

***CARIWIN COMMUNITY WATER STRATEGY BACKGROUND DOCUMENT:  
MILE GULLY/WARWICK CASTLE, JAMAICA***

**December 2009**



## List of Acronyms

CARIWIN	Caribbean Water Initiative
CDC	Centre for Disease Control and Prevention
CDPMN	Caribbean Drought and Precipitation Monitoring Network
CEHI	Caribbean Environmental Health Institute
CEP	Caribbean Environment Programme
CIDA	Canadian International Development Agency
CIMH	Caribbean Institute for Meteorology and Hydrology
CWS	Community Water Strategy
EPA	Environmental Protection Agency
GoJ	Government of Jamaica
GPA	Global Programme of Action
IDB	Inter-American Development Bank
IWCAM	Integrating Watershed and Coastal Areas Management project
IWRM	Integrated Water Resources Management
LBS Protocol	Protocol on Land Based Sources of Marine Pollution
NEPA	National Environmental Protection Agency
NPA	National Programme of Action
NRCA	Natural Resources Conservation Authority
NIC	National Irrigation Commission
NIWMC	National Integrated Watershed Management Council
ODPEM	Office of Disaster Preparedness and Emergency Management
OECS	Organisation of Eastern Caribbean States
PAHO	Pan American Health Organisation
RADA	Rural Agricultural Development Agency
RWP	Rural Water Programme
R2RW	Ridge-to-Reef Watershed Project
SCWSN	Small Community Water Supply Network
SIDS	Small Island Developing States
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WRA	Water Resources Authority
WHO	World Health Organisation
WSP	Water Safety Plan

## 1. Introduction

Given the wide range of issues connected to the water sector and the various scales they impact, the last few decades have seen a broadening of the approach to water management, and an emergence of new guiding principles such as decentralised decision-making, stakeholder involvement, and cross-sector integration and collaboration under the umbrella of Integrated Water Resources Management (IWRM). The Caribbean Water Initiative (CARIWIN) has as its goal to increase the capacity of Caribbean countries to deliver IWRM, through collaboration with government agencies, regional and national networks, and community water users in its three partner countries – Grenada, Guyana and Jamaica. Jointly led by the Brace Centre for Water Resources at McGill University, Canada, and the Caribbean Institute for Meteorology and Hydrology (CIMH), Barbados, CARIWIN aims to integrate the IWRM approach into the CIMH activities in order to build regional capacity to meet water management needs. CIMH is the regional organisation whose mandate includes providing training and capacity development in meteorology and hydrology to its CARICOM member states, and is therefore well placed to create a multiplier effect with respect to IWRM learning in the Caribbean. In addition, one of CIMH's primary functions is to collect, store and publish meteorological and hydrological data from the region. The Institute is proactively modernizing its data archiving infrastructure in order to host the databases from the newly developed National Water Information Systems, born from IWRM principles. The Water Forum for the Americas was held in 2008 in preparation for the 5<sup>th</sup> World Water Forum in Istanbul in 2009. In its report for the Caribbean sub-region, a number of challenges for water resources management were highlighted: population growth, increased water demand resulting from rapid growth in urbanisation and tourism, increased competition for land and water resources, increased climate variability and frequency of natural disasters, and pollution from industrial, agricultural and municipal wastes (Chase, 2008). CARIWIN's contributions to water resources management in the Caribbean were recognised in this report in the section "Progress made to meet the challenges". The report concluded that "an integrated and comprehensive approach towards water management is the correct way to face the challenges of managing a multiple-use resource, such as water".

Since its launch in February 2007, CARIWIN has developed and delivered short courses on IWRM to technicians, water managers and senior administrators in its three partner countries, providing learning opportunities for over 167 trainees. In addition to trained human resources for the national partners, a major output of CARIWIN to-date is the Caribbean Drought and Precipitation Monitoring Network (CDPMN). The CDPMN was initiated following a CARIWIN learning event where the need for a centralised information system that incorporates climate risk management into decision-making was identified (Trotman et al., 2008). Hosted at CIMH, the network is also intended to build towards the emergence of CIMH as a strengthened regional training institution and centre for data management and information flow.

CARIWIN is now preparing to launch its Community Water Strategy (CWS) component, which intends to build on several of the CARIWIN achievements to-date in order to strengthen activities in its pilot communities. The purpose of the CWS exercise is to:

- reinforce the principles of IWRM;
- promote leadership of CIMH, its institutional role and knowledge;

- conduct capacity-building exercise with National Partners focused on addressing needs and priorities in water management in the pilot community; and
- provide a forum for discussion amongst collaborators and regional, national, and community level stakeholders.

The CARIWIN pilot community in Jamaica is Mile Gully/Warwick Castle. The installation of a rainfall intensity gauge was completed on July 9, 2009 as part of the CARIWIN project. The installation of an automatic water level recorder is to follow, and a multi-parameter probe for water quality monitoring has been purchased. Through collaboration with the Water Resources Association (WRA) as its main national partner, outputs from the CWS Seminar are expected to be incorporated to strengthen water management in Mile Gully/Warwick Castle, including focusing efforts for strengthening the CDPMN to meet the needs of the pilot community.

This CARIWIN CWS Background Document for Jamaica examines water resources management at the national level in Jamaica, establishing the context for the CWS in Mile Gully/Warwick Castle. The information is summarised from country policy documents, strategies, and ongoing programs and projects. The document is meant to provide some background for discussions at the Regional Seminar to be held in Guyana on January 14-15<sup>th</sup> 2010, where an Implementation Framework will be further developed with CARIWIN's major regional and national stakeholders. Specific outputs expected from the discussion will include:

**1) Prioritisation of the needs for Mile Gully/Warwick Castle**

- a. Are the target areas identified relevant? Are any key issues missing?
- b. What resources are needed for strengthened water management and where should efforts be focused?

**2) Preliminary identification of the key players for Mile Gully/Warwick Castle**

- a. What are the respective roles and responsibilities of the key players?
- b. Who can provide the necessary resources to address the priorities identified?
- c. What is needed to get the necessary commitment from the different players (government, civil society, universities, community organisations)?

**3) Steps to implementation**

- a. What are the steps required for strengthened water management in Mile Gully/Warwick Castle?
- b. How can CARIWIN achievements to date (e.g. CDPMN) be strengthened to meet the needs in Mile Gully/Warwick Castle?

**2. Water Resources in Jamaica**

Jamaica is the third largest island in the Caribbean Sea, with a total land area of 10,939.7 km<sup>2</sup>. The island is characterised by a tropical climate and bimodal precipitation yearly, with two distinct wet seasons, May to June and September to November. Rainfall is generally at its highest in May or June, and at its lowest in December to March. Over the period from 1951 to 1980, the island received average annual rainfall of 1940 mm, ranging from a low of 1324 mm in 1976 and a high of 2593 mm in 1963. There is also extreme spatial variation in the precipitation patterns, with mountainous areas in the northeast receiving the highest annual rainfall (over 5080 mm annually), while coastal areas to the south receive less than 889 mm annually (Meteorological Service, 2002).

Due to the mountainous interior, most rivers either drain to the north or south of the island, divided by a central mountain range, with alluvial lowlands occurring in the south of the island (NRCA, 2001). The country is divided into 10 hydrologic basins, and 26 Watershed Management Units. The availability and type of water resources varies according to the geology of the island: while surface water is associated with basement rocks and the interior valleys, groundwater predominates in karstic limestone and coastal areas (NRCA, 2001). The island counts over 400 ground and surface water sources (16% surface water, 84% groundwater) (Chase, 2008). Island-wide, water use is estimated at 916 MCM/yr, compared to an available 4,084 MCM/yr (NRCA, 2001). There is nonetheless a current shortfall in supply of approximately 400 MCM/yr due to the uneven distribution of resources in time and location (Chase, 2008). Additionally, infrastructure to transport water is inadequate in some areas, resulting in erratic water supply. Water shortages frequently occur during the dry season in Jamaica, although they are not directly associated with a physical lack of water availability, but more so to a lack of infrastructure to deliver the water resources (NRCA, 2001).

### 3. Linkages to National and Regional Programmes and Priorities

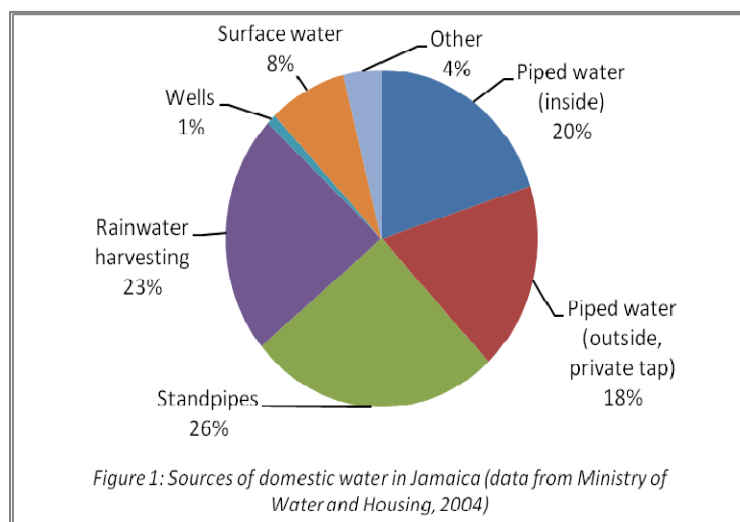
At the regional level, the role of CIMH as a regional training institute in meteorology and hydrology is central to support CARIWIN's monitoring sites as well as the storage, sharing and processing of data, and information provision. The objectives of the CWS are also aligned with a number of priorities, programmes and policies both in Jamaica and at the regional level in the Caribbean, ranging across multiple sectors described in the following sections.

#### 3.1 Water Supply and Sanitation

The major potable water supplier in Jamaica is the National Water Commission (NWC), along with the Urban Development Corporation and the Parish Councils in rural areas. The Runaway Bay Water Company (a subsidiary of the Urban Development Corporation) and 4 other private investors are licensed to supply water to the NWC and other designated areas. Currently about 72% of the population is serviced by the public water supply. A population of approximately 100,000 (4%) is estimated to rely on rainwater harvesting as a primary source of water (Ministry of Water and Housing, 2004).

Jamaica has set for objective to achieve access to potable water and adequate sanitation for all by 2010. In rural areas, access to piped water

(private taps, inside or outside) for domestic purposes is estimated at 45%, which is significantly lower than the national average of 72%. 26% of rural households obtain water from standpipes and 23% from rainwater tanks. 8% of households obtain their water from standpipes supplied directly from rivers, streams or ponds, of which more than half travel over 46 m, and 10% travel more than 914 m; water is trucked in by the NWC, Parish Councils and private firms when needed due to breaks or intermittent supply. The country's 595 squatter settlements comprise approximately



10% of the population, which lacks access to piped water or sanitation facilities. Only 3% of the rural households are connected to a sewer system; 39% of rural households use a flush toilet, while 60% use pit latrines (Chase, 2008).

The Water Resources Act (1995) delegates responsibility of water resources planning, regulation and allocation to the Water Resources Authority (WRA). Water quality monitoring is conducted by four different government agencies: Water Resources Authority, Natural Resources Conservation Authority (NRCA/NEPA), Ministry of Health (Environmental Health Unit) and Office of Disaster Preparedness and Emergency Management (ODPEM). A Memorandum of Understanding was developed in November 2003 to clarify the overlaps and gaps; the WRA was designated as the repository of all water quality data. The Government's objectives for rural water supply as outlined in the 2004 Water Sector Policy Paper include:

- Achieve universal access to safe water and sanitation in the country by 2010, using approaches that consider affordability, cost-efficiency, health and environment
- Expand the rural water supply through partnerships between a rural water supply company and various groups/entities to design, construct and manage sustainable systems
- Encourage the implementation of water conservation measures
- Increase the efficiency of the operations
- Introduce cost-recovery mechanisms and mobilise additional sources of funding

The Water Sector Policy recognises that minimum water supply and sanitation services must be provided to everyone regardless of ability to pay; this is identified as 'social water'. The provision of social water involves the implementation of a cost recovery programme by the service provider through a community development approach, and the establishment of mechanisms by the Government to underwrite the recovery of the remaining cost (Ministry of Water and Housing, 2004).

### **3.2 Agricultural Water Supply**

Agricultural water supply falls under the responsibility of the National Irrigation Commission. The agricultural sector represents the main water user on the island, although its demand has somewhat decreased over the last decades (from 75% in 1985 to 60% in 1997) (NRCA, 2001). Only 10% of cultivated lands are under irrigation, sugar cane accounting for most of the irrigated land area (NRCA, 2001). Approximately 9% of the land under cultivation is irrigated on the island, with half of the irrigated area operating under public schemes managed by the National Irrigation Commission (NIC) and the other half under private operation. Major crops include banana, papaya and sugar cane. Most small-scale farmers irrigate their crops with the domestic water supply or directly from streams and springs (FAO, 1997).

The Water Sector Policy encourages the evolution of private sector and co-operative involvement in public irrigation through the envisaged formation of Water Users' Associations, who would become responsible for local management, distribution, monitoring and maintenance of irrigation systems (Ministry of Water and Housing, 2004). The involvement of these WUAs is expected to lessen the burden on central government and ensure greater sustainability and cost recovery for irrigated agriculture. The formation of WUAs is also supported by the *Water Resources Development Master Plan* and the *National Irrigation Development Plan* as a means to increase farmer involvement and promote efficient water use.

### 3.3 Watershed Management

The National Integrated Watershed Management Council (NIWMC) was created for inter-agency coordination of watershed management. However, although different ministries are represented on the Council, smaller stakeholders such as the farmers and hoteliers themselves are only represented through a single seat for the private sector, or are indirectly represented (for example the interests of farmers are indirectly represented through the Local Forest Management Committees of the Forestry Departments or the Local Watershed Management Committees of NEPA) (Geoghegan et al., 2003).

### 3.4 Cartagena Convention and Protocol on Land-Based Sources of Pollution (LBS Protocol)

The CWS is closely related to the wider objectives of the LBS Protocol, which promotes the protection of the marine environment from land-based sources of pollution, through the formulation of a National Programme of Action (NPA). Jamaica was the first Caribbean country to establish a NPA in 2004 (NEPA, 2004). The NPA is intended to provide an integrated management framework, with the goal “to protect Jamaica’s coastal and marine environments from land based sources and land based activities (LBS/LBA) of pollution”. A number of specific objectives are outlined, focusing on the priorities of sewage treatment and disposal, agricultural practices and solid waste disposal:

- To review and revise the policy, legal and institutional framework to effectively manage the implementation and operation of sewage solutions
- To expand and improve the collection, treatment and disposal of sewage island wide
- To expand and improve public education on the effect of sewage on the environment
- To reduce and minimise soil loss and sedimentation in waterways that discharge into the coastal zone
- To put in place the policy, legal and institutional framework for effective management of solid waste
- To expand and improve the solid waste collection and disposal network
- To expand and improve public education concerning solid waste disposal, recovery and reuse and the effect on the environment by 2004

The NPA is designed at the country level, but calls for prioritisation of on-the-ground projects according to the ecological, social and cultural value of the impacted asset, the severity of the degradation, and location within protected areas or tourism areas. The National Environment and Planning Agency (NEPA) is the lead agency to coordinate the implementation of the NPA, in collaboration with other government agencies, the private sector and civil society. The implementation of the NPA will build on existing policies, programmes, plans and existing projects. Six main projects are to be developed to gain support from external partners:

- Public awareness campaign – Sewage and solid waste  
The NPA will build on a number of existing projects: USAID/GOJ funded projects, Coastal Water Quality Improvement Project, Ridge to Reef Watershed Management Project, Environmental Audits for Sustainable Tourism, which have all contributed to public education and awareness on sewage disposal and the environment (NEPA, 2004). The IDB/GOJ are also funding the Kingston Harbour Institutional Strengthening Project, which includes an educational component for school children. A public education programme is

also planned to be implemented jointly by the Environmental Foundation of Jamaica, CIDA and UNEP/GEF Jamaica.

- Declaration of additional forest reserves
- Reduction of pesticide and fertiliser contamination of waterways that discharge into the coastal zone
- Evaluation of soil and nutrient loss from use of practical and inexpensive soil conservation techniques in selected watersheds
- Framework for monitoring the status of Jamaica's coastal and marine resources
- Institutional strengthening for the Jamaica Blue Flag Programme (certification scheme for beaches and marinas)

### **3.5 Water Safety Plans**

The Water Safety Plan (WSP) methodology was developed by the WHO as an approach to ensure the safety of water supply. The approach builds on principles of prevention, multiple barriers, and risk assessment and management, where a WSP is defined as *"a comprehensive risk assessment approach that encompasses all aspects of a drinking water supply, from catchment to consumers, to consistently ensure the safety of drinking water supplies"* (Bartram et al., 2009). Underpinning the WSP approach is also the recognition of the catchment dimension of water supply, and implications for adequate watershed management and source water protection (WHO, 2008). A WSP requires the identification of risks, their prioritisation, and the establishment of controls to manage them (Day, 2009).

Although literature on WSPs for small community water supplies, especially in developing countries, is still relatively scarce, the approach is slowly being integrated in a number of small community water projects (e.g. Day 2009; NHRMC, 2005). WHO (2008) identifies three core issues of a WSP in a small community water supply system: source water protection, treatment, and prevention of contamination during distribution, storage and handling. In response to these issues, the International Small Community Water Supply Network (SCWSN) was formed to focus on the specific needs of WSPs in small communities, particularly in rural areas. The Network is currently working on the development of a Draft WSP Manual for application in communities.

The Water Safety Plan (WSP) approach has already been piloted in Jamaica, with the selection of the Jamaica Spanish Town Water Supply System as the first WSP demonstration site by a partnership between PAHO, CDC and EPA. Although the National Water Commission is required to meet the drinking water standards established in the Interim Jamaica Criteria (based on the WHO Drinking Water Quality Guidelines), there are currently no legally binding standards for drinking water quality. Drinking Water Guidelines and Regulations for Jamaica are to be developed by the Ministry of Health.

### **3.6 Extreme Weather Vulnerability**

As most other Caribbean islands, Jamaica is vulnerable to hurricane season, which spans from June to November. Flooding affects parts or all of the island annually, representing the single greatest source of loss of life and property (Walters, 2004). Damages from Hurricane Ivan in 2004 were valued at approximately US\$ 580 million, with the most severe effects being felt in the agriculture and housing sectors (Osei, 2007).



The WRA has already mapped several flood plains in the country, including the Yallahs River, Hope River and part of the Rio Cobre. Some work has also taken place on Early Flood Warning Systems at the community level in collaboration with the Office of Disaster Preparedness and Emergency Management (ODPEM), the National Meteorological Service, and the Water Resources Authority. The establishment of Early Flood Warning systems involves the monitoring of rainfall and water level gauges in the community, and a communication network through which information is relayed to the ODPEM and flood warnings are emitted. Community flood warning systems have been successful in providing timely warning for evacuation of communities at a low cost and have served as an entry point for the initiation of other projects working towards flood mitigation. Nonetheless, there remains a number of challenges, both technical and institutional, including community interest, financial sustainability, monitoring and evaluation, private sector involvement, and telecommunications systems (Douglas, 2003).

Given the high variability in rainfall both temporally and spatially, Jamaica is faced with the challenge of managing not only floods but also droughts, which can sometimes occur simultaneously in different parts of the island and change quickly from one extreme to the other. The agricultural sector is particularly vulnerable to drought events; crop losses from the 1999-2000 drought were estimated at approximately USD 6 million (Trotman et al., 2008).

### **3.7 Community Management Projects**

#### *3.7.1 Ridge-to-Reef Watershed Project*

The Ridge-to-Reef Watershed (R2RW) Project was a five-year initiative concluded in 2005 undertaken by NEPA and USAID to address watershed degradation in the Great River and Rio Grande watersheds. The project particularly aimed to demonstrate sustainable community based integrated water resources management. The project operated under 4 main pillars:

- Building strategic partners
- Approach to community involvement
- Identifying leverage points (social marketing)
- Targeted appropriate practices

Local Watershed Management Committees were formed and awareness raising was targeted through a variety of creative approaches. The project provided grants for group applications only, encouraging the formation of farmer groups or other stakeholder groups. Examples of projects included sustainable production methods for pineapple cultivation, rainwater harvesting and constructed wetlands.

#### *3.7.2 Other Initiatives*

A number of community-based groups have been created over the last years in Jamaica, with variable levels of activity, primarily established by parishes (NRCA, 2001). Awareness campaigns and participatory approaches have contributed to the reduction of bad practices. Examples include local NGO initiatives that have supplemented government efforts to introduce improved pit latrines, soil conservation practices or water quality testing (Geoghegan et al., 2003). Some important constraints to achieving change with the stakeholders include (Geoghegan et al., 2003):

- Lack of incentive to invest in improved soil conservation, sanitation or waste management given that half the population lacks secure land tenure
- High poverty in rural areas

- Agricultural incentives can encourage poor watershed management practices
- Lack of awareness of upstream-downstream linkages in the watershed and of their own position within it

One main issue with local initiatives is that much of these pilot projects have occurred in different areas and focused on different needs, without a clear mechanism to bring them all together (Geoghegan et al., 2003).

### **3.8 Key Water Management Challenges in Jamaica**

Land use, agricultural practices, flood and drought management, waste disposal and infrastructure expansion were all highlighted above as leading concerns pertaining to water resources in Jamaica. Main challenges to water management in the country include (Geoghegan et al., 2003; NRCA, 2001):

- Hillside farming and associated soil erosion and river siltation, leading to a reduced carrying capacity of rivers which creates conditions for overflow and flooding; flash flooding is frequent in the country, with severe flood events occurring on average at least every 4 years (Douglas, 2003). On the counter side, the agricultural sector is also highly vulnerable to drought events.
- Widespread inappropriate agricultural practices have been associated with the insecurity of land tenure and weak agricultural extension services
- Vulnerability to waterborne diseases is especially heightened following natural disasters, as well as during periods of low rainfall
- Poor sanitation and sewage disposal practices remain an issue, especially the location of pit latrines close to river banks or shallow aquifers and the resulting contamination of water sources
- Illegal tree cutting and river-bed sand mining are continuing causes of land and freshwater degradation
- Pesticide and fertiliser runoff are a significant source of pollution
- Lack of infrastructure is the main limiting factor for water resources delivery

## **4. Vision for CARIWIN and the CWS in Jamaica**

### **4.1 Aim & Principles of a CWS**

A Community Water Strategy defines the process to identify relevant water management challenges at the community level and outline an appropriate management plan for community partners to address them. The framework used to develop the CWS should be as inclusive as possible of a variety of applications relevant to the Caribbean context, including water supply and sanitation, watershed management, agricultural practices, environmental sustainability, rainwater harvesting, and flood and drought management.

Literature on community water management and examples of case studies are detailed more fully in CARIWIN's working document *Community Water Strategies: A Framework for Implementation* (available online at <http://www.mcgill.ca/cariwin/2009/cwsseminar/>). In this document, five key summary points are suggested from the literature/experiences reviewed as essential building blocks for a CWS:

- **Integration:** the CWS involves identifying and prioritising problems, and developing specific plans to address them. Inherent to this however is the recognition that the different uses of water and the various water-related problems are interconnected and require an integrated approach. Most importantly, this involves acknowledging that good water management practices can only be achieved by considering the broader context that affect them (e.g. economic sustainability).
- **Ownership and accountability:** the participatory process fosters the development of a sense of ownership in the community, which is essential for long-term commitment. A clear definition of roles and responsibilities combined with accountability mechanisms throughout the process are essential to ensure an adequate balance between ownership and external support.
- **Capacity and empowerment:** the CWS involves the development of plans to address existing water-related problems, but most importantly it aims to build the capacity of the community to respond to future water issues in an adaptive manner. Given that a variety of new responsibilities are required from the community for the establishment of a CWS, capacity building elements are needed at every step of the process.
- **Transparency and information:** equal access to information prevents power inequalities. Information flow within the community contributes to awareness-raising, while information sharing with outside actors will ensure alignment across scales and a stronger support environment.
- **Adaptation and flexibility:** the emphasis on assessment, monitoring, and knowledge sharing is important for the cyclical nature of the process. The CWS is not a rigid framework and should allow adaptation to changing conditions.

Elements to consider as part of a CWS, which are all described more fully in the document referred to above, are outlined in the following table:

Phases	Components
<b>A. Assessment</b>	A1. Stakeholder analysis A2. Socio-economic context A3. Governance framework A4. Environmental assessment A5. Information management A6. Awareness-raising
<b>B. Planning</b>	B1. Priority setting B2. Detailed plan development B3. Creation/reform of decision-making body B4. Definition of roles & responsibilities B5. Enabling environment B6. Financing & cost recovery B7. Conflict management
<b>C. Implementation</b>	C1. Plan implementation C2. Process monitoring and documentation C3. Information sharing & communications
<b>D. Monitoring</b>	D1. Development of indicators D2. Monitoring system D3. Sharing & learning

## 4.2 Indicators

Monitoring indicators are required at every step of the development of a CWS, and form the basis for identifying the needs and keeping track of the progress towards them. The Global Environment Facility (GEF) has established a framework for the development of indicators as part of its International Waters Project (Duda, 2002; CEHI/GEF-IWCAM, 2008). This framework has been used, among others, in IWCAM projects and in the development of Water Safety Plans. Indicators are divided in three main categories, which provide a useful framework for CARIWIN's pilots communities:

- **Process indicators** are a measure of the progress of project activities, including inputs and outputs of goods, physical structures, and services, including elements such as capacity and human resource development and stakeholder involvement. They demonstrate actual, on-the-ground institutional and political progress, and assist in tracking the reforms necessary to bring about change. Examples include: formation and documentation of a steering committee, adoption of a monitoring and evaluation plan that includes all 3 types of indicators.
- **Stress reduction indicators** reflect specific on-the-ground measures implemented to address a particular issue or problem. In contrast to process indicators which highlight needed reforms or programs, stress reduction indicators represent actions that have occurred. Examples include: non-point source pollution programs implemented, amount of eroded land stabilized by tree planting, protected areas designated.
- **Environmental status indicators** measure the actual performance or success in restoring or protecting a targeted water body, and reflect changes in measures of water quality. These can be combined with social indicators in order to measure whether communities and stakeholders benefit from the changes in environmental conditions. Examples include: improved ecological or biological indices, changes in local community income and social conditions as a result of improvements in environmental conditions, improved hydrologic balance as a result of reforestation.

## 4.3 Pilot Community: Mile Gully/Warwick Castle

The pilot site in Jamaica consists of the communities of Mile Gully, Warwick Castle, Tucker, George Town, Athalone and Silver Spring, which are all deep rural communities located in the Parish of St. Mary, approximately 5 km southeast of Gayle. The Mile Gully/Warwick Castle Community is already involved with the Rural Water Programme (RWP), a project led by the Ministry of Water and Housing (funded by the Inter-American Development Bank) to pilot community management of local water supply systems. The information below is summarised from existing documents from both the RWP and CARIWIN community profiles.

Mile Gully/Warwick Castle is located within the Rio Nuevo watershed, forming part of the Blue Mountains North hydrologic basin, with a total surface area of 109 km<sup>2</sup>. Approximately 85% of the rock material in the watershed is an aquiclude with low potential for groundwater development, with a remaining 15% of rocks with sufficient permeability to allow storage and conveyance of groundwater. The Mile Gully/Warwick Castle community is located in an area of karst topography. Most water in the area flows from the Rio Nuevo and its tributaries; a small limestone aquifer recharges the Silver Spring, and groundwater discharged from the spring flows into the Sambre River, a major tributary of the Rio Nuevo. Access to groundwater is significant for the community as it reduces the incidence and impacts of drought.

The Mile Gully/Warwick Castle Community regroups approximately 189 households, for a total of approximately 650 people. The area is characterised by low income and employment, as well as low population densities; these factors, combined with the poor condition of infrastructure such as roads, have contributed to a steady migration of the young away from the communities. Subsistence farming represents the main source of income (38%) in the communities, followed by buying and selling (11%), construction (9%) and others (25%). 43% of the households surveyed have no male member employed, and 60% have no female member employed.

The community relies on five main water sources outlined in the table below. The wide majority of the community collects water for domestic use from a communal standpipe, with an average time for collecting water of 30 minutes, while washing and bathing in streams is common. Water quality among the different sources is variable; a water quality assessment conducted as part of the RWP found *E. Coli* to be present in all sources except for Spring Bush, indicating the need for improved treatment practices. Most of the community (73%) relies on pit latrines.

<b>Water Source</b>	<b>Description of uses</b>
<b>Sambre River</b>	Farm animals, watering crops, washing laundry, bathing and recreation; not considered a drinking water source
<b>Silver Spring</b>	Main source of drinking water for Mile Gully, George Town and Athalone; water is pumped to an elevated tank to supply the gravity-fed system; spot streamflow measurements indicate daily discharge volumes ranging between 1700 m <sup>3</sup> /day to 24, 270 m <sup>3</sup> /day; according to the community the spring is a reliable source all year round
<b>Spring Bush</b>	Water supply for a small number of households in George Town; water in the holding tank treated with household bleach by community members; some concern by the community concerning the water quality
<b>Tracy Spring</b>	Main source of drinking water for Warwick Castle and Tucker; water is pumped to an elevated tank to supply a gravity-fed system
<b>Chapel Spring</b>	Only source of drinking water for the Mount Angus Primary School

Main concerns pertaining to water as identified by the communities include:

- Cost to carry water with taxis (George Town)
- Insufficient water availability for cultivating cash crops, raising poultry and/or other livelihood activities (Athalone)
- Personal hygiene, domestic chores and impact on children (all communities); strain of carrying water uphill (Silver Spring)
- Landslides can interrupt water supply lines for extended periods of time (a landslide susceptibility map has been prepared by the Mines and Geology Division)
- Less frequent bathing and washing during the dry season

Gender-specific issues are primarily related to the distribution of role, where the following are largely attributed to women:

- Washing clothes
- Cooking and drinking: some rainwater collection; chlorine disinfection to prevent contamination; some reliance on bottled water (but costly!)
- Cleaning of dishes, kitchen and raw vegetables
- Carrying water: time-consuming, strenuous, affects school attendance

The RWP involves 4 pilot communities, the Mile Gully/Warwick Castle community being the first one that will be responsible for managing the water system immediately upon construction, which will involve the formation of a Water Management Committee. The community will be responsible for running the scheme and finances, with any surplus staying within the community for further development. Upgrading the water supply system from Silver Spring is one main objective through improved harnessing, treatment and transport of water to households. Improvements at the Silver Spring intake include water treatment at the intake (chlorination), and the construction of a 100,000 litres tank at Athalone where water will be pumped. Water will then be gravity-fed to areas including Mile Gully, Athalone, Silver Spring, George Town and surrounding areas. In Warwick Castle, a 100,000 litres tank will also be built to store water pumped from a spring and redistribute to Warwick Castle and Tucker.

The cost to access the new water supply scheme was projected to be a connection fee of \$4500 to cover the connection from the main, the tank, stand and meter, and an additional capital cost contribution of \$3000 per household. Given the provision in the government's Water Policy for access to water regardless of ability pay (Social Water), it is still undetermined how inability to pay will be handled, how the limit for the amount of water provided would be set and who would qualify for it. In the study conducted by ESL Management Solutions Ltd. (2005), the community's concerns over the ability to pay for water once the infrastructure is provided is highlighted. Nonetheless, when asked for their willingness to pay for water, 98% of households gave a positive answer.

The Water Management Committee is to be responsible for the business side of the water operations, and is to consist of (GoJ/IDB, 2008):

- No more than 3 members of the Management Committee of the Benevolent Society
- 1 representative from the Ministry of Water and Housing
- 1 representative from the Parish Council
- 1 representative from business in the community
- 1 representative from a civil society organisation
- 1 person with technical expertise in water and/or sanitation
- 1 person with expertise in community development
- Equal gender representation (50/50 or 60/40) is required.

A household survey has already been conducted as part of the RWP (ESL Management Solutions Ltd., 2005), although any changes brought about by the RWP since then would not be reflected in it.

Target areas for the CWS will vary on a case-to-case basis and their identification forms part of the process for the development of a CWS. Nonetheless, four broad focus areas and associated tools, which may vary in their importance for each of the 3 CARIWIN pilot communities, have been

identified to guide this process. Over the following pages, these potential target areas are summarised along with a list of stakeholders that may be relevant to support the development of a CWS in Jamaica.

## Potential Target Areas for the CWS

### 1) Water Supply and drinking water contamination

The RWP is already addressing issues of infrastructure for water delivery. However, the focus seems to be mainly on water for domestic purposes, and water availability in the context of livelihoods may require further consideration. The development of a WSP for the community could also address issues of *E. Coli* contamination, and provide for more frequent monitoring.

### 2) Extreme climatic mitigation

Early Flood Warning systems have been used in other Jamaican communities as an entry point to address issues of flood mitigation. No specific information was found on the existence of such a communication network for Mile Gully/Warwick Castle. This may be considered as part of the CWS, depending on the importance of flooding in the community. Similarly, the communication network could be expanded beyond only flood warning to include drought, and include research on drought monitoring indices currently being conducted as part of CARIWIN.

### 3) Ecosystem Degradation

Land use practices, land degradation, natural disasters and water quality are recurring issues in a number of initiatives mentioned above, including the LBS Protocol, watershed management efforts and the mitigation of natural disasters. The GEF-IWCAM environmental status and stress-reduction indicators provide a useful framework to assess and monitor improvements in hillside erosion, sediment loading, establishment of buffer zones, etc. The water quality test kit purchased by CARIWIN would also allow for the monitoring of a number of environmental indicators, including temperature, pH, dissolved oxygen, and total dissolved solids. Furthermore, an Early Flood Warning system could provide an entry point to address broader issues of ecosystem degradation that have an impact on flood mitigation, such as soil erosion and sedimentation, which also relates to the NPA objectives of the country.

### 4) Governance & Capacity Building

The Mile Gully Benevolent Society is a community-based organization that was created in November 2002 and has been registered since 2003. The level of awareness of the Benevolent Society among community members varies, as does the confidence in the capacity of the Benevolent Society to improve the water situation in the community (ESL Management Solutions Ltd., 2005). The Jamaica Agricultural Society was formed in 2005 under the Benevolent Society, regrouping about 30 members, predominantly men. The Mile Gully Women's Group was also formed by women who wished to undertake home-based economic activities taking advantage of the abundant fruit in the region. The Rural Agricultural Development Agency (RADA) has committed to assist to this project, but the lack of water is a main obstacle for it, as well as for livelihoods and farming in general (Haiduk, 2007).

As there are already active community groups, the focus here may be more on strengthening existing ones. The progress in the creation of a Water Management Committee should be examined to identify how the CWS fits in. A number of initiatives are already in place at the national level for public awareness and education, including the Environmental Action Program of Jamaica and the Local Sustainable Development Planning, whom CARIWIN could collaborate with for Mile Gully/Warwick Castle specifically.



**Relevant stakeholders to support the development of the CWS**

<b>Institutions</b>	<b>Main Activities</b>
Water Resources Authority	Operates within the Ministry of Water and Housing; management, protection, controlled allocation and use of water resources; maintenance of hydrological data (streamflow, in-stream water levels, groundwater levels)
National Water Commission	Provision of water and wastewater services; urban water supply throughout the island
National Irrigation Commission	Agricultural water supply
Rural Water Supply Ltd.	Implementation of water supply and sanitation projects in rural areas to improve coverage
Forestry Department	Watershed management
National Environment and Planning Agency (NEPA)	Environmental standards for water supply and sanitation; implementation of NPA
Natural Resources Conservation Authority	Natural resource management, permits and regulation
Office of Disaster Preparedness and Emergency Management	Mitigation plans for high risk areas; relief activities; public awareness; collection and analysis of data; coordination of disaster response with government agencies, community based organizations and private sector
National Meteorological Service	Weather forecasting, climate and rainfall monitoring, issuance of warnings
Rural Agricultural Development Agency	Sustainable farming and land husbandry
Ministry of Housing, Transport, Water and Works	Road slope protection, river drainage; Rural Water Programme
Department of Cooperatives and Friendly Societies (DCFS)	Registration of societies and operating rules; education, training and institutional strengthening
Social Development Commission	Community empowerment; participatory research; local governance

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Other sources of information:

Report on the field work by UWI students in the Mile Gully/Warwick Castle Area, Summer 2008.

ANNEX



Figure 1: Location map

