National Integrated Water Resources Management (IWRM) Policy

Commonwealth of Dominica

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Collaborators
Dominica Water and Sewerage Company
Forestry and Wildlife Division
Caribbean Environmental Health Institute

Dominica Water and Sewerage Company Limited

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COMMONWEALTH OF DOMINICA

NATIONAL INTEGRATED

WATER RESOURCES (IWRM) POLICY

Prepared by

ENVIRONMENTAL ADVISORS INC.

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Integrating Watershed and Coastal Areas Management

IWCAM

in Caribbean Small Island Developing States

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Preface and Acknowledgements

This Integrated Water Resources Management (IWRM) Policy reflects the commitment of the Government of the Commonwealth of Dominica to build on previous policy development efforts and transition to an effective governance and technical framework for a vital resource – water.

This Policy and accompanying Policy Brief is being submitted as a draft for consideration. This Final Draft benefits from the results of Findings of the Dominica IWRM Policy Development Workshop which was held at the Fort Young Hotel in May 2010 to gather information and identify opportunities and constraints to IWRM in Dominica and a subsequently held National Consultation which was held at the Garraway Hotel in May 2011. The National Consultation attendees included Ministers of Government, senior executives and non-governmental organizations whose vital comments were supportive of the sponsors of the projects and the work that was accomplished. The resulting Policy provides a sound, easily adaptable and sustainable integrated water resources management framework for Dominica which reflects the wisdom of all stakeholders.

EAI is grateful for the chance to be part of this process. We gratefully acknowledge the Government of the Commonwealth of Dominica (GOCD), the Dominica Water and Sewerage Company, the Ministry of Housing, Land & Settlements and Water Resources, the sponsors - the Caribbean Environmental Health Institute and the GEF- IWCAM Project for giving us the opportunity to work on this important national policy. To the many stakeholders in Dominica who provided country-specific information to enable the drafting of this IWRM Policy, we make special mention and extend our heartfelt gratitude. This work could not have been accomplished without the contribution of all.
We look forward to continuing service to the Government of the Commonwealth of Dominica and the sponsors on this and other projects.
Thank you.

President
Environmental Advisors Inc.

List of Acronyms

DOWASCO – Dominica Water and Sewerage Company

GDP – Gross Domestic Product

GOCD – Government of the Commonwealth of Dominica

IWRM – Integrated Water Resources Management

LBS - Land Based Sources Protocol

WRO – Water Resources Organisation

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Introduction

Present Situation

The Commonwealth of Dominica is an independent island, and a member of the Organization of Eastern Caribbean States (OECS). The island is of volcanic origin and located at approximately 15 18N and 61 23W between the French islands of Guadeloupe in the north and Martinique in the south. The country occupies an area of 750sq.km and has a population estimated at 72,000 persons. Its climate is classified as humid tropical marine with distinct dry and wet seasons and the average annual rainfall varies between 1270mm and 7620mm dependent on location. The economy is heavily dependent on agriculture, the main source of food and income for most of the population.

The Water and Sewerage Act of 1991 governs water resources management and gives the Dominica Water and Sewerage Company (DOWASCO) the responsibility for supply and distribution of potable water, wastewater services and management of water resources. There are several other laws and institutions that are pertinent to water resources management. The laws include the Physical Planning Act (no.5 of 2002), the Development and Planning Corporation Act (1972), the Agricultural Small Tenancies Ordinance (1953), the Pesticides Control Act and Regulations, the Crown Lands Ordinance, the Forestry Act, the Health Act and the National Development Corporation Act (1988). However they are usually not considered within the formal management framework since there is no formal mechanism in place that mandates coordination, collaboration and/or cooperation among related institutions. The result is that while DOWASCO provides leadership on water resources management for the country, other pertinent contributions remain outside of the framework yielding a less than comprehensive approach to water resources management in the country.

However, Dominica's distinction from most of the countries in the region with respect to water resources is its abundance of rivers and water. This abundance of water is also

underscored by the fact that other Caribbean countries consider Dominica as an alternative source of water supply in times of need. As a result, in addition to the various water uses for industry including bottle water, agriculture, recreation/tourism, hydropower and domestic purposes, the government of Dominica has positioned itself to be an exporter of bulk water. The long term importance of Dominica's water supply to the region in light of climate change, drought, etc. is being explored also as an avenue for economic growth. Hence the importance of effective integrated water resources management must be understood and implemented in order to safeguard the water for the people of Dominica and ensure that they are not disadvantaged.

Most of Dominica's water supply comes from its surface water sources and DOWASCO produces approximately forty-five (45) million litres of potable water per day for water supply from rivers. In remote areas, rainwater harvesting is practised by individual households and institutions, and small communities with less than 200 persons that are not served by DOWASCO, are serviced through small water supply systems built by non-Governmental organizations. Groundwater is produced from surface water and a few springs for the supply of potable water to some communities and for the commercial purpose of bottled water.

About 90% of the population is connected to a potable water supply system of which it is estimated that DOWASCO supplies 80% of the total population on a 24-hour, seven day per week basis through connections to its water supply system and its standpipes. It must be noted that water released to the distribution system is not being measured and not all customers are metered.

With respect to sewage disposal, there is a large centralized sewerage system servicing the capital, Roseau, and two (2) small sewerage systems which service the areas of Cane Field and Jimmit. In the Roseau sewerage system there is minimal treatment and no treatment in the two small systems. In these sewerage systems, sewage is disposed via marine outfalls approximately 1,000 feet away from the shore. In most areas, the dominant method of wastewater disposal is by septic tank/soak away which may pose a

considerable challenge for water resources management where these systems do not function properly.

With respect to agriculture which contributes approximately 25% of the gross domestic product (GDP), there are concerns for the sector with respect to social and economic development, security of food supplies, economic costs and environmental consequences. Agriculture on a commercial scale utilizes a substantial volume of water that is abstracted directly from rivers but it is not quantified. It must be noted that DOWASCO has no legal responsibility to provide water for agriculture. Irrigated land accounts for less than 1% of the estimated acreage of farmland.

Continuous hydrological monitoring and assessment are not conducted as frequently as it should be; therefore the assessment of water availability may not be reliable as minimal work has been undertaken since the US Army Corps of Engineers Study, December, 2004. A 1987 DOWASCO survey of its 43 watersheds in use at the time indicated that very few of these were void of human activity. The results of ongoing water quality monitoring suggest that effects of chemical fertilizer and pesticides are not yet a threat to human health through the water supply. However, this problem can be expected to increase as activities incompatible with maintaining an uncontaminated water supply increase in the quest for economic development. In response to these concerns DOWASCO has recommended that all the island's catchment areas be declared "Water Quality Control Areas".

Water allocation to meet the needs of various users is based on the availability of water and not on any assessment based water allocation mechanism. There also appears to be no mechanism for demand management and neither does the water rate structure for consumers support demand management as the rates remain constant with increase in volume of water used.

With respect to water resources protection, actions are minimal. Actions undertaken with respect to watershed management may contribute but they are not as effective as they

should be since solid waste, agricultural waste, and manufacturing and industrial waste disposal are major sources of both point and non-point source pollution. In taking the lead on water resources management matters on the island, DOWASCO continues to take steps to improve coordination among the several stakeholders and interests in water including land use management.

DOWASCO operates the sewerage treatment facility that involves the safe treatment and disposal of more thank half a million gallons of waste water per day. The system transports raw sewage from homes, businesses and industries to the Sewage Treatment Plant. Two lift stations support the gravity system pumping the sewage through miles of force main to the Treatment Plant. DOWASCO's sanitation section responds to sewerage related emergencies. This section also maintains and operates the entire sewerage system by providing preventive maintenance to existing lines, replacing lines as needed and installing new service connections and clean-outs as requested. The utility's line maintenance section is responsible for necessary repair, maintenance and expansion of the sewerage collection system including all wastewater lines, mains, manholes and service connections.

A Roseau Water and Sanitation Project was completed in 2003 with the objective of enhancing the lives of the residents of Roseau and environs and Dominica by extension. The improved living conditions are achieved through the reduction of health hazards and protection of the environment. The major components of the works included the construction of a primary sewerage treatment plant, the installation of a submarine outfall line and the replacement of existing sewer and water lines throughout the city of Roseau. The total cost of the project was 62 million dollars EC.

In Dominica, persons must apply for a license to abstract water and also a license to sell water. These abstractors pay royalties and fees which are based on the type of use for which the water is required. A tariff system also exists for potable water supply. The tariff structure for water supply and sewerage was designed more as a function of affordability to pay than to reflect the economic value. In addition, public standpipes and public facilities are provided in communities for persons to access potable water. There is

no direct charge to the public for the water obtained from standpipes; however the GOCD pays DOWASCO on a monthly basis, for this service.

Governance of the country's water resources in a holistic manner is generally lacking as there is no WRM policy, strategy, plan or overarching legislative framework in place. With the growing demand for water, the inadequate institutional structure, ineffective land-use management, limited public understanding of IWRM, a lack of data and information to support decisions, legislation that needs updating, and a lack of adequate human and financial resources, it seems almost mandatory that appropriate actions are urgently undertaken. As with the rest of the Caribbean region the looming threats associated with climate change will place added stresses on the resource and place great challenges for sustainable management of the resource. Integrated Water Resources Management (IWRM) offers the framework within which these challenges and inefficiencies may be more effectively addressed. It is against this background, the Government of Dominica has committed to develop this IWRM Policy.

Annex C provides the stakeholder analysis of IWRM issues, Gaps/Challenges and recommended solutions. Table 1 below summarises the conditions that are necessary for implementing IWRM in Dominica.

TABLE 1: Important conditions for implementing IWRM

Important Condition	Contents
Political Will	Political will at all levels can help unite all stakeholders and move the process forward. It is especially needed if the resulting plan or arrangement would create or require changes in legal and institutional structures, or if controversies and conflicts among stakeholders exist.
Improved governance structure	a proper governance structure that will include a competent authority in water resources management and a mechanism for coordination, collaboration and participation of all stakeholders;
Integrated water resource planning and management	As water is a shared resource, water rights should be flexible in terms of allocation in order to accommodate changes. Preparing a master plan that reflects individual sector plans facilitates the coordination among various sectors and advocates the most appropriate utilization of the resource.
Well-defined flexible and enforceable legal frameworks	It is necessary to assemble and review the full range of existing laws and regulations that apply to water-related activities and determine how existing legislation adapts or can be better adapted to accommodate

and regulation	sustainability and integration with regard to water resources management.
Recognised value of water to economy	This will be accomplished by promoting conservation, improved water quality, the use of water efficient technologies; the precautionary principle and the polluter pays principle.
Capacity development	Capacity development and training priorities should be expressed at all levels, including that of decentralized local government. Participants who may be adversely impacted and/or socially marginalized may be stimulated to participate within a consensus-building strategy.
Comprehensive monitoring and evaluation	Monitoring and evaluation are essential for ensuring that the current management of water resources is properly implemented, and to identify the needs for adjusting management strategies. Upgrading new technologies is vital for effective performance both of local and central water management.

Source: Adapted from UNESCO Water Assessment Programme: "Introduction to IWRM Guidelines at River Basin Level"

The Need for a policy

The Government of Dominica in its commitment to ensure sustainable national development, recognizes the contribution of effective management of water resources to its continued social and economic growth. Water is therefore one of the most crucial elements in developmental planning. As Dominica enters the 21st century, efforts to develop, conserve, utilize and manage this important resource must be guided by policy. The need for a water policy is abundantly clear: water is a precious national resource to be planned, developed and conserved for optimal and sustainable use on a holistic, integrated and participatory basis, keeping in view the needs of Dominica. Planning and development of water resources need to be governed by national perspectives.

Though Dominica is well known as 'the land of many rivers' and it is perceived that Dominica has an abundant source of water to meet all its needs, the reality is that this resource is finite, vulnerable, inextricably linked to the environment and impacted by development, human activities and climate variability. In fact, general sentiments of those familiar with the historic flow conditions of the rivers are that the abundance of water resources on the island are not the same as they once were. This trend should be a rallying call for national action that is underpinned by the recognition at the widest public level that there is need for proper management of this valuable resource and that water resources management is everybody's business.

The existing arrangement in which DOWASCO executes the mandate to provide potable water and wastewater services as well as single-handedly managing water resources is recognized as not being the most desirable. This approach neglects the conflict between providing water services and managing water resources.

Goals of a Water Policy for Dominica

Stakeholder discussions in May 2011 on a policy statement from a previous attempt at policy formulation by De Jong (2005) identified the following Goals for Dominica's water policy:

- Ensure a sustainable, adequate and secure water supply for the Commonwealth of Dominica and guide the development of public policies across all sectors that promote efficient use and equitable distribution of water in an environmentally and economically sound manner.
- Assure the orderly and coordinated development and use of Dominica's water resources
- Value, protect and conserve such resources for the optimal socio-economic benefit of present and future generations of Dominicans, and
- Provide the Dominican population with a safe, adequate and reliable supply of water and dependable public sewerage services.

Objectives

The main objectives of such a policy are to:

- Ensure long term sustainability of the country's water resources for the benefit of all.
- Promote the adoption of integrated water resources management.
- Develop and manage the country's water resources wisely and efficiently to ensure the availability of a continuous supply of water to meet all needs and uses including that of the ecosystems.
- Implement measures to protect and enhance the water systems so that the water quality is adequate for all designated uses.
- Ensure that the present and future generations have access to a proper standard of sanitation.

- Minimize and protect against water crises whether caused by climate change and climate variability, man-made or other natural causes.
- Foster joint ownership and partnerships among the Government, private sector and the people of Dominica in managing the country's water resources.
- Enhance education, awareness and knowledge of Dominica's water resources.

Guiding Principles

- Water is a finite and vulnerable resource that has social and economic value and is essential for life.
- All water resources of the Commonwealth of Dominica are owned by the State for the common good
- Water resources planning and management should be based on a participatory approach involving all key stakeholders;
- Watershed management and coastal zone management should be undertaken in an integrated manner taking into consideration the LBS Protocol
- Water as an economic good should take into account affordability and equity;
- All water use should be sustainable;
- Water resources management should be demand driven rather than supply driven;
- Measures must be implemented to avert and minimize risks to human health and the ecosystems;
- The polluter pays principle must apply;
- Management of water resources should allow for multiple uses of water giving priority to water use with the highest socio-economic benefits but giving priority to human consumption and the watering of animals in times of water shortage;
- Water should be priced in order to encourage judicious use;
- Everybody has a responsibility in water management.

Implementing Instruments

Implementing instruments are the major avenues for addressing the issues to effect integrated water resources management.

Legislative Reform

Within the context of water resources management, the main objective of water legislation is to obtain consistency in all legislation, policy and actions which relate to the protection of the quality, available quantities and sustainable use of water as a natural resource and for equitable distribution. The legislation establishes the framework for action on water resources matters. It sets out and implements agreed policies, specifies duties that are to be discharged and by whom (institutional framework), the strategies and processes that are to be used to achieve desired results and provides for compliance and enforcement initiatives. A strong legal and institutional framework is an essential tool for avoiding overlap and possible conflict among stakeholders, fostering coordination and more importantly establishing cohesive and collaborative efforts towards effective water resources management.

A legal framework for integrated water resources management shall take into account and must incorporate the following major elements:

- juridical status of water i.e. choose between ownership of water and the right to use water resources
- water resources policy
- institutional framework and operation of the water resources administration in Dominica including other related water administrations and institutions e.g. water resources committee (below), stakeholders (farmers, voluntary agencies);
- order of priorities in water use e.g. drinking versus irrigation,
- the delivery of water and wastewater services;

- water use (groundwater, surface, etc.), water quality, discharges to receiving fresh and coastal waters and pollution control regulation;
- control and protection of waterworks and structures;
- declaration of protected areas or zones;
- service regulation consisting of public and customer interests;
- standards of service;
- water resources development financing, and;
- implementation and enforcement measures for sustainable use of water as a natural resource.

The Government will establish a comprehensive application of the legislation, all other legislative enactments concerning water resources will be harmonized in a continuous process as circumstances change to be consistent with the National Water Policy or where permissible repealed and incorporated into a single statutory instrument. Detailed regulations and guidelines on enforcement and implementation to support the enabling Act will be prepared. Table 2 sets out the existing legal framework that is in place for pollution control in Dominica.

Table 2: Existing Legal Framework for Pollution Control in Dominica

Act/Regulation	Key Provisions
Environmental Health Services Act of 2000	Establishes a framework to regulate waste, including hazardous waste and the control of activities likely to cause pollution of the environment. The Act is administered by the Environmental Health Department.
Physical Planning Act	Provides for the orderly development of land. The environmental protection plan prepared under it could include policies and measures for the protection of water supplies, water catchment areas etc.
Water and Sewerage Act	Establishes DOWASCO's responsibility for the development and control of water supplies and sewerage facilities.
Water and Sewerage (Catchment) Regulations	Regulation 4 deems, inter alia, agricultural activity, requiring the use of agrochemical inputs and camping to be uses that are incompatible with a water catchment.
Public Health (Nuisance) Regulations	Regulates activities that cause pollution.
Fisheries Act & Regulations	Promotes and regulates fishing and the marine waters. Regulations prohibit the dumping of litter, soil debris or pollutants activities in marine reserve.
Forestry & Wildlife Act	Prohibits the deposit of deleterious substances in water or in any place where such substance may enter the water or streams.
Forests Act	Controls and protects watersheds by maintaining water supplies in springs, rivers, canals and reservoirs.

Water Catchment Rules	Rules prohibit, washing, use of pesticides in rivers or streams, disposal of household or industrial waste in catchment areas.
Crown Land (Forest Produce) Rules	Provides some protection to watersheds
National Parks & Protected Areas Act	Minister has power to make regulations for the preservation and maintenance of water supplies and the prevention of soil erosion, landslides, deposit of mud, silt stones in any water. Offers legal protection to approximately 20% of Dominica's forestlands as forest reserves or national parks.
Stewart Hall Catchment Rules	Prohibits agricultural cultivation and other activities, which may be detrimental to the water supply.
Agricultural Small Tenancies Ordinance	Promotes soil and water conservations
Solid Waste Management Act	A person shall not deposit solid waste in any marine waters, rivers or river banks without a licence.
Pesticide Control Act	Controls the importation and use of pesticides.
Litter Act	Controls the deposit of litter in public places including waterways

Governance and Institutional Framework

Good governance is essential to the process of sustainable water resources management, as policies and decisions must be based on what is best both in the long and short terms, taking into consideration the holistic view. Often times knowledge is limited to potable water supply and distribution therefore decisions for integrated water resources management are not holistic. Capacity building in integrated water resources management is therefore required.

Internationally and in the Caribbean, political will has been identified as critical to a sustainable scenario. However it is obvious that political will must be coupled with good governance to achieve success, doing the right thing and doing things with integrity. The Dominican Government, in the interest of the island and its people, is committed to ensuring good governance and as such will: -

- Establish a proper institutional structure which will include a Water Resources Organization, the Water and Sewerage Company, a Utilities Regulatory Organization and a mechanism for coordination, collaboration and participation of stakeholder organizations

- Set ground rules in collaboration with major stakeholders, obtain agreement on the method of decision-making for major water projects and implement appropriate actions
- Facilitate and support appropriate capacity building at the various organizations and levels including the political directorate.
- Facilitate and support the right human resource capacities in positions for effective water management.
- Support public education and awareness.
- Seek and provide funding to support integrated water resources management

To cope more adequately with the fast growing demand for water and to rationalize between competing uses, the need for new approaches that would maximize the development of water resources on the one hand and protect the public interest for water yet avoiding conflict between the two is apparent. An IWRM approach to water resources management transcends the separate administration of different types of water, ground, surface, coastal and atmospheric- and substitutes it for a truly integrated system in which all waters are treated as one undifferentiated whole.

The nature of water resources management is such that it must be operated at the national, sectoral and community watershed levels. This means that the structure, roles and responsibilities at each level must be clearly articulated and coordinated to facilitate functionality of various components of the water sector.

An immediate undertaking for the Government therefore will be to separate the responsibility for the management of water resources from that of service provider; both of which roles are presently vested in DOWASCO. To effect this, the Government will undertake restructuring of the institutional arrangements and will implement the necessary supporting legislation to give effect to the proper structure. And as some activities in the water sector are shared with other sector departments, the corresponding sectoral policies and plans must be reviewed and made consistent with the National Water Resources Management Policy.

However there are major responsibilities missing from some of the Governmental units that must be established and adopted. These activities include: -

- National Landuse Plans must be developed as a major responsibility of the Planning Department in collaboration with other stakeholders.
- Integrated Watershed Management, must be a major responsibility of the Forestry Unit in the Department of Agriculture and be undertaken in collaboration with other stakeholders Watershed Management Plans must be developed and implemented.

- National Irrigation Management, must be a major activity of the Agriculture Department to facilitate satisfying water demands for development of the agricultural sector. National Irrigation Plans must therefore be developed and actions taken to implement them.

- Government shall establish a separate Water Resources Organization (WRO). This WRO will have responsibility for coordination, planning and implementing integrated development and management of the water resources.

The WRO will be responsible for overall inter-agency/inter-sectoral coordination and wider stakeholder participation for water resources management. This is to ensure the coordination of water management activities across sectors.

Core responsibilities of the WRO will include: -

- Development and implementation/coordination of implementation of the Water Resources Policy, Legislation and Plans
- Collection and provision of water resources data and information. Establishment of a hydrological and hydrogeological monitoring network.
- Allocation of water resources that includes the determination of water use rights, obligations and conditions of water use, abstraction licensing, permits and compliance monitoring.

- Development and implementation of a Water Resources Master Plan
- Water demand analysis and management.
- Implementation of water pricing.
- Designation of source protection zones
- Regulation of flood water control.
- Public education and awareness
- Monitoring and assessment of the state of the water resources
- Advise the GOCD on water resources matters

- DOWASCO will be responsible for providing the services of water supply and distribution, and the collection, treatment and disposal of sewage. Their powers and duties must at a minimum include the responsibility for : -

    - The provision of a clean, safe potable water supply for domestic, tourism, commercial, industrial and any required potable uses.
    - The provision of wastewater collection, treatment and disposal to the extent and to the standards determined.
    - Development and enforcement of rates and charges in accordance with the pricing policy.
    - Development and implementation of Water Supply and Wastewater Policy, Legislation and Master Plan. Furthermore Sewage Regulations must be developed. These regulations must deal with at least: -
    - The connection of premises to sewerage works.
    - The control of private sewerage installations by the Dominica Water and Sewerage Company.

For the Governmental and non-Governmental entities that have an important role in integrated water resources management, roles, responsibilities and interrelationships of these entities will be ratified and agreed to through memoranda of understanding.

It is a fact that most of the integration, coordination and cooperation that has taken place is through the commitment of individuals to achieving positive results. This is not sufficient and therefore stakeholder participation must be facilitated through legislation. Another dimension to integration is the need for cross-sectoral and multidisciplinary representation of persons on Committees. This too should be mandated through legislation.

Economic Instruments

Failure to recognize the economic value of water can lead to wasteful and environmentally damaging uses of the resource. Economic instruments therefore play a vital role in supporting effective management of the water resources because the rate structure plays a major role in protection and optimization of the water resources use. There is also an opportunity cost to inefficient pricing and allocation of water resources. Water rates should convey the scarcity value of the resource to users and foster the motivation for economy of water use. The Government will therefore use economic instruments, where feasible, to implement this policy for effective water resources management, water and wastewater services. Included are:

- Pricing for cost recovery to ensure that the supply of services can be maintained.
- Volume based rates especially with respect to water for export.
- Pricing to encourage conservation, including re-use and recycling of water and wastewater, efficiency of water use and demand management.
- Water abstraction licences except for specific household domestic purpose.
- Pollution charges or effluent discharge rates.
- Special water use rates to facilitate the socially underprivileged and special user categories to be subsidized by government.

Financing for expansion of infrastructure would be obtained, where feasible, from international agencies, the beneficiaries of the projects, and/or the private sector or public-private partnerships.

Integrated Water Resources Planning

The Government endorses an integrated approach to the planning and development of water resources to ensure sustainable use and development of the resource in an efficient and effective manner, recognizing its value, the ecosystems that depend on it, the competing uses and the fact that the available water resource is limited. In support of its commitment to integrated, long term planning for the development and management of water the GOCD will: -

- Adhere to integrated water resource planning and management in the island.
- Produce a Water Resources Master Plan that provide actions to be implemented to support integrated water resources management. These plans will be developed for the country as a whole and for subunits (watersheds) and will be consistent with this Policy.
- Encourage the integration of water management objectives and plans with those of landuse objectives and plans, on the basis of the watershed to reflect the unity of natural processes and the interdependence of uses and users in that spatial unit.
- Establish and apply evaluation criteria to all proposed projects for implementation, to ensure that they are in keeping with the water management goals recognizing the value of water and related resources.
- Ensure that all significant national water related development projects are subject to an environmental assessment (or effects assessment) and review process, so that potential adverse environmental and socio-economic effects can be identified and mitigation measures taken.
- Ensure the participation and/or co-operation of all relevant coordinating and regulatory agencies.
- Encourage and provide opportunities for public consultation and stakeholder participation in the integrated planning
- Inform and educate the public through public awareness and education programmes in water resources management and awareness of water as a scarce resource.
- Utilize the National Physical Development Plan as a major input in the development of the Water Resources Management Master Plan.

Information Management

The lack of proper data and information to manage the finite water resources of Dominica for sustainable use is due to inadequate hydrological monitoring and assessment among other issues. This deficiency in data and information has been recognized as an international problem and declared so by the World Water Council. Among the data needs include hydrological and socio-economic data on groundwater, streamflows, watersheds, fresh and coastal water quality, water use, precipitation, evaporation and other parameters to enable water managers to understand past and present scenarios and to anticipate future needs. This data and information is not only needed by water managers but by many sectors. The need for this information will increase when an appreciation of the value of water grows. In this respect, the Government has an essential role to undertake in educating the population in water management.

The GOCD is therefore committed to ensuring that a comprehensive national water resources database and information system is available to provide a basis for sound water resources management decision making, protect the health and well being of the people of Dominica and support socio-economic development.

The GOCD will through the WRO: -

- Establish and maintain a national water resources database on a geographic information system platform
- Ensure continuous water resources assessment with the establishment and maintenance of a continuous hydrological and hydrogeological monitoring network and complementary environmental data.
- Facilitate and support the production of reliable and timely data and information on the water quality, quantity and variability of the island's water resources to support effective decision making.
- Establish and maintain data quality standards and control.

- Maintain a comprehensive directory of water-related data and sources of such data and information in electronic format, facilitate access to and promote use of the national water database.
- Encourage the integrated planning of information gathering systems.
- Undertake and promote appropriate new technology.
- Implement cost recovery policies for data and information, recognizing that basic data constitutes a common good.

Environmental Impact Assessment

Water is inextricably linked with the environment and activities in the watershed or environment impact on the water resources. Environmental and social impact assessment of development programmes, projects and operations is an important strategy to support management for sustainable water resources. Also, the method and processes of supplying water or treating wastewater like other projects must be environmentally responsible. Water resources management activities must therefore be subjected to environmental impact assessment. This method utilizes the stakeholder participatory approach and environmental standards, guidelines and criteria as benchmarks.

Participatory Instruments

Participatory instruments include: -

- Involvement of appropriate stakeholders throughout the process from the planning stage to implementation and continued operation
- Coordination and collaboration among Governmental agencies/public sector through legislation and/or partnerships and commitments through appropriate institutional mechanisms.
- Cooperation and collaboration among individuals and organizations, and between Government and private sector
- Community participation in the development process

It must also be noted that every individual is a stakeholder and has a role and responsibility in water resources management.

To facilitate effective stakeholder participation, a public knowledgeable of the sector is necessary, therefore the Government shall ensure this through: -

- Public awareness and education
- Dissemination of relevant information in a timely basis to allow appropriate actions to be taken.
- Avenues for stakeholder input such as public meetings, consultations and workshops.
- Facilitation of self-help and community projects.
- Involvement of appropriate stakeholders in effects assessment of proposed initiatives, programmes or projects.
- Empowerment of stakeholder/community groups including the poor.

Creation of specific legal, institutional and financial/economic mechanisms.

Coordination and collaboration among relevant Governmental entities facilitated through mechanisms such as legislation will identify the roles, responsibilities and areas of accountability. However, successful coordination and collaboration require partnerships and commitments which would be facilitated through appropriate institutional mechanisms to foster the right attitudes and working environment. Some of these mechanisms include periodic coordination meetings

Water Policy Issues

The water policy issues are major actions that comprise the water sector and which must be addressed to facilitate effective management of the sector.

Climate Change and Island Vulnerability

Significant global changes are taking place and these global changes directly impact on hydrological processes. Therefore any climate change or climate variability will affect the supply of and demand for water, as well as the design and management of water resource projects.

Dominica as a small island developing state with the risk of climate related extreme events such as droughts, floods and hurricanes must plan to minimize the negative impacts and prepare to protect and maximize the water resources available for water supply under these conditions.

To address the potential problems associated with climate change and variability, and island vulnerability in the water sector, the Government will: -

- Support improving the availability and analysis of climatic data and services.
- Effectively utilize climatological information in water resources planning and management to protect and optimize available water resources for water supply.
- Support utilizing avenues for keeping abreast and understanding information on climate change regionally and internationally and the impacts on water systems.
- Support and promote measures to strengthen Dominica's human resources for assessing the impacts of climate change and variability with respect to water resources, environmental, social and economic aspects.
    - Develop national capacity to undertake hazard assessment and risk management using vulnerability assessment and risk management with respect to water resources.
    - Develop plans for drought, flood and hurricane events which must include mitigation, response and adaptation measures, and water supply alternatives.
    - Enhance coping mechanisms by partnering with appropriate stakeholders and integrating with other policies such as disaster preparedness, landuse planning, coastal planning, environment and national plans for sustainable development.

Drought

Drought is a natural phenomenon that results from the prolonged absence or infrequency of precipitation. Drought occurs naturally but can be worsened by the demands of human actions and changes in climate. In order to manage the water resources and water supplies to minimize problems associated with droughts, the Government will: -

- Encourage an integrated approach to planning and managing augmentation and allocation of water supplies.
- Encourage and promote water demand management and conservation practices with a view to extend the use of limited supplies.
- undertake appropriate analyses to inform decisions on drought
- Ensure the development and dissemination of information on water conservation technologies and practices to educate the public in order to promote best use of supplies.
- Encourage and support optimization of the storage facilities to contain wet season runoff for use in the dry periods.
- Encourage actions in landuse planning that would minimize negative impacts under drought conditions

Flooding

Flooding is an event that occurs with high intensity rainfall or during storms and hurricanes and made worse by watershed practices and human actions. In Dominica flooding is caused by high seas and rivers and the impacts are exacerbated by the lack of zoning to prevent development in flood prone areas.

The Government will ensure : -

- A Strategy and Masterplan for flood management is developed and implemented which will include: -
  - support for integrated watershed management and landuse planning to minimize and if possible alleviate the negative impacts and costs of flood damages.
  - compilation of appropriate data that will allow the identification of flood risk areas and discouragement of developments in these vulnerable areas.

- assessment of the effectiveness of various flood protection measures, such as flood risk mapping, flood warning and forecasting, landuse adjustments through zoning and acquisition, and traditional structural solutions such as upstream storage. The assessment should take into account costs, benefits and environmental impacts in order to apply appropriate measures and reduce recurring expenditure on flood relief.
- providing the public with information on floods, the impacts of dumping rubbish in rivers, sediment in channels and measures to reduce flood risks.
- Effective legislation for development control and landuse zoning together with proper monitoring and enforcement

Most of the activities of this flood management Masterplan will be undertaken by the WRO, the National Emergency Planning Organization (NEPO) and the Physical Planning Unit. The National Emergency Planning Organization will undertake the monitoring and warning activities with cooperation from the communities.

Water Supply

Safe and adequate water supplies are essential.
However, it should be noted that though the focus here is potable water supply, there are uses for which non-potable water supply is adequate.
The Government is therefore committed to: -

- Protect and restore the integrity of the nation's potable water supplies, and;
- Enhance the public water supply system to satisfy the quantity and quality requirements of the public water demand.

To meet this commitment, the GOCD through the WRO will: -

- Ensure protection of the available water resources through the development and implementation of effective watershed management and landuse management plans in keeping with the principles of sustainable water resources management

- Establish ambient water quality criteria through the collaboration of environmental and other relevant national and local authorities
- Regulate abstraction activities to maintain minimum river flows to support ecosystem services and social use of rivers where rivers are used for water abstraction or hydropower generation.
- Ensure that potable water is treated and routinely tested for chemicals, metals and biological quality and set standards for potable and non-potable water uses..
- Develop and implement a water efficiency strategy and plan that includes operations and maintenance measures to improve the efficiency of the distribution system, residential and industrial, commercial and institutional programs, rates structures and prices, regulations and public education.

  The water efficiency plan should include: -

  - A metering program.
  - Establishment of the country's water footprint
  - Reuse and recycling of grey water.
  - Mandating that new development proposals include aggressive water efficiency plans.
  - Harnessing and utilizing rainwater from roof catchments for individual households in cisterns or on a small scale in surface storage tanks in areas of water deficit
  - Licensing for water abstractions.
  - Developing a program to support retrofitting public buildings with water efficiency/conserving measures.
  - Programmes to reduce internal leaks and use water efficiency equipment, example, low-flush toilets.
- Ensure that the service provider develops a plan indicating the efficient use and allocation of the water resources prior to development of new sources
- Ensure in developing new freshwater supplies that first priority will be placed on local supply sources to minimize conveyance systems
- Assess the groundwater potential

- Utilize appropriate technology to meet the country's supply – demand balance taking into consideration environmental objectives and concerns.

Water Abstraction and Allocation

Development in Dominica will undoubtedly increase demand on the water resources which will result in conflict between users. However, the Dominica government is committed to improved water management for all users. Hence to manage the water resources with minimal conflict between water users and ensure that water resources are used efficiently and economically, the Government through the WRO will:-

- Establish an abstraction licensing system to facilitate effective water resources management and protection of the interests of water users. These licences must take into consideration priority of uses in the watershed and the rights of users. Abstractions requiring a licence include but are not limited to: -
    - abstraction of water from any source such as surface water, groundwater and coastal waters.
    - uses of water resources that in any way affect the flow, quantity or quality of the water sources.
    - impoundment or diversion of water from runoff.
- Develop appropriate allocation strategies taking into consideration social, economic and environmental benefits
- Implement fees for access to and use of ground and surface water. These fees will include: -
    - an application processing fee
    - a volume based abstraction charge
    - a fee to cover monitoring and associated administrative costs.
- Ensure that abstraction quantities allow sustainable use of the resources without negative environmental effects.
- Develop a fee structure that encourages conservation. Fees will be charged based on allocation, once allocation is greater than actual consumption.
- Implement measures to protect and improve the quantity and quality of the sources.

- Suspend partially or entirely, or revoke abstraction licences in the event of: -
    - Emergencies
    - failure to comply with the terms of the licence.
    - allocation amounts not being utilized over an established period of time or continuous abstraction over the allocated amount.
    - uses impacting negatively on public health or the environment.

With respect to Dominica's agriculture that depends largely on rainfed water, on a commercial scale a substantial volume of water is abstracted directly from rivers and streams. However, DOWASCO has no obligation to provide water for agriculture.
As a consequence, government will support: -

- Improved water management for agriculture based on a cost effective and efficient manner consistent with national development plans, water allocation priorities, and health and environmental considerations.
- Close integration of wateruse and landuse policies
- Efficient water use and the application of appropriate technology to do so.
- Development and application of realistic pricing and water conservation technologies and programmes including measures to improve irrigation efficiencies and reduce system losses.
- Information programmes directed to water conservation and proper agricultural chemical usage.
- Participation of farmers and the private sector in the decision making process, management and investment for irrigation water.
- Cost recovery mechanisms to ensure that the direct beneficiary pays and that the services provided can be maintained and expanded if necessary.
- Improved capacity of organizations in particular the agriculture department to provide technical support to the farmers in irrigation, drainage and soil and water conservation and administrative support when required.
- An appropriate system of abstraction licencing by the WRO.

- Development of an effective National Irrigation Strategy which will take into account measures to reduce or alleviate negative impacts created by the wet and dry season variability, droughts and floods.
- Facilitating the development of a strategy for subsidized irrigation to farmers, if necessary, to ensure continued operation of farming activity.
- Development and implementation of appropriate legislation to address irrigation issues.

Monitoring and Assessment

Water resources monitoring and assessment provide the data and information necessary to support effective water management and inform actions for national development.
At present in Dominica, there is an inadequate water resources monitoring system which is not geared to allow comprehensive water resources/hydrological assessment. However, in order to support sustainable use and development of the water resources and preservation of the ecosystems, the Government through the WRA will: -

- Establish and maintain a hydrological monitoring network to assess the quantity and quality of the island's water resources
- Ensure appropriate data processing, including analyses of trends and forecasts, to provide a comprehensive hydrologic and water resources assessment.
- Determine aquifer extent, safe yield and other parameters such as the saline interface.
- Monitor landuse changes, human induced variations and their impacts on the water resources in the watersheds.

Water Quality Management

Successful water quality management begins with the protection of the water resources and the prevention of pollution from upstream in the watersheds to coastal waters. Pollution can have negative impacts on health, water use both inland and coastal, land-use, ecosystems, livelihoods and socioeconomic development.

Dominica being a small island developing state, the effects of inland activities, river discharges and actions like the disposal of untreated sewage at sea are quickly reflected in coastal areas and will give rise to negative impacts if not addressed. Associated with water pollution is a direct and indirect cost for clean up. In addition, the coastal waters, the Caribbean Sea, is shared by many islands that also impact it through discharges from land based activities and pollution. Hence there is need for a regional partnership and commitment to prevent, reduce and control pollution of the area. Such partnership is realized in actioning the Protocol concerning pollution from land based sources and activities (LBS Protocol) under the Cartagena Convention.

For Dominica, quarrying activities, garbage disposal, sewage, effluent discharge, pesticides and fertilizers are some of the potential sources of water contamination

The Government of Dominica will promote the protection, preservation and enhancement of the quality of water for sustainable beneficial use.

As such, the Dominican Government shall: -

- Develop and adopt measures to prevent, reduce and control pollution of the water resources and the supporting ecosystems.
- Implement an appropriate and effective water quality monitoring programme
- Develop or adopt water quality standards to protect water bodies for various uses.
- Establish and implement standards for recreational water quality.
- Implement the 'pollution pays' and 'precautionary' principles.
- Develop and implement an effective public education programme to promote water resources protection
- Ensure that development projects and programmes are subjected to environmental impact assessment and approved before implementation.
- Develop and implement strategies for identifying the nature and extent of water quality deterioration.
- Adopt/implement appropriate technology to undertake and support water quality management.
- Develop adequate data and information systems to address water quality concerns.

- Develop and implement appropriate sewage disposal systems, quarry systems, effluent discharge systems and best management practices to minimize environmental and health impacts.
- Reduce the cost of combating water pollution through preventive actions
- Develop the expertise needed to assess the information and implement solutions.
- Develop in consultation with relevant stakeholders, strategies, guidelines and actions for water protection.
- Develop legislation and enforce compliance on pesticide control and disposal.
- Adopt and implement integrated watershed and coastal area management including the LBS Protocol

Wastewater Management

In Dominica, there is one centralized sewerage system in the capital Roseau and two (2) smaller sewerage systems at Canefield and Jimmit. In the former, sewage is collected and disposed at sea after the removal of material and sludge, whereas in the latter two (2) areas, sewage is collected and disposed at sea 1000 feet from shore with no treatment. In other areas of Dominica, sewage disposal is by septic tank and soak ways.

The Dominican Government is therefore committed to: -

- Support and promote the development and implementation of a strategic plan for the wastewater sector.
- Establish and enforce regulations and operating standards for wastewater to ensure protection of the people's health and the environment.
- Extend the sewerage systems to other communities, where practical and make mandatory connections to the sewerage systems where available
- Treat wastewater before disposal to alleviate negative impacts on human health and the environment.
- Support development of the sector and examine the costs and pricing of establishing and maintaining public wastewater treatment systems to allow cost recovery.
- Support and establish rules for design, construction, operation and maintenance of septic systems and soakaways. Such rules will include but are not limited to water

levels, soil type, proximity to aquifers and other water sources, minimum and average lot size.

- Maximize efficiency in the provision of urban drainage.
- Promote greater private sector participation and involvement in the wastewater sector.
- Build public awareness of the wastewater sector
- Develop and implement the requirements to deal with industrial discharges.
- Promote and adopt appropriate cost effective wastewater treatment technology.
- Promote recycling of wastewater

Water Valuing

Water is always seen as a social good but the economic value is most times neglected and this leads to a serious deficit in financing the water sector. At present water is viewed as a potential economic driver for Dominica.

Pricing for the use of water is intended: -

- To recognize the real value of water.
- As a means of controlling demand, generating revenues to cover costs for water resources management and utilizing water as a potential economic driver example for bulk water export
- To encourage water conservation and improved water quality. In so doing appropriate water-efficient technologies and industry processes such as cleaner production technology must be developed and adopted to minimize costs.
- To encourage efficient water use through application strategies such as the polluter pays principle.

Rates would be charged for: -

- Abstraction of water from aquifers and surface sources for consumption or use in production except in extraction for individual household use.
- Discharges of treated or untreated effluent and liquid or gaseous waste into a water body for dilution or disposal.
- Any uses that affect the flow of a water source both in terms of quality and quantity.

Rates for domestic purposes must take into consideration the needy and Government must develop mechanisms to assist the poor.

Fees for the use of water resources will take into account, among others, the following: -

- In the extraction of water, the volume of water removed and the variation in flow.
- In the discharge of effluents, other liquids and gaseous waste, the volume discharged, the variation in flow, the physical, biological and chemical characteristics and the toxicity of the effluent.

Fees collected will be allocated to water resources management including financing studies, projects, programmes, water resources monitoring and assessment and to the extent necessary administrative costs.

To facilitate an understanding of the rates and fees, a comprehensive public education and sensitization programme must be developed and implemented.

Watershed and Coastal Area Management

Watershed management is essential to water resources management as changes in landuse and actions in the watershed impact the quality, quantity and variability of the water resources. The Commonwealth of Dominica being a small island developing state is impacted by both the inland and coastal activities. Coastal area management together with watershed management is critical to sustainable development of the island. In addition the coastal waters are shared with other islands in close proximity, therefore protection from pollution of the marine environment of the Wider Caribbean region is necessary.

The Dominican Government will, through the relevant stakeholders such as the Ministry of Planning, Forestry Department, the Department of Agriculture, the WRO, organizations responsible for coastal and marine areas, and any other major stakeholders necessary, commit to: -

- An integrated approach to watershed management and coastal area management including adoption of the LBS Protocol.

- Establish effective legislation for watershed and coastal area management
- Support the establishment of Watershed and Coastal Area Management Plans based on prioritization of watersheds. These plans will include actions to support sustainable use and development of the coasts and ensure that indiscriminate occupation and exploitation of coastal strips are discouraged and that the location of economic activities in areas adjacent to the sea is regulated.
- Establish monitoring and assessment programmes
- Establish landuses based on land suitability and soil and water conservation criteria.
- Establish and maintain land zoning areas that are critical for the protection of the water resources.
- Develop landuse zoning and watershed and coastal area management plans taking into consideration the aspect of land ownership
- Classify water resources uses in watersheds
- Enforce measures and implement actions for protection of the watersheds and coastal areas.
- Develop and implement measures in collaboration with major stakeholders for the restoration of degraded watersheds and coastal areas, and mitigation of negative practices.
- Facilitate, establish and implement measures including nonstructural measures, to alleviate flooding and reduce the cost for restoration in the event of flooding.
- Establish a comprehensive programme and implement measures, including best management practices, to alleviate and control the effects of pollution from point and non-point sources in the watersheds and coastal areas.
- Protect the coastal areas and establish criteria for development on the coasts and the preservation of freshwater.
- Build human resource capacity to provide effective watershed and coastal area management.
- Develop and maintain a comprehensive data and information system
- Implement a comprehensive public awareness and education programme to inform people's actions in keeping with proper watershed and coastal area management practices and facilitate community level participation and cooperation.

Sensitive Ecosystems Management

Water is critical to supporting ecosystems. In particular, wetlands are an integral component of the hydrologic cycle as they can greatly influence water quality and water quantity. Wetlands modify the quality of the water and help to mitigate the consequences of shoreline erosion and sedimentation as they serve as protection from the effects of drought, flooding and storm surges. They also contribute to groundwater supplies through aquifer recharge and are productive ecosystems providing habitats for many species, recreation, tourist attraction and educational opportunities.

The Government's policy is to conserve and enhance wetlands in coordination with private organizations, landowners and the public. As such the Government will: -

- Seek to minimize the negative impacts of policies, programmes and activities including those causing pollution and sedimentation on wetlands.
- Identify, conserve and manage wetlands.
- Encourage appropriate landuse practices, integrated land and water resource planning, and application of environmental impact assessment practices to mitigate undesirable effects on existing wetlands.
- Ensure flow to wetlands is in keeping with established allocations.
- Promote public education of wetland values and public participation in the conservation of wetlands.
- Ensure there is legislation on the protection, use and development of wetlands

Water Use Conflicts

Potential for conflicts between users will develop and increase as demands grow. Conflicts are however most often rooted in inequity in access to water from the standpoints of quantity and quality. In addition it is recognized that there is a lack of information on areas of conflict and potential conflict and that water for domestic use versus water for export must be seriously considered in the future.

With respect to meeting demands and resolving conflicts, water management must: -

- Assess the available surface water and groundwater resources
- Determine the present water demands and forecast the future water demands for the various users/sectors
- Develop a policy on water for export
- Focus on harnessing, storing, regulating and providing supplies to meet needs.
- Explore alternative means of meeting demands and resolving conflicts through reuse, recycling, water pricing.
- Allocate resources through the supply-demand balance, use of the pricing system, priority of more beneficial uses.
- Identify conflict and potential conflict areas to inform effective planning
- Encourage an integrated resource planning and management approach to optimization and allocation of water supplies in order to ensure consideration of the full range of values.
- Include research into establishing appropriate prices for water, identifying areas of potential user conflicts and encouraging the development and adoption of water conservation technologies and practices.
- Promote and support public awareness and public participation in water protection and conservation.

Public Education and Awareness

The Dominica Government recognizes that increasing public education and awareness and providing opportunities for public input on water decisions are fundamental to integrated water resources management as it provides the best approach to ensure that decisions take into account the public perspectives. However success of this approach is dependent on a well informed public, including the media, on the water sector, integrated water resources management, policies and an understanding of the role of each person, and consequently a change in attitude towards the value and importance of water and related resources to society, the economy and the environment.

In order to promote public education and awareness, and participation in initiatives and programmes to improve and protect Dominica's water resources, the Government will: -

- Develop a comprehensive public education and awareness strategy and plan for the water sector targeting all ages and strata of society including media practitioners, and implement programmes and actions with private sector participation support so as to effectively inform and change peoples' attitude towards water.
- Provide the financial resources to support continuous public education in water
- Provide opportunities to consult with the public and ensure that its views are considered in all major water management decisions. This includes major cross-sectoral decisions that impact on water management.
- Ensure that information on the status of the water resources is made available for public access through appropriate means in a timely manner.

National Security

The national security of water is essential to protect human life and protect against economic loss referring in the latter particularly to fire fighting.

The Government will therefore through the water service provider ensure that: -

- Water sources and areas designated restricted are adequately protected from interference and contamination.
- Water of an adequate supply and pressure is made available to meet the needs of fire fighting.
- Hydrants are installed, operated and maintained to appropriate specifications to be effective.
- Water security provisions are included in National Security
- Measures are put in place to ensure safety of water infrastructure such as dams

Implementation of Policy

The Water Resources Organization will be the main Governmental organization directly responsible for water resources management and therefore must be established through

legislation to effectively implement the policy. However, because of the multi-sectoral and multi-disciplinary nature of water resources management many other departments have some responsibility in the implementation of the water resources policy. Institutional arrangements are critical to the formulation and implementation of IWRM policies and programmes. It must clearly map out the actors, co-ordination mechanisms, jurisdictional authority, and match responsibilities, authority and capacities for action for successful implementation of the Policy.

To ensure Policy implementation, the Government will reference the water resources policy annually for planning (inclusive of feasibility considerations), and budgetary purposes within the context of a Strategic Plan. A comprehensive review and policy revision will be undertaken once every five (5) years through consultations, public comments and workshops. In addition, to ensure that the policy remains relevant, the Government will: -

- Undertake a regular review of water related policies and programmes to assess the degree to which these policies and programmes are supportive of the Water Resources Policy.
- Reconcile the water related policies' positions to promote a coordinated approach.
- Ensure amendments or additions to the water resources policy as appropriate.
- Establish functional units as outlined in the water resources policy.
- Apply environmental impact assessment and the review process to examine water related developments and projects.

Furthermore, the adoption and implementation of water policy goals and strategies will be encouraged and promoted through coordinating mechanisms and arrangements which include: -

- Information exchange and consultation
- Interagency agreements or memorandum of understanding for cooperative programmes.
- Formal and informal consultative or advisory committees to address particular issues.

- Public awareness and education.
- Workshops, seminars and other consultative mechanisms.

Table 3 below summarises the challenges and issues which IWRM can improve.

Table 3: Challenges and Issues

Physical	Institutional	Capacity
Water Supply: Degradation of watersheds due to high rates of deforestation	Weak institutional framework for managing water resources	Poor irrigation supply network leading to underdevelopment of agricultural sector. Poor and aging water distribution and sanitary system networks
Limited access to water and sanitation	Limited stakeholder involvement and public participation in decisions affecting water;	leading to contaminated discharges into waterways and coastal areas
Extensive environmental damage due to agricultural and human encroachment into watersheds	Unplanned growth in the tourism and developing housing areas placing additional stress on water supply and sanitation services and resources	Little wastewater and sewage treatment and proper waste disposal affecting water quality Inadequate ,monitoring and assessment to make informed decisions

It must be noted that this draft policy is the beginning of a process whereby the next steps would be public comment on the draft policy on invitation from the Government, finalization of the policy and adoption by the Government. Following this, legislation must be drafted and enacted to give effect to the Policy and establish the Water Resources Organization.

Annex A

Definition of key terms

Integrated Water Resources Management (IWRM):

A process which promotes 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.

Sustainability

Sustainability focuses on meeting the needs of both current and future generations.

Water resources management is sustainable if it meets the needs of the present without compromising the ability of future generations to meet their own needs, while maintaining the ecological, environmental and hydrological integrity of the water resources systems involved.

Sustainability does not refer to physical aspects only, but to technical, financial, social, economic, institutional and environmental aspects.

In water resources management, the following aspects of sustainability should be considered: -

- Technical sustainability (balanced demand and supply, no mining of water).
- Financial sustainability (management based on a cost recovery principle).
- Social sustainability (aiming at stability of demand, taking into account the people's 'willingness to pay').
- Economic sustainability (sustaining economic development and production).
- Institutional stability (the capacity to plan, manage and operate the water resources system).
- Environmental sustainability (no long-term negative or irreversible effects).

Policy: Governmental statement on objectives, goals and priorities of integrated water resources management. (*i.e.* where do we want to go?)

Water Resources: All available water that can be used for people, food and nature not only potable water.

Water Resources Assessment: This refers to the continuous study of water availability and is accomplished through programmes and activities in on going survey, monitoring and analysis and in research and development.

Water Demand Analysis: This activity involves determining the water requirements of the various sectors and stakeholders, in other words, the water needs for the various uses e.g. agriculture, tourism, industry, and households.

Demand Management: This is the process of controlling the quantity of water abstracted by the various sectors and stakeholders and ensuring the most efficient use of this water.

Conservation: This refers to the prudent use of and the preservation of water resources. This activity is undertaken through the reduction of domestic demand, the treatment and reuse of water, proper watershed management, and public education and awareness.

Master Planning and Allocation of Water: This involves the determination of how much water is to be provided to each sector or stakeholder.

Pricing of Water: This is the process of determining an economic valuation of water taking into consideration its social and ecological value. A distinction would be made between prices that are charged to water abstractors and prices that are charged by the abstractors to the end user of the water.

Legislation and Enforcement: This is the process to ensure that proper laws and regulations are established and that they are complied with as regards abstraction of water, use of water, prevention of water pollution and use of the land.

Water Resources Development and Distribution: This encompasses the activities involved in making water available for use by its various consumers through the process of abstraction, storage, transmission and distribution. This also includes the proper sewerage and treatment of used water.

Aquifer: A permeable subsurface zone capable of yielding quantities of groundwater to wells and springs.

Effluent: The liquid waste from sewage or industrial processing.

Greywater: Kitchen, shower and bath water, excluding toilet water.

Hydrological Considerations: Considerations which deal with the occurrence, circulation, distribution, and properties of water and its reaction with the environment.

Hydrological cycle (or water cycle): The complete cycle through which water moves from the oceans, through the atmosphere, to the land, and back to the oceans.

Point source pollution: A stationary location from which pollutants are discharged. An example of point source pollution is direct, concentrated discharge such as sewage effluent discharging from a pipe into a river.

Potable: Suitable for drinking.

Rate of charge: The rate of inflow into a ground water aquifer.

Riparian zone: A margin of vegetation which includes trees, shrubs and grasses extending 30-50 metres from the water line of rivers and streams.

Total annual sustainable yield: The total annual sustainable yield for ground water is that total quantity of ground water which can be extracted annually without exceeding the recharge rate.

Watershed: The area, which supplies water to a stream and its tributaries by direct runoff and by groundwater runoff, is the drainage area or watershed for the stream.

Water table: The upper portion of the part of the ground that is completely saturated with water.

Wetlands: Areas inundated or saturated by surface or groundwater often and long enough to support vegetation adapted for saturated soil conditions.

Annex B

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Annex C

Situational Analysis

Group 1

	Water Sources	Gaps/ Challenges	Recommended Solutions
1	Potable Water Supply	• Affordability; availability of capital funds for existing and new supply; cost recovery • Availability of supply to all communities • Land management plans	• Planning and zoning • Research - Export of water, commercial activities- bulk and bottle - Construction of mini ponds/ dams - Inclusion of filtration system for water quality
2	Monitoring and Assessment	• Inadequate monitoring of volume and quality of water • Data gathering, evaluation and sharing	• Set up gauging stations • Establish a new Authority to deal with water management including data gathering and sharing.
3	Water Abstraction and Allocation	• Lack of information on water volumes/ quantity at locations	• Detailed continuous study to determine water volumes in all water catchment areas.
4	Groundwater and Surface Water	• Pollution from waste, use of chemicals, runoff • Quality of surface water • Turbidity of water • Volume/ quantity of water • Recharge rate of aquifers	• Legislation and enforcement on pesticide control, disposal • Adequate filtration system • Study for recharge rate
5	Rainwater Harvesting	• More promotion • Advocacy to promote and encourage rainwater harvesting	• To be used for uses other than drinking • Construction of mini ponds/ dams for aquaculture, irrigation • Establish a system based on RWH models • Collaborate with planning division on design to incorporate RWH

			• Develop capacity for treatment and testing rainwater
6	Water Quality Management including Recreational Water Quality	• Quarrying activities • Disposal of garbage/ pollution in ravines, valleys • Inadequate water quality testing and treatment.	• Filtration system established for potable water. • Education and legislation, polluter pays principle. • Comprehensive Environmental Impact Assessment (EIA) • Ongoing monitoring - Ministry of Health is in the process of establishing standards for recreational water quality.
7	Watershed Management and Coastal Zone Management	• Lack of a land use plan and watershed management plan • Land ownership • Monitoring • Identification of watersheds	• Establish a zoning/ land use plan in collaboration with physical planning • Review and establish legislation • Education and public outreach • Collaboration among stakeholders
8	Wastewater	• Cost of wastewater systems • Inappropriate treatment and Infrastructure • Monitoring and testing wastewater • Lack of recycling • Lack of standards and regulation • Need to extend the existing sewage systems to more communities.	• Treatment of wastewater • Promote recycling of wastewater • Establish regulation and standards for wastewater • Extend sewage systems to more communities.

	Legal and Compliance	**Gaps/Challenges**	**Recommended Solutions**
1	LBS Protocol	• Pollution: agriculture, solid waste, industrial chemicals, sediments, dumping, quarrying, sewage • Research, data collection and effective monitoring	• Establish effective systems of monitoring In case of solid waste, use students to collect data and learn from data collection
2	Public Education and Awareness	• An uninformed media Improved training and retraining of resources to combat the knowledge gap	• Seminars and field trips to educate media • Annual events to coincide with special days • Education and awareness programs to begin at an early age and continually reinforced Education to start at preschool
3	Monitoring and Enforcement	• Multi-sectoral approach to enforcement • Sensitization of the police on litter enforcement	• Make examples of perpetrators. • Use village councils for enforcement
4	Wateruse Conflicts	• Lack of information on areas of conflict and potential conflict • Water for domestic use versus water for export	• Identify conflict and potential conflict areas to inform an effective planning function.
5	Water Pricing	• Water is seen as a social good • The correct value is not placed on water.	• Public awareness and sensitization • Price based on use (differential pricing)

	Areas Affecting Supply		
1	Drought	• Also include landslides, hurricanes, mudslides, floods – Absence of Data • Information to the public	• Landuse Planning • Education and Public awareness • Comprehensive automated national system of meteorological data collection
2	Climate Change	• Lack of information • Need to understand the impact of climate change on water systems and biodiversity.	• Expose relevant staff and the public to training on this issue

GROUP 3

	Related Issues	Gaps/Challenges	Recommended Solutions
1	Information Management	• Availability and format of information • Water quality and quantity in catchments • Lack of information sharing among Agencies and Stakeholders	• Information clearing house to decide on relevant information for stakeholders • Protocol for sharing information and information dissemination • Protocol for collection and analyses of data/information
2	Coastal Zone management	• No coastal zone plan	• Review existing legislation as it relates to coastal zone management and Physical Planning Act • Develop coastal zone management plan
3	Water Use in Irrigation	• DOWASCO provides water for potable use and not for irrigation • Lack of legislation regarding irrigation	• New water legislation • Over arching legislative framework to address irrigation issues • Regulatory body to manage all water resources
4	Environmental Impact	• Water quality	• Develop zoning plan for

		perspective • Lack of zoning	Dominica • Stricter guide for development including buffers
5	Sanitation	• Not mandatory for houses to connect to a sewerage system	• Enforcement of regulations • Connect to sewerage system where possible • Explore use of dry toilet systems where appropriate
6	Wetlands	• Lack of education and awareness regarding wetlands • Wetlands not identified and zoned	• A Public Awareness Programme • Wetland legislation
7	Flooding	• Lack of zoning to prevent development in flood prone areas and flooding from high seas and rivers	• Stricter conditions for development permission

8	National Security	• Security for intakes, treatment plants and storage • Private ownership of catchments • Lack of appropriate pressure for fire hydrants	• Install security systems around catchments and water facilities • Acquisition of lands for catchments protection • Water security provisions included in national security legislation • No restrictions for the use of water for fire fighting • Legislation on fire hydrant use