Ministries with portfolio responsibilities for Health and Agriculture, and other authorities.

To ensure that appropriate measures are adopted, irrigation providers will monitor and minimize water loss and energy use as much as possible. Water loss reduction can be realized through the acquisition of financing and execution of a comprehensive irrigation maintenance and management plan. Public irrigation systems are to be maintained to improve operational readiness to meet demand and mitigate environmental impacts including drought conditions, dry spells and increased evapotranspiration. The NIC will explore alternative conveyance methods in some areas for reduction of water loss and water quality deterioration. Public

irrigation systems will consider renewable energy technology to reduce operating costs, thereby reducing dependence on GOJ subsidies, with a view to cost reduction for farmers.

12.2.2 Institutional

The GOJ encourages a diverse arrangement of irrigation schemes to meet the irrigation needs of farmers. Regardless of the arrangement, the irrigation provider should have the financial, technical, and managerial capacity to plan, build, operate and maintain irrigation systems, while remaining responsive to the farmers it serves.

The best institutional arrangement for providing irrigation services will vary according to physical needs and the type of irrigation system. The NIC will use the NIDP to support the national policies of sustained social and economic growth and development via the agricultural sector. Public irrigation systems will continue to be built out and operated by the NIC as stipulated in the master plan. Efforts to mobilise sources of funding and investment, support from the private sector, as well as international sources, must be heightened. Investments in renewable energy technologies should also be emphasized when seeking funding.

To protect agricultural lands, the National Land Use Planning Instruments will guide the NIDP, as well as any other active agricultural development plans.

The Ministries with responsibility for Water and Agriculture will maintain a public and private irrigation database to inform decision making and policy directions. Stakeholder consultations and public awareness and training will be driven by these Ministries to mitigate against threats such as, environmental degradation, contamination of water sources and reduction in farmer productivity.

Water Users Associations

The Water Users Associations (WUAs) comprises local farmers who benefit from public irrigation schemes. The NIC will continue to partner with the WUAs to develop capacity in the areas of on-farm water management and best practices, which should result in increased operational efficiencies.

12.2.3 Financial and Regulatory

The GOJ has long provided subsidies in the irrigation sector to increase agricultural productivity and protect employment for the many Jamaicans who work in agriculture. Fiscal constraints mean that the GOJ will be unable to increase subsidies to irrigation. However, maintaining existing irrigation schemes and building new ones, where it is economical to do so, are vitally important for the agricultural sector and the national economy.

For there to be development, an equitable distribution of cost and benefit for the provision of irrigation must be achieved. As such, it is crucial that irrigation tariffs recover, at least, the cost of operating and maintaining systems. At a minimum, this level of cost recovery will guarantee that existing irrigation schemes continue to support agricultural production. Where possible, irrigation tariffs will also recover capital costs. Operational costs can be lowered by exploring cheaper alternative energy solutions.

For new NIC operated irrigation schemes, the GOJ may finance capital costs. The appropriate financing option for each new scheme will depend upon the GOJ's development goals. Specifically, any of the following financing options may be appropriate for new NIC operated schemes:

- GOJ may support capital expenditure.
- Farmers who benefit from NIC operated irrigation schemes pay some capital recovery, while the GOJ absorbs the remaining portion.
- Farmers benefitting from new NIC operated irrigation schemes will pay tariffs that recover operations and maintenance costs.
- For the NIC operated schemes, levels of farmer productivity should inform tariffs.

Irrigation providers will be held accountable by the contracts that they sign with farmers. All parties, including investors, are encouraged to engage in mutually beneficial irrigation services.

The OUR will regulate service quality and tariffs for public and privately[22] operated irrigation schemes, in accordance with the OUR Act and taking into account the objectives of this Policy.

12.2.4 Disaster Planning & Mitigation

Irrigation Providers will collaborate with relevant Agencies to develop policies and approved plans, in response to the impacts of climate variability and other environmental hazards, to ensure the maintenance of food security.

[22] Private operators that should be regulated by the OUR, refer to those who produce and supply irrigation water to the public.

13 Flood Water Control and Drainage

13.1 Current Situation

Flooding in Jamaica occurs not only in coastal and low lying areas, such as St. Catherine and the Clarendon Plains, but also in interior valleys and depressions, such as Cave Valley in St. Ann and New Market in St. Elizabeth. It is a natural phenomenon where, for rainfall conditions above a certain intensity and duration, a river overflows its bank inundating its floodplain (riverine flooding) or, in some Karst limestone areas, the groundwater levels rise above ground levels, filling and overflowing depressions, or in others, such as the Moneague area, the rainfall inflow rates exceeds the sinkhole discharge, causing a rise in the depressions and at times overflowing to the depression flood plains.

Throughout the years, the experience of vast destruction of property and infrastructure, as a result of rainfall induced flooding, is caused or aggravated by man's encroachment of the riverine and depression floodplains, along with unplanned development activities in the upper watershed areas, such as urbanization interfering with the natural drainage system.

Numerous other elements have been cited as major contributing factors to this situation, among which are the lack of integrated and forward planning for adequate drainage networks throughout the island and the lack of maintenance of existing drains and gullies.

In a diagnostic study of the issues addressed in the National Water Sector Policy, Strategies and Action Plan (2000), the WRA revealed various inadequacies in the legislative framework that remains unresolved. The issues underlying flood water control and floodplain management are predominantly administrative, institutional and legislative in nature. Among these are:

- The existence of several laws designating overlapping functional responsibilities to different agencies. This created unclear mandates as to which Ministry/Agency is responsible for maintaining (including cleaning and repairing) gullies and drains island wide; and
- Inadequate and unenforced legislative provisions.

Implementing policies that prepare for natural disasters and decrease the damage they cause is becoming increasingly important, as climate change increases the risk of flooding and the intensity of hurricanes. However, there has to be a shift from the traditional fragmented localized approach, to one that integrates flood management with the wider water resources management, by taking a holistic approach that uses the river basin resources as a whole. Hence, the employment of strategies to maintain or augment the productivity of floodplains, while at the same time providing preventive and protective measures against losses due to flooding.

Table 13.1: SWOT Analysis of Rain and Storm Water Run-Off and Flood Water Control

Strengths	Weaknesses
• GOJ has developed a Drainage Improvement Plan. ▪ GOJ undertakes civil works for the management of waterways (river training, gully and drain cleaning). ▪ Floodplain maps exist for reaches of some major river, both in the public and private sectors. ▪ Guidelines exist for assessment of drainage design re: development in vulnerable areas. ▪ Development approval process does screening of development proposals in vulnerable areas.	▪ No flood zoning done for the country to guide the level and type of development to be permitted in vulnerable areas, hence a piecemeal approach to risk analysis re: development approval. ▪ Where flood plain maps exist, there are no guidelines for their interpretation and use. ▪ There is no approved national standard for the return period flood boundary to be used for regulating development in the flood plain (the 100-year flood boundary is adopted by the WRA). ▪ Failure to integrate upper watershed characteristics in the design of hydraulic structures on the plains (e.g. not taking into consideration the debris flow that must pass through a bridge, culvert, etc.) ▪ Some roads, in urban and agricultural areas are often poor, due to inadequate infrastructure design and maintenance. ▪ Institutional responsibilities for flood management are not clearly or fully defined in some cases. ▪ Agencies often cannot recover costs for providing flood management services. ▪ Flood water control infrastructure is lacking, resulting in deterioration of road surfaces.
Opportunities	**Threats**
• The GOJ is committed to improving the legislative and institutional framework by amending legislation related to flood water management. • Engage private sector participation in flood information sharing (aerial photos, floodplain mapping, and topographic survey data). • Engage universities in the participation of floodplain mapping, vulnerability assessment and risk analyses. • Climate change data and information generated by UWI and Met Service can be integrated in analyses of flood flows for design and planning purposes. • Improved flood water control infrastructure will help mitigate effects of climate change. ▪ Increasing cost recovery can give service providers needed funds to build and maintain infrastructure.	▪ Jamaica is prone to natural disasters, particularly hurricanes, which cause large-scale flooding. ▪ Climate change models predict that hurricanes will increase in intensity and future rainfall will be more concentrated, making the Island more prone to severe flooding. ▪ Existing large scale floodplain encroachment by unplanned housing and other developments

13.2 Policy Measures

Service Targets for Flood Water Control

The GOJ's policy is to ensure that flood waters are so managed that the risk to loss of life is zero, and for property damage as minimal as possible. Additionally, flood waters will be adequately managed to protect the environment, including the capacity of watersheds to meet sustainable demands on water resources.

The GOJ and service providers recognize the need to improve flood water control infrastructure. To provide institutional clarity, the GOJ is committed to seek amendment to the Water Resources Act to assign planning and regulatory functions to the Water Resources Authority. The GOJ will also develop and adopt a comprehensive Flood Water Master Plan.

13.2.1 Technical

Flood water control and drainage service providers will utilize the least-cost methods that will effectively meet the policy objectives for flood water control.

Methods should conform to international best practices for flood water control and watershed management. Specifically, the GOJ will encourage the following practices where they are economical:

- Using natural features, such as floodplains and swales, to accommodate flood water runoff;
- Construction of permeable rather than impermeable surfaces on commercial and residential plots; and
- Harvesting of flood waters through groundwater recharge and storage.

13.2.2 Institutional

Institutional responsibilities for flood water control are divided among entities with responsibility for providing flood water control services and those with responsibility for planning flood water control efforts.

Entities with responsibility for providing flood water control services

Flood water control responsibilities are assigned as follows:

- Municipal Corporations and Local Authorities—responsible for local roads and settlements.
- The Ministry with portfolio responsibility for Works infrastructure—responsible for national works infrastructure.

- The Ministry with portfolio responsibility for Agriculture—responsible for providing drainage services on irrigated lands.
- For other agricultural land, drainage is primarily the responsibility of the landowner, but large drainage issues that affect multiple land-owners will be coordinated through the GOJ.

Agencies with Responsibility for Planning Flood Water Control Efforts

Agencies that have responsibility for flood water control services will consider flood risk management standards to deal with storm surge barriers, sand replenishment, river bank strengthening/reinforcement, water table monitoring and wetland boundary mapping. They will also establish plans at the appropriate level, taking into account the objectives in this Policy, in consultation with the relevant IWRM Committees. For example, the NWA will assess the drainage network across the island, to mitigate against the impacts of flooding and infrastructure damage. The WRA will be responsible for flood plain mapping and planning.

13.2.3 Financial

Agencies with responsibility for improving and maintaining flood water control should have adequate cost recovery mechanisms when providing flood water control services. These include:

- **Local roads and settlements**—Municipal Corporations and Local Authorities will pay for flood water control through property taxes.
- **Works infrastructure**—the works infrastructure provider will recover costs from users of that infrastructure (through road user charges and a petrol tax, in the case of highway infrastructure).
- **Irrigated lands**—irrigation providers will include the cost of drainage in its tariffs.
- **Other agricultural land**—land-owners will pay for these services.

14 Monitoring and Evaluation

The Water Policy and Monitoring Branch, in the Ministry with responsibility for Water, will monitor and evaluate the implementation of this Policy. This process will be mainstreamed into the corporate planning cycle.

The Branch has two (2) objectives to monitoring and evaluating this Policy:

1. **Ensuring proper implementation of the Policy**: Through the monitoring process, the Division will ensure that Ministries/Agencies with responsibilities to implement the Policy are doing so, and will provide guidance and coordination.
2. **Allowing for Policy learning and adaptation**: Monitoring the results of the implementation of the Policy will allow for mid-course corrections and adaptation to emerging developments. Evaluation of the Policy after a period of time, will allow lessons learned to inform future Policy developments.

The Water Policy and Monitoring Branch will develop a Monitoring and Evaluation Framework

Within one year of the approval of this Policy, the Water Policy and Monitoring Branch will develop a Monitoring and Evaluation Framework ('the M&E Framework'). The M&E Framework will identify specific indicators to evaluate success against goals and service targets in this Policy. The M&E Framework will include indicators for:

- Integrated Water Resources Management (IWRM);
- Climate adaptation and mitigation processes;
- Energy efficiency in the water sector;
- Private participation in the water sector;
- Water supply in Utility and Non-Utility Service Areas;
- Rainwater harvesting;
- Wastewater management;
- Drought Management; and
- Legislative amendments to the WRA and Flood Water Control Acts.

Reporting

Subsequent to the approval of this Policy, the Water Policy and Monitoring Branch will issue a bi-annual Monitoring Report on progress against the identified indicators. The Report will include recommended adaptation measures to improve performance in areas where targets are not being met.

The Water Policy and Monitoring Branch will comprehensively evaluate the Policy. The results of the evaluation will be presented in an Evaluation Report. The Evaluation Report will include an assessment against the policy goals and will make a recommendation to the Ministry with portfolio responsibility for Water on whether an update to this Policy will be needed.

15 Implementation Plan

15.1 Introduction

The purpose of this Implementation Plan is to set out Action Steps that the stakeholders in the water sector will take to meet the objectives and targets in the Water Sector Policy, including the implementation of the Water Supply Development Strategy for Non-Utility Service Areas.

15.2 Consultations

The contents of this Implementation Plan are based on extensive consultations with stakeholders, who shared their institutional and technical experience to identify challenges in implementing the Water Sector Policy. Action Steps to overcome these challenges are based on stakeholder feedback and international best practices in the water sector.

15.3 Accountability

The Ministry with portfolio responsibility for Water will have primary responsibility for holding Stakeholders accountable to Action Steps and timelines for completing Action Steps. Agencies that report to other ministries, such as the Ministry with portfolio responsibility for Agriculture or the Ministry of Health, will report to their respective ministries, and coordinate with other Stakeholders as necessary, as set out in the Government's objectives for implementing Integrated Water Resources Management (IWRM).

15.4 Timeline

The Implementation Plan also sets out a timeline for completing the Action Steps. The Action Steps and timeline spans across Financial Years 2017/2018 to 2029/2030. Table 15.1 sets out the timeline for achieving the goals of the National Water Sector Policy and the Water Supply Development Strategy for Non-Utility Service Areas.

Table 15.1: Implementation Plan

	Action Step	Lead Agency	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
1	**Policy, Strategy, Approval and review**														
1.1	Submit the Water Sector Policy and Implementation Plan to Cabinet	MEGJC													
1.2	Approval of Water Sector Policy and Implementation Plan	Cabinet													
1.3	Submit Cabinet Note on Water Supply Development Strategy for Non-Utility Service Areas	MEGJC													
1.4	Embark on Public Education Campaign	MEGJC													
2	**Integrated Water Resources Management (IWRM)**														
2.1	Develop TOR for legislative gap analysis	MEGJC													
2.1.1	Undertake a legislative gap analysis to idenitfy gaps in the legislative framewo	MEGJC													
2.2	Develop TOR for IWRM Council and LIWRM Committees	MEGJC													
2.2.1	Establish the IWRM Council to replace NIWMC and LWMC	MEGJC													
2.3	Establish the Water Resources Advisory Committee (WRAC)	MEGJC/WRA													
2.4	Establish LIWRM Committees commencing with the most severely degraded watersheds	MEGJC/IWMC													
2.5	Develop a National Water Supply Plan (inter-basin water transfer)	MEGJC/NWC/WRA/RWSL													
2.6	**Protecting Watersheds**														
2.6.1	Identify projects for funding in the Watershed Areas	MEGJC & IWMC													
2.6.2	Enforce trade effulent rules and fees	NEPA													
2.6.3	Reduce point-source pollution	MEGJC & NEPA													
2.6.4	Improve Waste Water Treatment Plants to meet national standards	All Providers													
2.6.5	Establish policies to encourage wastewater re-use	MEGJC/NEPA//MOH/WRA/NIC													
2.6.6	Set standards for wastewater re-use	MEGJC/NEPA/MOH/WRA/NIC													
2.6.7	Enforce standards for septage regulation	MOH													
3	**Climate Change Adaptation and Mitigation**														
3.1	Coordinate integration of Climate Change (CC) adaptation in water sector	MEGJC (CCD)													
3.2	Coordinate public education on CC adaptation in water sector	MEGJC (CCD)													
3.3	Develop appropriate hydrological and water resources modeling tools	MET Services/WRA													
3.4	Develop water protection zones, flood bank monitoring, rainwater harvesting systems, reforestation of degarded water catchment areas and establish emergency water supply systems	MEGJC,NEPA, WRA, FORESTRY DEPT, NWC													
4	**Energy Efficiency**														
4.1	Adopt new techniques to conserve energy	All Service Providers													
4.2	Identify economical investments in Energy Efficiency (EE)	All Service Providers													
4.3	Lobby for participation of the water sector in the Wheeling Policy	MEGJC/MSET/NWC/NIC/													
5	**Water Supply and Sanitation Planning & Financing**														
5.1	Develop Water Access Fund Structure	MEGJC/RWSL													
5.1.1	Identify financing for the Water Access Fund	MEGJC/RWSL													
5.2	Develop Water Supply Plans for NUSAs	RWSL, Municipal Corporations/ Local Authorities													
5.3	Develop Rural Water Master Plan	MEGJC/RWSL													
5.4	Review and finalize NWC Parish Plans	NWC													
5.4.1	Seek financing for water supply and sanitation	NWC/MEGJC													
5.5	Secure budget for social water	MEGJC, NWC													

6	**Expand Water Supply in Non-Utility Service Areas (NUSAs)**															
6.1	Implement Priority Projects under the Development Strategy	MEGJC,RWSL, Service Providers,MCs														
6.1.1	Undertake feasibility studies	MEGJC,RWSL, Service Providers,MCs														
6.1.2	Mobilize community around proposed solution	RWSL, MCs/LAs														
6.1.3	Build capacity to manage system	RWSL														
6.1.4	Monitor system	RWSL														
7	**Expand Piped Water Supply in Utility Service Areas**															
7.1	Implement Priority Projects	MEGJC/NWC														
7.2	Identify financing for Projects	NWC														
7.3	Provide bulk raw water to the NWC	Private Providers														
8	**Improve Wastewater Services in Non-Utility Service Areas**															
8.1	Expand wastewater systems in NUSAs	MLG&CD/RWSL/MCs														
8.2	Establish and enforce standards for wastewater systems	MOH														
9	**Expand Piped Sewerage Services in Urban Areas**															
9.1	NWC prioritizes areas	NWC														
9.2	Identify financing for schemes (NWC funds or PPP)	NWC														
9.3	Build Own Operate and Transfer schemes	Private Providers														
10	**Drought Management**															
10.1	Establish Steering Committee for the revision of the drought management plan	MEGJC														
10.2	Develop Terms of Reference for consultancy															
10.3	Develop drought management plan	MEGJC														
10.4	Employ strategies to increase public awareness of demand side management approaches	MEGJC/NWC/WRA/RWSL														
11	**Irrigation Services**															
11.1	Expand irrigation systems	MEGJC/NIC, Private														
11.1.1	Identify financing for new irrigation schemes	MEGJC/NIC, Private														
11.1.2	Build, operate, and maintain new systems	MEGJC/NIC, Private														
11.2	Increase tariffs to recover costs	MEGJC/NIC, OUR														
11.3	Review and implement plans to increase collections and improve efficiency	NIC														
12	**Flood Water Control**															
12.1	Amend WRA and Flood Water Control Act to assign planning & regulatory functions to the WRA and implementation functions to the NWA	MEGJC, WRA, CPC, NWA, MLGCD, ODPEM, MET Service														
12.2	Develop flood water control master plan	WRA														
12.3	Implement appropriate cost recovery mechanisms for flood water control	MEGJC/WRA/NWA, OUR, MOF														
13	**Monitor and Evaluate**															
13.1	Develop Monitoring and Evaluation Plan	MEGJC (WP&M)														
13.2	Release bi-annual reports on implementation progress	MEGJC (WP&M)														

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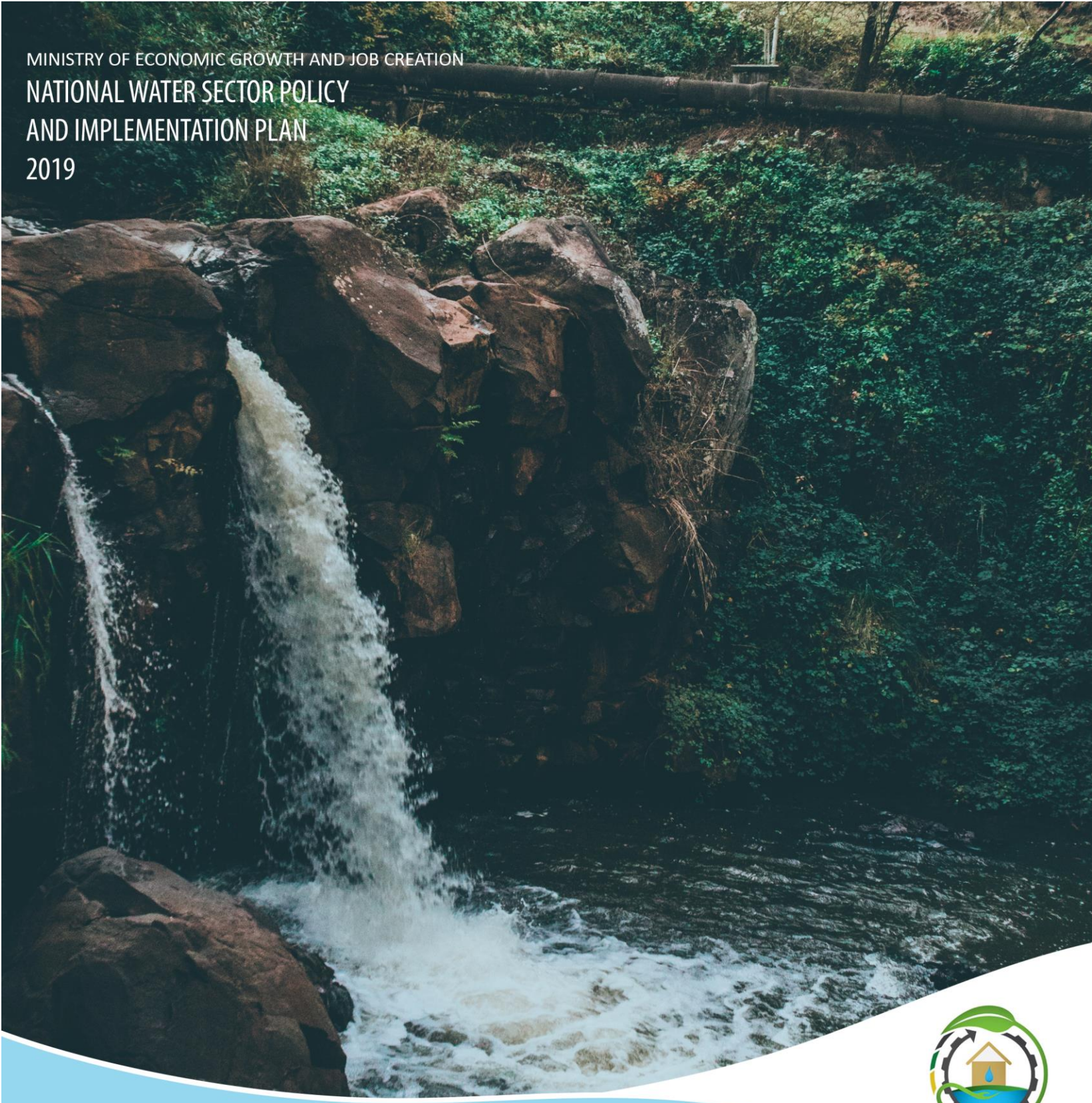
NATIONAL WATER SECTOR POLICY AND IMPLEMENTATION PLAN 2019



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