DEPARTMENT OF THE ENVIRONMENT

Ministry of Sustainable Development,
Climate Change & Disaster Risk Management

Fourth Draft Belize Wastewater Policy

September 14th 2022

Source: Wikimedia

Fourth Draft Belize Wastewater Policy

Department of the Environment
2nd Floor, Green Complex Building,
7552 Hummingbird Highway,
Belmopan City, Belize, C.A.

The Draft Belize Wastewater Policy was spearheaded by the Department of the Environment (DOE) and financed by The Global Environment Facility (GEF) under the GEF CReW+ Project;

The GEF CReW+ is a partnership project funded by the Global Environment Facility (GEF) that is being co-implemented by the Inter-American Development Bank (IDB) and the United Nations Environment Programme (UNEP) in 18 countries of the Wider Caribbean Region (WCR).

This project builds upon its previous successful phase "The Caribbean Regional Fund for Wastewater Management (CReW)" project (2011-2017). CReW+ is being executed by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the Organisation of the American States (OAS) and the Secretariat of the Cartagena Convention (CAR/RCU) on behalf of the IDB and UNEP respectively.

The 18 participating CReW+ countries (Barbados, Belize, Colombia, Costa Rica, Cuba, Dominican Republic, Grenada, Guatemala, Guyana, Honduras, Jamaica, Mexico, Panama, Saint Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago) vary geographically from large, continental countries to small island states, with significantly different political, linguistic and cultural contexts.

About the GEF: The Global Environment Facility (GEF) has provided $22 million in grants and blended finance and mobilised nearly $120 billion in co-financing for more than 5,200 projects and programmes. The GEF is the largest trust fund focused on enabling developing countries to invest in nature and supports the implementation of international conventions on biodiversity, climate change, chemicals and desertication. It brings together 184 governments, plus civil society, international organisations, the private sector and partners.

CReW+

Financed by

Co-implemented by

Co-executed by

Content

Figures

Abbreviations

BOD	Biochemical Oxygen Demand
BWRF	Belize Wastewater Revolving Fund
BWSL	Belize Water Services Ltd
CAR/RCU	Secretariat of the Cartagena Convention
CReW	Caribbean Regional Fund for Wastewater Management Project
DFC	Development Finance Corporation
DOE	Department of Environment
GEF	Global Environment Facility
GIZ	Deustche Gesellschaft für Internationable Zusammenarbeit
GPD	Gallons per day
GPM	Gallons per month
GOB	Government of Belize
IDB	Inter-American Development Bank
IMU	Information Management Unit
MoHW	Ministry of Health and Welfare
NGO	Non-Governmental Organization
NSTMP	National Sustainable Tourism Master Plan
OAS	Organization of the American States
PRTR	Pollutant Release and Transfer Register
PUC	Public Utilities Commission
SIF	Specialized Investment Fund
UNEP	United Nations Environment Programme
WCR	Wider Caribbean Region
WWPSC	Wastewater Policy Steering Committee

1 Foreword

Belize is a country "with wealth untold, where mountains and valleys and prairies roam...". A guardian of the second largest barrier reef in the world and custodian of pristine rainforest, ancient Maya monuments and astonishing waterfalls cascading from the Maya mountains down towards the Caribbean Sea. The protection and preservation of this unique 'jewel' is a priority for Belize and a cornerstone of our Sustainable Development agenda.

Wastewater management is a key component of that agenda. The Department of the Environment (DOE) acknowledges the importance of this matter, its major environmental impact and notes that multiple agencies have important roles to play in achieving our desired objectives.

In this context, the Department of the Environment established a Wastewater Policy Steering Committee (WWPSC) to initiate the process of policy formulation and to develop strategies for then implementing the policy once approved.

This document represents WWPSC's work. A first and a second draft were presented with broad policy principles as a basis for consultations that were considered by the WWPSC with the intent that the views and recommendations of all national experts and stakeholders can be included as part of the generation of a final document which will then be submitted to cabinet for final approval.

The vast range of activities which may be considered under the 'umbrella' of wastewater management are complex and require comprehensive policy guidance from Government. Regulations exist to address many of those activities already (though it is acknowledged that more needs to be done). In order to address priority areas first however, this document focuses on the safe disposal of human waste, industrial and domestic wastewater.

Recognizing that all countries face constraints on possible rates of progress from change management to capacity issues, this document should be considered not as a final product but rather another step forward, a policy guide for the next - ten years in our continued efforts to improve the quality of life of all Belizeans.

2 Preface

This policy document addresses a subject that intimately affects human health and the environment. In order to adequately deal with the safe disposal of industrial, commercial, agricultural, - and black / grey wastewater, the cooperation of multiple agencies and Government Departments is required.

3 Acknowledgments

The following agencies are represented on the WWPSC and support this draft document:

Department of the Environment; Belize Water Services Limited, Ministry of Health and Wellness; Ministry of Natural Resources; Ministry of Tourism and Diaspora Relations; Ministry of Agriculture; Ministry of the Blue Economy and Civil Aviation; National Association of Village Councils; Belize Mayors Association.

The development of this document was supported by the GEF CReW+, a partnership project funded by the Global Environment Facility (GEF) that is being co-implemented by the Inter-American Development Bank (IDB) and the United Nations Environment Programme (UNEP) in 18 countries of the Wider Caribbean Region (WCR). This project builds upon its previous successful phase "The Caribbean Regional Fund for Wastewater Management (CReW)" project (2011-2017). CReW+ is being executed by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the Organisation of the American States (OAS) and the Secretariat of the Cartagena Convention (CAR/RCU) on behalf of the IDB and UNEP respectively.

The GEF, Global Environment Facility has provided more than $22 billion in grants and blended finance and mobilized an additional $120 billion in co-financing for more than 5,200 projects and programs. The GEF is the largest multilateral trust fund focused on enabling developing countries to invest in nature and supports the implementation of

major international environmental conventions including on biodiversity, climate change, chemicals, and desertification. It brings together 184 member governments in addition to civil society, international organizations, and private sector partners.

4 Introduction

In recognizing the need for action with regards to the comprehensive management of wastewater in Belize, the Department of the Environment recognizes the roles of the multiple agencies involved. Supported by those agencies, the Department of the Environment has produced this policy document as a first step in creating a comprehensive system of addressing this challenge in a coordinated and sustainable fashion. The Wastewater Policy Steering Committee (WWPSC) acknowledges the work of the Department of the Environment in providing wastewater management regulatory services to the wastewater sectors countrywide and to Belize Water Services Limited - in providing wastewater management services to portions of Belize City, Belmopan City and San Pedro Town. Nonetheless, much more needs to be done if Belize is to achieve its targets for sustainable development. The WWPSC was tasked to guide the preparation of a policy document and an implementation strategy to ensure a realistic plan of activities to realize those policy objectives. While focusing on the safe disposal of human waste, industrial, commercial, agricultural and domestic wastewater, the WWPSC considered many critical factors from Human Health through Environmental Health and including the economic realities for communities throughout Belize. The document considers not only the aspirational requirements of Belizean citizens but also the practical circumstances faced. The issues are complex and fall under the jurisdiction of different departments and agencies. The policy focuses on integrated wastewater management, and as such an integrated approach is essential and this document describes such a methodology.

5 Wastewater and Sanitation – the challenges and opportunities:

a. Human Health
b. Environmental Health and Preservation
c. Illegal Dumping of Fecal Sludge

d. Economic activity, preservation and expansion (especially tourism)

The challenges of inadequate wastewater management – inadequate sanitation – represent an inconvenient truth that many are content to 'flush and forget!' The impact though, must be fully understood. Our water resources are affected – particularly water quality - by wastewater management or the lack thereof. The health and well-being of our people is at risk. In key areas for tourism expansion and great economic potential, inadequate sanitation further risks irreparable damage to our reef, our fishing industry and the quality of our coastal waters.

Industry and Agriculture, from distilleries and breweries, sugar processing plants, citrus, bananas, shrimp and aquaculture discharge wastewater every day. Effluent regulations have been established for these different industries since 2009. But it appears that currently they are not being fully applied and monitored, which leads to lack of control of industrial pollution. The monitoring and evaluation processes are inadequate and must be upgraded to allow proper regulation of the sector. Currently, there are only 60 wastewater licenses emitted for all the country, but that is insufficient. The industries/companies are not reporting in adequate frequency and the information reported to DOE in not up to date.

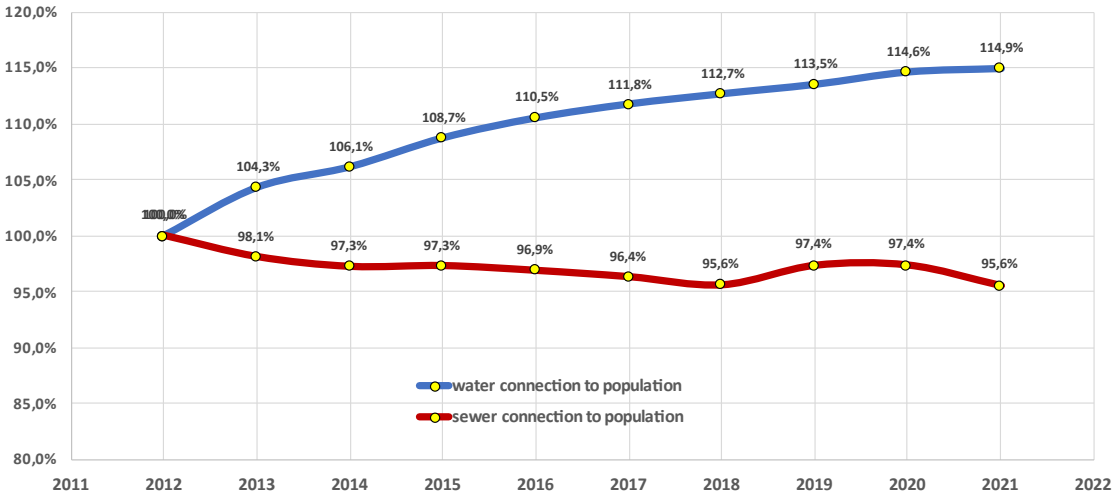
In order to determine the real situation, an important activity for the country is to develop, in the next 2 years, a systematic survey of polluting loads in the country. Therefore, developing an inventory of the polluting loads and crossing with the preservation areas.

Everyone uses some sort of "toilet" facility every day. Yet it is estimated that only 16 per cent of Belize's population is connected to a sewage treatment plant. In Belize City, sewerage services are available to 8,200 households (ca 50%), in Belmopan City 2,100 (ca 45%) and in San Pedro Town 1,100 (ca 30%). The rest of the country may be using anything from poorly constructed septic tank facilities to unimproved pit latrines. Figure 1 shows that Belize diminished the percentage of connection of households to sanitation in regard to the growth of the population.

Much of the existing septic systems are not functioning properly, generally due to the designs which are not to standard and only partially treat the raw sewage and grey water. There is also a lack of proper maintenance and desludging of the septic tanks. This fallouts in direct impacts that can immediately contaminate any nearby water body such as creeks, rivers, sea and underground water.

In rural areas, private sector septic cleaners collect the sewage, but lack proper disposal sites of sewage waste for treatment.

Figure 1 - Santiation evolution of household connections in regard to the population growth



water connection to population	100,0%	104,3%	106,1%	108,7%	110,5%	111,8%	112,7%	113,5%	114,6%	114,9%
sewerconnection to population	100,0%	98,1%	97,3%	97,3%	96,9%	96,4%	95,6%	97,4%	97,4%	95,6%

There are fewer sewer connections per inhabitant than there were 10 years ago. The pollution problem is growing.

However there is a lack of systematic data to be able to determine the pollution per source, area and water body.

The effects of this wastewater management challenge are threefold:

- Human Health – particularly for children and their quality of life, their education and the development potential of our communities.
- Economic – the impact on the rapidly developing tourism sector could be catastrophic – while the effect on household communities in terms of the cycle of poverty, illness and lost educational and economic potential is no less important.
- Environmental – Inadequate sanitation leads to dispersed and diffuse pollution of water sources, damage to reef and coastal ecosystems which may be irreversible.

This document is intended to confirm Government's commitment, at the highest level, to an appropriate, sustainable strategy for the improvement of wastewater management, the improvement of health and quality of life and the protection of our environment and natural resources.

6 Policy Principles

The following represent key 'guiding policy directions' which should inform current and future decisions.

1. Legal and Policy reforms must be harmonized with national priorities (Plan Belize, SDGs, NDC, etc.) to establish a robust framework for Wastewater Treatment in Belize.
2. Development of Wastewater Monitoring and Evaluation Systems for evidence-based solutions.
3. Implementation of the Circular Economy approach, recognizing waste as a valuable resource.
4. Implementation of the Polluter Pays practice – The cost for cleaning the wastewater must be paid by the polluter as a basic principle.
5. "Some for All", rather than "All for Some" – this should not imply a complete uniformity of services (some areas with greater population density or greater resources may be able to afford a different level of services), but available resources should prioritize sustainable and achievable solutions for areas inadequately served so far.
6. Basic Services are a Human Right – Government should provide access to services, as well as support in obtaining those services but to connect and to use those services is a social responsibility which the Government should promote permanently through all its levels and agencies. In the end it is the individual people who are responsible for those services.
7. Development should be demand driven and community based – responsibility includes the willingness or responsibility to pay towards the costs of providing and operating a sanitation system.
8. Equitable Allocation of Development Resources – basic service provision should be equitably distributed across the country – taking into consideration population density and levels of development.
9. Wastewater Treatment has an economic value – just as the pollution of water resources has an economic cost, so to the provision of sanitation services has

economic value. Good sanitation preserves health and the environment and supports related revenue generation.

10. The User Pays – Sanitation systems must be sustainable and therefore must be affordable. User payments are essential to ensure this.
11. Integrated Development – Sanitation services require coordinated action across multiple sectors. Special note should be made of the relationship between water supply and sanitation and their impact on human and environmental health.
12. Environmental Integrity – As with Environmental Impact Assessments, the environment must be considered in all development activities. Appropriate protections must be applied – sanitation services which do not protect the environment cannot be considered adequate.
13. Sanitation is about Health – Sanitation is far more than toilets and sewer systems. It incorporates educational and promotional activities as well as change management initiatives designed to help people and organizations improve behaviors which may otherwise negatively impact quality of life.
14. Sanitation is a social responsibility – Benefits are most likely to be achieved when the majority of households and organizations are included and not disaggregated into individual efforts.
15. The tariff rates will give adequate price signals regarding scarcity, environmental risk and operating costs. Total or partial subsidies may be given to people on an individual basis and after verification and should be designed in a way that does not promote irrational use.

7 National Wastewater Policy

The provision, improvement and ongoing operation of adequate sanitation affects all members of society. It should be addressed in a coherent and consistent way. The guiding policy principles should apply in all communities, rich or poor, urban or rural – whether wastewater management services are provided at the industrial and agricultural level or where sanitation services are provided at the individual household as in a septic tank - or as a system for an entire community. From this perspective there are a number of dimensions to wastewater management services which should form the framework for the policy:

- The institutional and organizational frameworks required; the regulatory and legislative frameworks need to be strengthened and enforced. The language

used should be modernized and include further definitions of types and volumes of effluent as well as defined penalties for breach. Wastewater treatment systems should be improved – probably with more active treatment facilities. The circular economy, with wastewater considered as a resource with value, should be a central theme. Information management systems must be strengthened in order to monitor and track these factors.

- The financial and economic strategy;
- The technical issues, particularly those related to environmental protection; including: - Sewage systems – BWSL is clearly the main provider, but there is also activity in the informal sector – pumping out septic tanks and disposal of that waste etc. must be considered. The Public Health Department developed the standard design for septic tanks, and incorporated it into the Public Health Act. This may need to be updated (make sure it has leach field/soak away and grease traps (if needed) - public awareness must be considered and promoted for these adjustments. The proposed Master Plan for BWSL should be highlighted in the policy document and harmonized with it. Access to the BWRF may provide an incentive for good practice. The policy document must be 'tied into' the Sustainable Development Goals for Belize. There must be a strong monitoring and evaluation component.
- National Development Plans shall take the policy into consideration. When existing national development plans are updated, they should take into consideration the policy. For example, the National Sustainable Tourism Master Plan (NSTMP) and the Cruise Policy should also be harmonized with the policy.
- The social circumstances and educational support needed to ensure that sanitation programs achieve real human and environmental health improvements through community support.
- Communities usually require a degree of conformity to achieve public and environmental health standards while maintaining affordability. To obtain that conformity is in the public interest. To connect if the sewer network is available should be mandatory. This is the norm in many countries and it is what enables agencies to charge for the service even if the people do not connect as a fine and as pressure to connect.

These 'dimensions' must be addressed in a manner sufficiently detailed to inform a comprehensive policy while retaining enough flexibility to allow for locally determined approaches. They must simultaneously ensure that adequate attention is given to the key objectives of achieving sustainable benefits within the resource constraints of the economy and the environment.

8 Institutional and Organizational Framework

The institutional arrangements for the promotion and provision of effective wastewater treatment services must be guided by and consistent with existing law – there appear to be some inconsistencies in existing legislation but in principle it appears that:

- The provision of water supply and sanitation services is currently the responsibility of the Belize Water Services Ltd under license from PUC.
- In the event that BWSL does not assume this responsibility, municipal and village councils may assume it through "Water Boards" or other authorized and licensed organizational agencies.
- The municipal and village councils, in coordination with the Department of the Environment and BWSL should be responsible for ensuring that all technical and operational aspects of service provision comply with current regulations.
- The Government, acting through the Department of the Environment has both the responsibility and the authority to intervene in order to ensure that minimum standards are maintained.

The legislative environment requires clarification. It is recommended that the GoB commits to a review and a harmonization of the legislation within two years of the passage of this policy.

Updating of the effluent standards in the Environmental Protection (Effluent Limitations) (Amendment) Regulations, 2009, is necessary. Penalties should be increased. A ticketing system can be implemented for non-compliance issues observed during site inspections. Effluent licenses shall be renewed every two years based on compliance. Within the two-year timeframe, the DOE shall conduct compliance which shall determine if a license shall be renewed.

Recognizing the different stages of development around the country, it is clear that institutional arrangements will vary in several ways – approaches in smaller, less wealthy, developing areas will be different from those in large, well established areas

– and rural areas will generally require different solutions to urban. Some of the factors which influence these decisions include:

- Financial and economic constraints – institutional arrangements will be different in wealthier communities from those where poverty and insufficient technical capacity make the provision and ongoing maintenance of the most sophisticated service solutions more challenging.
- Technical and Environmental issues – the technologies used where sanitation systems serve an entire community (treatment plants) will be different from those systems which serve individual households (septic tanks). Environmentally vulnerable areas of course, require special care.
- Social circumstances and educational support – Programmes in developing areas may require more attention to the so called 'softer' elements such as health promotion, education and perhaps financial assistance (including possibly, support for new entrepreneurs wishing to participate)

9 Integration with other programmes:

The vision of the GoB is one of collaborative effort, no agencies should work in silos. The Wastewater policy and strategy should deal with the challenge holistically. Many departments and organizations, for example, have a direct impact on sanitation services, including:

1. Central and local building authorities
2. The Lands and Surveys Department in the Ministry of Natural Resources and Land Utilization Authority (LUA).
3. The Ministry Infrastructure Development and Housing in support of coordinating with water supply and sanitation infrastructure.
4. Belize Water Services Ltd
5. The Environmental Health Department in the Ministry of Health and Wellness promoting sanitation improvements as a contribution to improved public health
6. The Department of the Environment
7. The Ministry of Tourism
8. Municipal councils
9. Ministry of Agriculture
10. The Ministry of the Blue Economy and Civil Aviation

A critical component of this policy is the need to deal with the issue holistically.

Wastewater treatment Improvement Program

In order to make progress towards the Sustainable Development Goal in which all Belizeans have access to adequate sanitation services and all industrial and agricultural wastewater is adequately and appropriately managed, three specific objectives must be met:

I. Integrated and coordinated activities between the different departments of government at the national and district levels – especially with regards to technical, financial, communications and organizational levels.
II. Pilot activities successfully planned, implemented and analysed in support of the promotion of adequate sanitation and wastewater treatment systems
III. The provision of technical, financial and communications support for the achievement of adequate wastewater management and sanitation to those communities which are not already assisted with such programmes. This might prioritise especially vulnerable coastal communities, rural areas, smaller municipalities and villages.

The range of inputs needed are broad and will require any proposed programme to be based on the inter-departmental approach described. To be effective it should fall under the leadership of a particular Ministry or Department (we suggest Environment).

The management of the wastewater treatment improvement programme should be guided by the WWPSC comprising representatives from the collaborating departments and agencies. The programme should maintain an emphasis on human and environmental health and on the importance of an integrated and coordinated approach.

Where financial interventions are required, they may be supported through the Belize wastewater revolving fund established for that purpose and utilizing community water boards, with enhanced capacity where required, to monitor and maintain systems in coordination with the service provider. The design of programmes should support and assist inexperienced agencies both technically and financially, to deliver wastewater management and sanitation services in a community based, sustainable manner.

The role of the Private Sector:

While the wastewater management improvement programme described here may require a high degree of support from National and Local Government agencies, it is intended that such a programme will be a partnership between the public and the private sectors, with private sector inputs including:

- Technical assistance
- Specialized consulting, guidelines preparation.
- Planning, design and contract supervision.
- Construction through licensed contractors
- Preparation of communications materials and methods
- Training and Capacity building
- Materials supply
- Financing
- Investing in infrastructure for new land subdivisions.
- Developing business plans for the efficient management of effluent collection and treatment systems at the individual and community level.

Household responsibility

Primary responsibility for household sanitation service provision rests with the household itself. Government and other agencies should facilitate this and regulate the quality of the service provided. Where community systems exist, households should be required to connect and should be required to pay the associated fees.

If a household has difficulties paying the cost of connection to the wastewater system, a possibility would be to use the revolving fund.

Local Government Responsibilities - Ministry of Labour, Local Government and Rural development:

Local government responsibilities include:

- Planning and programming the provision of communal infrastructure with BWSL.
- Coordinating public health efforts with the department of Public Health.
- Facilitating community involvement.
- Assisting the establishment and capacity building of local water and sanitation Boards in all villages.
- Coordination with other agencies to generate best practice, consistent and sustainable approaches.

Ministry of Agriculture Responsibilities:

In agriculture, **biological cycles** are the foundation of the circular economy. Indeed, the circular economy, in its definition of an economic model that aims to preserve the

environment, fits perfectly into a mode of agricultural production by optimizing the use of available resources, and by re-injecting them into the production circuit.

- Planning and programming land use utilizing biological cycles that optimize the use of available resources and regenerate or restore materials to be reused.
- Coordinating initiatives with the Department of the Environment.
- Promoting 'buy in' from the agricultural community.
- Assisting in the implementation of accurate and timely monitoring and evaluation systems.
- Coordination with other agencies to generate best practice, consistent and sustainable approaches.

National Government Responsibilities:

National responsibilities include:

- Coordination of an integrated approach to all activities
- Policy and strategy development
- Establishment of minimum standards and levels of service
- Maintenance of the regulatory framework
- Allocation of national funds (where applicable)
- Development of proposals for grants, loans and technical assistance
- Development of guidelines
- Promotion and advocacy of sanitation improvements
- Monitoring and evaluation
- Periodic contributions to the revolving fund to allow growth and expansion.

Belize Water Services Limited

BWSL responsibilities include:

- The supply and provision of services consistent with the existing legislation and regulations.
- Harmonizing the BWSL Master Plan with this and other appropriate Policy documents – a critical component of the Policy and Strategy should be to deal with wastewater holistically. In order to insure that, the masterplan should be used as a baseline for each location and as a guide for prioritizing implementation.
- Expansion of the collection system in current service areas

- Improve effluent compliance
- Implement wastewater systems prioritizing the areas: Caye Caulker, Placencia, North Ambergris Caye.

Other stakeholders:

The improvement of wastewater treatment services is everyone's business. Many actors have important roles to play including:

- Householders (first and foremost!)
- Village water and sanitation Boards
- Contractors
- Materials and equipment suppliers (for stocking and making special items)
- NGOs – to use existing networks for lobbying, information and influence
- Consultants (technical and communications support etc)
- Businesses to support training and capacity building
- Community workers – to motivate community initiatives
- Health workers
- Financial institutions (DFC, SIF, National bank etc)
- Industry and Agricultural sector, such as distilleries, aquaculture, breweries, etc.
- Private sector – entrepreneurial activities and promoting sustainable development and best practices
- Researchers (monitoring and evaluation)

10 The Financial and Economic Approach

Household sanitation has always come a poor second to water supply and distribution services. It is usually a lower priority for householders and has been neglected. Debates over public investment in sanitation tend to be poorly informed and somewhat emotive with concern over 'standards', health and politics tending to produce unsustainably high levels of provision for the few and nothing for everyone else!

Human and environmental health benefits are a primary objective of sanitation improvement programmes – these must be measured against the costs involved. From a public and environmental health perspective there may be no difference between a

well built, properly maintained VIP latrine and a waterborne wastewater treatment plant – but financially they are very different.

Put another way – there are no economic benefits to installing the more expensive systems (like sophisticated treatment plants), the only added benefit is increased convenience. If anything, the real danger is in incurring economic costs which low income households cannot afford to maintain and which therefore require expensive subsidies. Indeed, where operational costs are not met due to lack of consumer payments or ongoing subsidies, very high clean-up costs or environmental catastrophes may follow.

Affordability

One key issue is that of affordability. While there is an urgent need to address this neglected area, it must be done in keeping with the economic realities which communities face and with sustainable, appropriate systems in mind. The choice of level of service and of technology, must be within the financial 'space' available to households and to Government.

In this context, the Government should set short and medium term objectives in alignment with longer term goals. It is simply not possible to address all needs for all sectors all at once.

Prioritized Investments:

It seems clear that Government cannot immediately embark on a programme to provide full services to all Belizeans right away. It is recommended that investments are prioritized to support most critical areas first, recognizing that no single community or industry is more important than any other. Certain policy principles are applicable here including "demand driven" and "the user pays". In general the priority areas will be the main areas for tourism in Belize, (especially with marine environments), such as Caye Caulker, Placencia, North Ambergris Caye as already mentioned above but also San Ignacio and Santa Elena town, Dangriga town, Belize city expansion, and the industrial and agro-productive sectors. The factors taken into consideration to prioritize these areas were commercial activity, population size and the lack of sanitation on the economic and non-economic impacts of Belize.

- A strategy is required to support the prioritized implementation of the policy.
- BWSL, village water boards and local entrepreneurs should be the service providers guided by the policy and strategy.

- Wastewater service systems should be adequate to meet human and environmental health needs, be sustainable and appropriate to the economic standing of the community.

Various costs for consideration:

It is useful to understand the various cost components of a wastewater treatment system including:

Capital costs:

- On site components such as the settlement ponds, treatment plants, toilets themselves and septic tanks.
- Internal infrastructure such as the sewers in the streets and
- Bulk and connector infrastructure: the outfall sewers and treatment works, where these are required.

Recurrent costs:

- Operation and maintenance costs – the cost of keeping the service running. This may include the cost of repairing broken pipes, emptying pits, unblocking sewers and paying for staff and utilities as required.
- Administration costs – including managing the system in the long term, including the cost of issuing bills and making collections along with monitoring and evaluation and financial services
- Programmatic costs – including health education, capacity building, awareness and other support costs.

Replacement Cost:

- This is the cost to replace pipes, tanks, pits etc when their useful life expires.

The way in which these costs are paid for is considered financial policy which is addressed in the following sections.

Key Principles related to finance:

- Wastewater treatment should be self-financing at a local and regional level with very few exceptions (which may include those very poor people who are not able to afford even a basic level of service)
- The "user pays" and/or "polluter pays" principles in which a supplier provides a sanitation service but the consumer (or polluter) must pay for this service. The amount to be paid by the consumer is covered under "Tariff policy" below, while any polluter must pay all associated cost of their negative actions.

- Service providers should be responsible for recovering payments associated with the sanitation services they provide. In particular, the extension or upgrading of a service should not result in a request for additional funds from Central Government.
- Invoices for the supply provider may contain charges to amortize financing or build 'guarantee funds' or 'trust funds' which would allow for rationalizing investment costs for the benefit of users and service providers alike.

Financing Urban Sanitation

Up to now, wastewater treatment systems which exist in Belize City, Belmopan City and San Pedro Town have been financed by BWSL (and/or Central Government). Guiding principles for the financing of urban sanitation include:

- In general BWSL needs to raise its own finance, largely through loans and other financial tools (such as charges to amortize financing or build 'guarantee' or 'trust' funds. They need to be innovative in raising such loans from a wide range of financial institutions and efficient, in order to repay those loans. They will also need to generate revenue from consumers charged through tariffs charged for the service provided (which is covered under tariff policy below).
- To promote efficiency and to clearly identify expenses and income related to sanitation services, there should be a chart of accounts which allows for the costs of sanitation to be identified in a disaggregated manner. This is especially necessary if the additional participation of the private sector is to be considered.
- Where services are upgraded for existing customers, this is the responsibility of the service provider and the customer. Government should only provide assistance in exceptional circumstances and then only where agreement has already been reached on responsibility for payment of operating and maintenance costs.
- Government may consider financial and technical assistance to alleviate a severe human or environmental health problem.

Financing Rural sanitation

Point polluters in the industrial and agricultural sectors are issued effluent licenses which are then monitored and regulated by the Department of the Environment. The BWRF may provide support for proposals which seek to better manage the wastewater from these activities. License holders who discharge pollutants should pay for the

appropriate management of those pollutants according to type and volume of discharge according to the 'polluter pays' principle. This payment is separate from any fines levied for inappropriate or unlawful discharge. In practice however, rudimentary water systems, often established through grants from the Social Investment Fund, are managed by Village Water Boards. Consistency would dictate that these same Boards are given authority and responsibility over wastewater treatment services in their area of jurisdiction – though the legal framework would need to be clarified. Issues of economic scale and insufficient technical capacity arise in small villages with only a few hundred community members.

The integration of Village Water Boards from adjacent villages should be considered to improve economic scale, along with advisory or partnership arrangements with BWSL, the private sector, additional fee collections on water bills to support investments in sanitation, access to the Belize Wastewater Revolving Fund – all are possible considerations.

Based on such institutional arrangements, important issues for financing include:

- The principle of financial viability applies equally to rural areas as it does to urban. In the initial stages this may require central Government support and BWSL led 'sanitation teams' at the district level may form an early part of the envisioned wastewater treatment improvement programme.
- Given the importance of sanitation at schools, Government, through the Ministry of Education, will provide financial support for schools – perhaps as a fixed amount per student enrolled – with the school administration (particularly in church administered schools) contributing the balance required. New schools must be required to provide adequate and appropriate wastewater treatment facilities.
- The Department of the Environment should consider mechanisms to establish appropriate and adequate sanitation systems for farmworkers, casual labourers and other similar categories of workers.

In the absence of direct subsidies various initiatives should be considered to allow individual householders in low income areas to improve their domestic situation to achieve basic standards. These may include low interest loans from the Development Finance Corporation of the National Bank of Belize, the 'Revolving Fund' or even grants where so indicated.

Such assistance would be based on the following principles:

- Wherever possible funds would be made available directly to the individuals who wish to improve their wastewater treatment – on the principle that the individual has the maximum say over how it is spent (within the framework of the sanitation services and with appropriate oversight)
- Funds would apply to projects where groups of individuals (or a community) have organized themselves, possibly with the support of local government or other agencies, and planned an adequate wastewater treatment project.
- Such a project might be supported if at least 50% of households in the community have demonstrated their ability and willingness to participate.
- Assistance can only be provided to those who have agreed to contribute with their own resources to wastewater treatment improvement – particularly to the building of toilets.
- The amount of financing made available would be set according to a clear framework, which will anticipate a substantial household contribution. Where physical conditions for wastewater treatment services are particularly difficult, the amount may be increased.

It should be noted that there will be other costs associated with a wastewater treatment improvement programme – health promotion and education, capacity building, administration etc – which may be regarded as an indirect subsidy.

Tariff Policy

The government, within the framework of its socioeconomic objectives in terms of sanitation, proposes tariff principles to be applied by Belize Water Services Limited (in the localities where it provides service), and by other public, private or mixed providers (in the other localities). These principles will be guidelines to the Belize Public Utilities Commission (PUC). It is recommended that within 5 years, a tariff revision plan is implemented.

These objectives include the continued financial viability of the services while meeting the needs of the citizens of Belize and conserving the environment. For sanitation services, the following tariff principles apply:

a. Generality: The tariff policies are valid both for the services provided by Belize Water Services Ltd. in the locations where it provides service and for other public, private or mixed providers to whom the authorities authorize the provision of services and regulate their services from now on.

b. Affordability: Rate setting should take into account the affordability of households. Rates should be fair and equitable.

c. Fairness: Tariff policies must be fair and easy to understand. Individuals or groups of individuals must not be discriminated against and all people must be treated equally.

d. Separate charge: A separate charge (other than the water charge) must be made for sanitation. This will vary according to the level of service provided.

e. Payment in proportion to the quantity consumed: In general, consumers must pay in proportion to the quantity of the service they consume. Thus, for water-based sanitation, the rate will be based on the amount of wastewater discharged into the sewage system, estimated as a proportion of the water used. For other types of sanitation, other measures will be used that will be established in relation to the consumption of the service.

f. Total payment of operation, maintenance and investment costs: In general, all households must pay all of the operation, maintenance and investment costs associated with the services consumed. For households truly incapable of assuming these costs, social support must be sought separately in the form of economic subsidies of different degrees that ensure basic consumption in a way that does not defund service providers.

g. Nature and origin and use of subsidies: Consumption subsidies to avoid underfinancing providers always go to specified individualized persons. They may be budgeted fiscal funds transferred to service providers, cross-subsidies paid by other consumers, or a mix between these two types of subsidies.

h. Rational use of services: Subsidies will only cover minimum vital consumption so as not to promote irrational use. Consumption above those levels of rational use will not be reached by subsidies and payment will be required from the consumer.

i. Economic sustainability: The income of the service providers (BWSL and others) must be sufficient to ensure that the services are economically sustainable. Tariff policies that rely on unsustainable subsidies will mean that essential infrastructure maintenance will not be carried out and that there will be inadequate services in the future.

j. Transparency of invoices and investment financing: Invoices for services must allow a clear understanding of the charges that are included and the nature of the

payments. Any subsidies that exist, including cross-subsidies between different categories of consumers, must be transparent (visible, quantified and understood by all those affected). In a clear and disaggregated way, the invoices may contain charges to amortize financing or build guarantee funds or trusts funds that allow optimizing processes and rationalizing investment costs for the benefit of users and the service.

k. Efficient allocation and use of resources: Tariff policies should help facilitate the efficient use and allocation of scarce resources (both renewable and non-renewable) seeking a balanced development of the country. Rates should avoid promoting internal migration with low rates and better services in urban areas with a better economic scale to the detriment of rural areas.
   In general, service rates at the country level should tend to be uniform, avoiding reflecting the relative costs (or comparative advantages) of supplying different areas. However, in the case of sophisticated or complex solutions conditioned by lack of space or severe environmental requirements, rates that reflect price signals that promote a better and more rational use of resources will apply.

l. Inadequate use of services (Environmental Sustainability): Rates may include specific charges for inappropriate use of services based on the "polluter pays" principle when effluents with values above the maximum allowable values for proper operation of the system are discharged into the public system impacting the environment. In the same way, services may be suspended in the event that discharges of prohibited substances are detected that the systems cannot treat or exceed tolerable thresholds.

m. Charge for service availability: Once the investments in collection networks and effluent treatment have been completed and the service has been enabled, the user is obliged to connect to the system and the provider is authorized to charge for the service even if the user does not connect. This charge is based on the principle that connection to the sanitation service is mandatory and of public interest for health and environmental reasons and acts as a fine that punishes the lack of connection by promoting the regularization of the situation.

n. Promote punctual payment. Late payments allow the service providers to apply charges for late payment in addition to interest charges associated with the time exceeded with respect to the payment date.

o. Consistent rate compliance: A consistent policy must be implemented whereby non-payment (correctly) of the amounts billed for services results in the restriction or suspension of the consumer's service.

11 Administrative regulations

The government, within the framework of its socioeconomic objectives in terms of wastewater management, proposes administrative regulations to be applied in new urbanizations and land subdivisions in the country in line with the practices applied in a growing number of countries, contributing to optimize the use of public resources and reverse Belize's current low sanitation scores.

The administrative regulations to apply are the following:

a. Provide infrastructure in new urbanizations: Entrepreneurs and subdividers of land for housing or real estate investments are required to build water and wastewater infrastructure at their own expense as a condition prior to the approval and registration of properties prior to sale or transfer to third parties.

b. Building Construction standards and works transfer: The designs of these infrastructures will comply with current technical regulations and, depending on their jurisdiction, they will be approved and then supervised in their execution by the Service Providers that correspond to their geographical location. Once the works are completed, they will be transferred to the service providers for their operation unless other alternatives or independent management are agreed upon.

c. Feasibility requirement to the service provider: When developers aspire to access existing treatment plants, they must previously request the feasibility of the service provider. If there is no feasibility, it is possible for them to agree on contributions to expand the plant or collecting pipes or advance in individual solutions that comply with current quality regulations for effluents.

d. Real estate developments outside the scope of service providers: In case of being outside the jurisdiction of an authorized service provider, the approval and inspection will be in charge of the Department of the Environment.

12 Technical Issues

Technology choice

The technologies chosen should have proven efficiency for the treatment of that type of effluent according to the "Environmental Protection (Effluent Limitations) (Amendment) Regulations, 2009" and all other applying regulation.

The end destination of the treated wastewater also plays an important role in technology choice. So if reuse for agriculture irrigation is considered the reuse standards have to be met. A reuse standard should be defined in the timeframe of two years.

There are numerous factors that must be considered when deciding on the most appropriate technology for a particular situation. The following list addresses most of the factors:

- Affordability: By far the most important factor influencing the choice of technology is affordability - at household, local and national levels. This is highly linked with the tariff to be charged and other subsidies (see the Tariff Chapter). As far as it affects technology choice, it must be clear who is willing to pay what amounts for a particular level of service, or quality of product. It is especially important to consider the investments and also the operational costs for operations and maintenance. When comparing the costs of systems, it is important to ensure that all costs are considered.
- Institutional needs: The more complex systems may require substantial technical human resources both for delivery and for operation and maintenance. This may not be available in smaller towns and rural areas. In such areas the technologies promoted should be as technically simple, robust and durable as possible. Any sanitation improvement programme should include resources to develop the necessary local institutional capacity to manage the ongoing programme and future operational needs.
- Environmental impact: All sanitation systems should be designed to reduce the environmental impact of unmanaged human waste disposal. Nevertheless, most systems will cause some degree of environmental impact, particularly if they are not managed as well as the designer intended. The general risk of environmental problems and the specific risks resulting from system failure (and the likelihood of failure) must be considered at the

time of selection. This is treated more fully in the following section on environmental issues.

- Social issues: Social and cultural practices and preferences vary considerably from area to area. These will affect the range of options acceptable to consumers, and must be catered for, so that facilities are used effectively and health benefits gained by users and the community as a whole.
- Reliability: Only proven designs with proven efficacies should be used. The systems should have performance criteria and be evaluated in terms of operational requirements.
- Upgradeability: Since sanitation improvement is a process, it is desirable to consider upgrading sequences, where this is likely in the foreseeable future, and to design accordingly, within today's cost constraints.
- Site-specific issues: The geology, hydrology and topography of an area may influence the choice of technology, insofar as they may affect ease of excavation, percolation rates, amongst other factors.
- Use of local resources: The local availability of materials and skills has an important bearing on the choice of technology or construction method. The design of facilities should maximize these resources.
- Settlement patterns: The density and layout of a settlement are important factors in selecting technology. Sewered systems become more cost effective in denser areas, with more linear layouts, while on-site systems are generally more viable where plots are larger.

When considering on-site systems it is important to note that one disadvantage is their inability to handle large quantities of water (except in cases where soil percolation rates are high). This may mean that sullage or "grey water" generated by the family has to be disposed of separately through a soakaway. Government will encourage the use of all properly designed waste water treatments including soakaways. A properly designed system of septic tank with soakaway will discharge effluents that are not damaging to the environment.

13 Domestic Wastewater

In order to ensure access to wastewater coverage and treatment a progression plan needs to implemented with clear goals for the next 5, 10 and 20 years. This policy establishes that within 2 years a baseline will be defined and based on that also

the percentage increase for each indicator for the next years. The main indicators are the percentage of the number of households or of the inhabitants in the municipality with wastewater collection and the percentage of the number of households or of the inhabitants in the municipality with wastewater treatment.

Sludge is a by-product of wastewater collection and treatment and as such its management plan should be elaborated by BWSL in the next 5 years, including the context of circular economy when possible.

Sludge is an excellent source for natural fertilizers and is nutrient rich which can replenish depleted nutrients in soil and eroded lands so long as it is adequately characterized and treated to prevent the spread of pathogens and contagious diseases as well as heavy metals.

14 Industrial Wastewater

The technologies chosen should have proven efficiency for the treatment of that type of effluent according to the "Environmental Protection (Effluent Limitations) (Amendment) Regulations, 2009" and all other applying regulation.

Moreover, it is recommended that the industries look for environmentally friendly measures to continue production and limit the number of contaminants in the waste water. For example, the reuse of treated wastewater for lower quality water needs in the industry itself. Also, it is recommended that the industries search for less pollutant inputs in their productive chain.

In order for the policy to be effective, the industries should follow the monitoring and reporting guidelines mentioned below.

14.1 Reporting, control and penalties

The main reason for reporting the monitoring of wastewater discharges and their effects on the environment is to help us manage our activities and water resources in an effective and sustainable manner. Like many areas of resource management, "we cannot manage what we do not measure".

However, monitoring can be expensive, and there must be a sound rationale supporting any monitoring programme. Above all, the scale of monitoring should be appropriate to the potential for, and severity of, adverse effects on the environment. For this reason, the monitoring requirements should follow a 'risk-based' approach. The risk-based approach takes into account the characteristics of the discharge (e.g., its volume and contaminant concentrations) and the sensitivity of the receiving environment. The guiding principle is that, the higher the potential risk of the discharge to the receiving environment, the greater the scale of monitoring. The companies that have no monitoring plan or where old plans are obsolete, should present their monitoring plans within 2 years from the date of this policy for DOE's approval.

The indicators in the monitoring report should be designed with sound scientific understanding and should meet the scientific criteria of validity, reliability, and accuracy.

The data already available shall be used for decision making and to make recommendations on improving existing infrastructure and for approval of new developments. The DOE's Information Management Unit (IMU) shall venture into the use of GIS applications to enter data for planning and strategizing. The DOE shall reactivate the Pollutant Release and Transfer Register (PRTR) development years ago.

The report to the authorities should be made on a regular basis.

Effluent License holders are required to report to the DOE in terms of effluent monitoring. Effluent License holder shall conduct monthly testing of effluent parameters and conduct regular maintenance of the treatment systems. Holders shall report to the DOE but are not doing so. DOE shall conduct quarterly, or bi-annual evaluations of effluent licenses issued to ensure compliance. Holders shall pay a fee for non-compliance of conditions of the license. Most effluent license holders are in existence for many years and shall not be given more time to put measures in place to compliance but shall be charge for non-compliance.

In order for the supervision to be effective, the authorities should improve the system for receiving and analyzing the monitoring reports in time. The authority should analyze and produce the notification by the next month of the report, so that it is effective. In two years, the system should be implemented in a digital form with a notification structure working linked to it.

The reports should be responsibility-linked: i.e. the "process owner", program manager or program team who is accountable for reporting and making progress on the indicators should be clearly identified.

Consequences should be linked to actions or failures to act – as an example to be considered:

The utilities/industries that do not report on the due date, will first receive a notification with a new due date, and in case of no non-fulfilment should receive a fine. In case, the reported values exceed the limitations for effluent standards there will also be a due date for them to present a plan of readjustment of the treatment system with a schedule of implementation. In case, no actions are made to readjust it, the company will receive a fine.

Effluent license holders shall pay if they are not complying with license conditions or standards as dictated in the Environmental Protection (Effluent Limitations) (Amendment) Regulations, 2009 (version to be updated).

15 Environmental Issues

A basic requirement is that wastewater treatment systems, whether on site or waterborne sewerage, must be environmentally sound. Lack of suitable sanitation or inappropriate or non-functioning systems represent pollution risks to the general environment, especially to surface and groundwater resources, which in turn pose a threat to human and environmental health.

The priority areas will be the main areas for tourism in Belize, especially with marine environments and the industrial and agro-productive sectors.

The environment must be addressed in a holistic manner – all natural resources should be conserved and protected. All resources, and especially water, should be used in a sustainable manner – there are limits to the amount of polluting matter that our water systems can sustainably deal with. For the purposes of this document, this section confines itself directly to wastewater treatment systems.

The DoE has identified the need to implement a circular economy approach – promoting materials management strategies that are regenerative or restorative by design and which recognize waste as a valuable resource. For this to be

effective, monitoring and evaluation systems and procedures must be in place – we cannot manage what we do not measure!

The provision and ongoing operation of wastewater treatment systems must be both economically and environmentally sustainable. Environmentally, they should create wherever possible, positive environmental impacts, preventing or at least minimizing pollution of natural resources. At the same time, for a system to be sustainable, it must be affordable – and continue to be affordable to the users and the economy which supports it – or failure will happen at some point.

A sophisticated system which is poorly maintained can be just as bad an environmental hazard as no system at all!

Every degradation of the environment has a cost, even where it cannot be quantified – but where it can be calculated, this should be done in order to evaluate alternative approaches to a challenge by looking at total system costs. For example, water resources may be at risk of pollution from inadequate wastewater treatment systems, but before a decision is made to invest heavily in changing that wastewater treatment system, the extra costs of water treatment and other environmental impacts should be estimated. Such costs can then be compared with other options including phasing in solutions when necessary and constantly evaluating.

15.1 Monitoring Environmental Impacts

All methods of waste disposal must be subject to ongoing monitoring for compliance with regulatory standards, particularly with regards to pollutants such as heavy metals and nutrients which could have a permanent negative environmental impact. The increasing stress on our water resources makes this ever more necessary and Government, through the Department of the Environment, should review monitoring procedures and processes – and the institutional arrangements for them – in order to make them as efficient and as effective as possible.

Water Quality Management

(See "Final Comprehensive, National Water Quality Monitoring Program and Protocol" CBCL 2019)

Integrated Environmental Management

(Department of Environment to advise)

Reducing, Recycling and Reusing – the circular economy

A holistic approach should be followed regarding the management of waste from wastewater treatment systems. Where economically viable and sustainable, both the liquid and solid constituents of the sewage disposal end products should be recycled for further use. Especially on the islands and Cayes the recycling can be very important. The existing infrastructure of separated greywater and blackwater could be used to enhance greywater treatment which could then be used as reclaimed water for gardening, toilet flushing etc. Adequately treated and stabilized sludge may be a useful fertilizer.

Indicators that allow measurement of the impacts of a circular sanitation economy still need to be developed to make sure improvement is being made in this subject. Some examples of indicators are tons of sludge reused, cubic meter of wastewater reused. **Environmental Education**

In order to establish sound environmental principles and to foster an environmental ethic amongst communities, formal and informal education activities are required and should accompany – or even precede – all wastewater treatment projects. Government should encourage communities to get involved in independent monitoring of the quality of their own water resources to increase monitoring, heighten awareness and raise social pressure on polluters.

Economic Instruments:

The principle of polluter pays must be upheld. In some countries a fee is charged based on the measured loads of discharged effluent. Essentially a fee per kg/BOD and kg/nitrogen – with phosphorus and heavy metals fixed, with "polluter charges" possibly being used to 'top up' the Revolving Fund as per earlier suggestions.

This should be considered in the context of water as an economic good, valued according to its availability and quality. Any reduction in receiving water quality could have a value assigned and the source of pollution charged accordingly.

The polluters pay principle should be implemented via legislation.

15.2 Environmental Legislation

A 'polluter pays' principle is needed for important substances which may need to be subsequently empowered by legislation. Such an approach has proven successful in other countries. While it is not the purview of this document to make legislative recommendations, the policy principles may be based on the following points:

- Polluter pays
- Payment is based on units of contamination (the existing German regulations may be useful to provide a guide)
- The annual declaration would form the baseline charge – this being validated with the annual measurements
- Plants that remain within approved parameters should receive discounted rates (perhaps 80%)
- On introduction of such payments, the funds paid in would be escrowed for 2 years during which time an acceptable project to enhance the sanitation safety standards of the plant must be presented including a completion dates for work needed of less than three years. Funds that have been escrowed may be recovered for that investment.
- None recovered funds should be applied to the Revolving Fund.
- Following improvements, evaluations of success could be made based on the year before investment and the following two years.

The general idea here is that agencies in compliance should receive 'net benefit' while agencies in non-compliance should be provided with the right mix of incentives and punitive measures to encourage compliance. Such a system would operate independently of the regular system.

Given that there appear to be some inconsistencies in existing legislation, it is suggested that an exercise to include these principles while harmonizing current legislation could be conducted within 12 months from the approval of the policy.

16 Social and Educational Issues

As has been presented, wastewater treatment programmes are really a process of improvements which must be accompanied by promotional activities and human

and environmental health education and promotion aimed at encouraging people to improve their quality of life.

To undertake such a process of improvements and achieve lasting benefits needs the commitment of every household and every community. However, not every household is aware of the damaging effects of poor wastewater treatment so they are not yet prepared to commit time, energy and money to the process.

In more developed areas, decisions on the initial level of wastewater treatment services have already been made but in other areas community members will have strong interest in choosing the level of service for which they are willing to pay and in understanding the benefits of such an improvement and the risk of doing nothing. Making an informed choice will only happen when individuals become involved. A robust and prolonged public education programme will be a requirement, coordinated between multiple agencies

16.1 Social context of wastewater treatment

Helping people to help themselves requires a knowledge of and sensitivity to the social context of a wastewater treatment improvement programme. Government programmes must adopt people oriented strategies in which community members play an active role in planning and organization to ensure that the resulting programme is:

- Relevant
- Appropriate
- Acceptable
- Accessible
- Affordable
- Equitable
- Empowering and
- Considers indigenous knowledge and local skills

16.2 Community Involvement

Community Involvement is essential for long term success. In rural areas, existing bodies such as Village Councils and Village Water Boards, assisted by the Ministry with responsibility for Local Government and Rural development, should be involved in promoting wastewater treatment programmes.

It is the responsibility of every community to safe guard human and environmental health and to reach consensus on the type of system that is affordable and acceptable to the majority. Consideration should always be given for the future potential to upgrade any option.

The program should predict measures to ensure that residents can see the projected benefits and support the cause, helping also on tariff acceptance.

A programme will not succeed unless the entire community is mobilized, not only the (often) male family decision makers but particularly women and children. An initial 'public health survey' is often a good way to start the process, followed by establishing special points of concern including security and privacy needs, cultural 'taboos' around age and gender and generating action points for consideration.

Primary Environmental Health care should become a collective responsibility. Self-monitoring should be encouraged including incidence of hygiene related disease and notes on environmental improvements – to generate a real awareness of the implications for improved quality of life.

Schools are a natural focal point for improved wastewater treatment, environmental and hygiene education, encouraging the adoption of best practices from an early age. For this reason it is important that theory and practice coincide – all schools should have hygienic, attractive toilets and washing facilities and the use of these facilities must be linked to lessons on personal hygiene, health and the environment.

The special requirements of small children are often overlooked in the design and construction of toilets. All schools should be encouraged to participate in the design and to maintain clean, child friendly facilities, usually with a caretaker appointed for this specific purpose.

For rural areas, a key point for the program is to raise public awareness on how to properly construct a septic tank for temporary storage of waste.

16.3 Human and Environmental Health and Hygiene Promotion

Improved wastewater treatment facilities will only achieve a parallel improvement in human and environmental health if they are developed alongside health promotion programmes in which barriers can be created between potential pathogens, vectors and potential human and environmental sites:

Hygiene messages – personal, household and community hygiene

These should be accompanied by programmes which:

- Raise awareness of the link between wastewater treatment and health
- Build capacity in health personnel
- Embrace community messaging
- Promote both sanitary practices and the use of toilet facilities

The *education programme* should proceed at both national and district levels with strong and innovative media coverage and publicity. Schools in particular should be targeted.

It is important to ensure that the programme is high profile and maintains momentum, phased – probably – over several years.

Links to other programmes – the implementation of new water supply and distribution systems should always be preceded by or accompanied with sanitation improvement programmes.

Specific areas that need special attention in the program due to unhealthy situations in sanitation are the coastal communities and low-lying areas.

The program should also address specific diseases such as Gastroenteritis and Diarrhea which is the two main common disease due to lack of sanitation.

16.3.1 Human Resources Development

The proposed wastewater treatment and improvement programmes will depend to a large extent on the quality and training of the personnel involved. Continuous training and/or retraining is essential.

Training and capacity building at community level, especially in smaller villages

Training of public health personnel – should be ongoing

Training of small building contractors – training in the construction of appropriate and adequate sanitation facilities (usually septic tanks with soak-away/leach field) will improve the quality of the basic infrastructure as well as promote private sector involvement

Training of other professionals – planners, engineers, administrators etc – to bring focus to this neglected area.

16.4 Monitoring Human and Environmental Health Impacts

To determine the success of the wastewater treatment programme, progress must be monitored from a baseline assessment including quality and quantity of water supply and toilets, quality and quantity of existing sanitation facilities, high risk areas etc. Existing data suggests that as a percentage of total households with access to water supply, the percentage of those with access to adequate sewerage services has been decreasing over the last ten years. The access to adequate and appropriate wastewater treatment services must at least maintain pace with the access to water distribution and supply services.

Selective monitoring of diseases linked to poor sanitation should be monitored by the epidemiology department of the MoHW and reported on regularly, with interventions when appropriate.

Monitoring the effectiveness of programmes: Communities participating in wastewater treatment improvement programmes will be encouraged to report 'insults' to human and/or environmental health.

CReW+

Financed by

gef global environment facility INVESTING IN OUR PLANET

Co-implemented by

IDB

UN environment programme

Co-executed by

Caribbean Environment Programme

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

OAS More rights for more people

In partnership with

Department of the Environment

Ministry of Sustainable Development, Climate Change & Disaster Risk Management