

WATER RESOURCES AUTHORITY



ANNUAL REPORT FOR

PERIOD

1ST APRIL 2010 - 31ST MARCH 2011

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Our Mission

To ensure sustainability of Jamaica's water resources through

- Continual assessment and proper management...
- The promotion of conservation and protection...
- Optimal development...

...of the resources.

To ensure rational and equitable allocation of the nation's resources, to reduce conflicts among water users.



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MESSAGE FROM THE CHAIRMAN

The Water Resources Authority continued to make significant progress in contributing more visibly to wider society over the past year becoming more actively engaged in matters of national significance. The year began with the signing of a Memorandum of Understanding with the University of the West Indies to collaborate, share resources and information on water related research. This MOU recognizes the multi-disciplinary nature of water research – touching not just hydrology and hydrogeology but also public health, ecology, chemistry, nuclear and atmospheric physics and economics among others. The WRA being at the forefront of water issues in Jamaica would provide a mechanism for related research at the UWI to be practically applied, while the WRA benefits from a ready and willing pool of active researchers able to tap into funding and grant mechanisms to support water research. In October Jamaica was affected by Tropical Depression #16 which would become Tropical Storm Nicole. Far from a significant hurricane, this system managed to inflict over J\$20 billion worth of damage to Jamaica's public infrastructure alone. This highlights the very important need to understand that Jamaica does not need to suffer from a hurricane-a wind storm event-to suffer damages from rainfall and flooding. The WRA magnificently performed in two main areas in the immediate aftermath of event. The Authority worked assiduously with its colleagues at NEPA and JBI in preventing what could have been a catastrophic disaster at the Windalco Ewarton bauxite/alumina plant, where its red mud waste disposal facility was in danger of breaching into the Rio Cobre river. In the wake

of a similar disaster in Hungary in September of the same year, this would have been an environmental, water supply and public relations disaster.

Secondly in the spirit of the MOU with the UWI and in association with the Department of Geography and Geology and the Mona Geoinformatics Institute at UWI, hosted the first public seminar on the impacts of the flood rains associated with TD#16/TS Nicole. This well attended event presented the results of the WRA's monitoring and observational activities, as well as brought out representatives from the Met Office, ODPEM, NWA, UWI and local government. This direct engagement with the public, as well as fulsome and timely presentation of topical and critical matters is a hallmark of the WRA, where we do not take long to prepare and present reports when flooded areas and affected people desperately await assistance. Another output of the collaboration emanating from the MOU was the completion of the "Water Resources Fact Book of Jamaica". This fact book, launched on World Water Day 2011, compiles numerous pieces of information on different aspects of water issues in Jamaica in a simple and easy-to-read format designed for schools and professionals alike.

All of these activities were in addition to the routine operations of the WRA as it continues to build its own internal capacities to conduct water research, both locally and regionally. Its efforts at upgrading the Rio Cobre Flood Warning System are in high gear as are its regional collaborative projects such as the CARBHYCOS which will revolutionize how regional data are shared and used. The WRA continues to improve and update its in house systems including its data and file management.

The Board of the WRA is very pleased with the management and operation of the agency and has been fully involved in its activities. Similarly the management has been upfront and forthright with the Board keeping to up to date on all activities, for which the Board is grateful. As Chairman, and on behalf of the Board, we wish continued success for the organization.

**Dr Parris Lyew-Ayee
Chairman**

MESSAGE FROM THE MANAGING DIRECTOR



In 2010-2011 the Water Resources Authority continued to provide data, information, technical assistance and water resources assessments to the public and private sectors within and outside the water sector. The support to national development is provided within the liberal interpretation of Section 4(3)(e) of the Water Resources Act 1995 and in keeping with the principle of Integrated Water Resources Management (IWRM). The basis for the provision of information and support to drive national development is the data collected on surface and ground water, water quality, well construction and abstraction of water.

A review of the data collection programme indicates that there is a need for improved coverage, longer periods of the data record, increased reliability, a more comprehensive database that is easily accessible and rigorous analysis through the application of the various software and Geographic Information Systems (GIS).

In the past the Authority has concentrated on the upgrade of the national hydrometric network to address the issues of coverage, longer records and reliability. We have had some success but with limitations of resources as a result of lack of funding and/or under funding of the Capital A budget the impact on this core function has been significant. We have lost stream flow stations due to vandalism and Tropical Storm Nicole which are still to be rebuilt. The loss of solar panels, data loggers and other equipment at stations that the

Authority had upgraded to improve coverage and reliability continues to be one of great concern. The equipment at the newly erected Sweet River station at Deans Valley in Westmoreland was stolen last year and just recently the Rio Cobre near Spanish Town station had its equipment removed at 3am one morning. While it may be possible to replace the equipment the data record for the down time would have been lost.

The Authority in an effort to make the data more accessible to all has established a web-enabled database which has recently been upgraded. It is now necessary to consolidate all the existing and fragmented databases to improve compilation and storage while enabling easy and better access even remotely and to facilitate the analysis and interpretations that must be done. However before the database can be fully functional the data must go through a quality assurance/quality check (QA/QC). This QA/QC begins in the field during the collection of the data and includes the metadata which enables a better understanding and interpretation of the data.

The Computer/GIS Unit has been issuing guidelines for the recording of metadata for data collection and all hydrologic events. The Unit will be further coordinating the implementation of the solutions to ensure that the Authority in keeping with Section 4(3)(a) of the Water Resources Act 1995 can “**obtain, compile, store and disseminate data concerning the water resources of Jamaica**” It is incumbent on each and every member of the Authority’s staff to ensure that the data collected can stand any test for accuracy and reliability.

In the past you have all worked assiduously to ensure that the data collection programme is executed with a high degree of professionalism. I know that you will continue in the same path.

Basil Fernandez
Managing Director

FUNCTION OF THE AUTHORITY

The Water Resources Authority became operational on April 1, 1996 as a result of the promulgation of the Water Resources Act 1995. The Act provides for the management, protection and controlled allocation and use of the water resources of Jamaica.

1. The Authority, under Section 4 of the Act, carries out the following duties:
2. It shall be the duty of the Authority to regulate, allocate, conserve and otherwise manage the water resources of Jamaica.
3. Subject to the provisions of this Act, the Authority may, for the purposes of performing any of its functions under this Act, do anything and enter into any transaction which, in the opinion of the Authority, is necessary to ensure the proper performance of its functions.
 - a. In particular, and without prejudice to the generality for the provisions of subsections (1) and (2), the Authority may –
 - b. Obtain, compile, store and disseminate data concerning the water resources of Jamaica;
 - c. Exercise planning functions as provided in this Act in relation to the Master Plan and Water Quality Control Plans;
 - d. Allocate water resources in conformity with the provisions of this Act;
 - e. Control the quality of water resources in accordance with the provisions of this Act;
 - f. Provide to any department or agency of Government, at its request, technical assistance in respect of any projects, programmes or activities which relate to the development, conservation and use of water resources;

Perform such other functions relating to the management, conservation and use of water resources as may be assigned to it by or under this Act or any other enactment.

THE EXECUTIVE

The Board of the Authority

The Board of the Authority, by Cabinet Decision No. 38/10 dated 19 October 2010, was re-appointed with effect from 19 October 2010 for a period of three (3) years terminating on 18 October 2013. There was no change to the membership of the Board.

The members of the Board as at 31 March 2011 were:

Dr. Parris Lyew-Ayee Jr.	Chairman
Mr. Basil Fernandez OD, JP	Secretary/Managing Director
Mr. Alexander Williams	Member
Dr. Geoffrey Williams	Member
Dr. Willard Pinnock	Member
Miss Camiek Blair	Member
Mrs. Cheyenne McClarthy	Member
Miss Sandra Buchanan	Member

Mrs. Charmaine James continued as the Recording Secretary, and Mrs. Natalie Ferguson, Hydrogeologist and Head of the Permits and Licences Unit, continued as the Technical Advisor.



Board of the Water Resources Authority 2010/2011

Back row from left-Dr Willard Pinnock, Mr. Basil Fernandez-Managing Director, Dr Parris Lyew-Ayee Jr-Chairman, and Mr. Alexander Williams.

Front row from left-Ms Sandra Buchanan, Mrs Cheyenne McClarthy, Ms Camiek Blair, Mrs Charmaine James-Recording Secretary and Mrs Natalie Ferguson-Technical Advisor. Missing: Dr Geoffrey Williams.

The Finance Committee met six (6) times for the year with an attendance of six (6) persons at five (5) of the meetings and three (3) persons at one meeting (the first meeting for the year).

Technical Advisory Committee

There were two (2) changes to the Technical Advisory Committee. Dr Carol Archer was unable to attend any meetings in the 2009/2010 year and requested to be removed from the Committee; Mr. Andreas Haiduk, Chief Hydrologist of the Authority proceeded on vacation leave in February 2011 and resigned from the Authority effective 31 March 2011. Ms Angella Graham was appointed to replace Mr. Haiduk and she attended her first meeting in March 2011.

The following were the membership of the committee as at 31 March 2011.

Dr. Willard Pinnock	Chairman
Dr Parris Lyew-Ayee Jr	
Miss Camiek Blair	
Mr. Basil Fernandez	(MD-WRA)
Mr. Herbert Thomas	(DMD-WRA)
Ms. Angella Graham	(Senior Hydrogeologist-WRA)
Mr. Rafi Ahmad	(UWI-Geography/Geology Department)
Dr Arpita Mandal	(UWI-Geography/Geology Department)

The committee met every other month at 1pm just before the Board meeting.

For the 2010/2011 financial year there were six (6) meetings of the Technical Advisory Committee. Attendance varied from five (5) persons in November 2010; six (6) persons in July 2010; seven (7) persons in September 2010 and January 2011 and all eight (8) members in May 2010 and March 2011.



Technical Advisory Committee of WRA Board 2010/2011

Back row from left- Mr. Herbert Thomas, Mr. Rafi Ahmad, Mr. Basil Fernandez, Dr Willard Pinnock-Chairman, Dr Parris Lyew-Ayee Jr,

Front row from left-Ms Angella Graham, Dr Arpita Mandal and Ms Camiek Blair.

Management of the Authority

A three (3) person team had the responsibility for the management of the Authority. They are listed below:

- Basil Fernandez OD, JP. Managing Director (MD)
- Herbert Thomas, Deputy Managing Director (DMD)
- Miss Hermine Downer, Director, Finance and Accounts (DFA)

Two positions, that of the Director, Planning and Investigation and Director Administration and Human Resource Development remained vacant for the entire year.

Public Sector Transformation Project

Inter-Disciplinary Transformation Team (IDTT)-WRA

In the 2010/2011 FY the Authority completed the establishment of the Inter-disciplinary Transformation Team (IDTT) under the instructions of the Public Sector Transformation Unit (PSTU). The IDTT of the Authority consisted of eleven (11) persons led by the Deputy Managing Director, Mr. Herbert Thomas. The membership of the IDTT represented a wide cross section of the Authority from technical, administrative, financial and support areas inclusive of professional and sub-professional staff. The IDTT functioned within the terms of reference set out by the PSTU.

The IDTT held several meetings to review the guidelines and the documents that accompanied the terms of reference. The first meeting assigned responsibilities for assessing improvement of services and cost recovery to Unit Heads and senior staff. In addition a SWOT analysis was to be done by each Unit Head to look at how the efficiency of the unit and the WRA could be improved. The SWOT led to the development of new mission and vision statements; a new organization structure and the recognition for a performance based management appraisal system (PMAS) with detailed job descriptions and outputs for each staff member.

The completed organizational chart was presented to the staff and after much discussion was accepted. The organizational chart with all the associated outputs was discussed with the Board of the Authority who approved the direction being taken; the Permanent Secretary in the Ministry of Water and Housing and then with the Deputy Financial Secretary (DFS) in charge of the Wages and Compensation Unit in the Ministry of Finance.

The new organizational structure will remove a number of Director Positions, merge two units and allow for greater cooperation between units to achieve the mandate and a higher level of service to the clients of the Authority.

The work of the IDTT will be completed within the 2011/2012 FY.

REPORTS ON SPECIAL EVENTS

WRA/UWI-MEMORANDUM OF UNDERSTANDING

On 2010 April 8 the Water Resources Authority (WRA) and the University of the West Indies (UWI) signed a Memorandum of Understanding (MOU) to facilitate greater collaboration in research and capacity building in the area of water resources.

The MOU is intended to improve and sustain research on water resources management. It is expected to enhance capacity building through training and internship at both the undergraduate and post graduate levels in the areas of hydrogeology/hydrology, climate change, economics of water, environmental management and disaster mitigation. The MOU will strengthen and formalize the present relationship between WRA and UWI to foster greater cooperation and research on water related issues in the interest of national development.



Signing of Memorandum of Understanding-WRA/UWI-April 2010.

From left-Dr Parris Lyew-Ayee Jr-Chairman WRA, Mr. Basil Fernandez- Managing Director WRA, Dr Horace Chang-Minister of Water and Housing and Professor Gordon Shirley-Principal UWI.

The first anniversary of the signing of the MOU was achieved on 2011 April 8. The milestones under the MOU in year 1 included the following.

- Establishment of a steering committee to give oversight to the implementation of the MOU. The representatives of the committee consist of the following persons. From the UWI-Dr. Michael Taylor, Dr. Michael Witter and Dr. Arpita Mandal. From the WRA-Mr. Basil Fernandez, Mr. Herbert Thomas and Miss Angella Graham.
- Provision of data/information on the water resources of the island to support the hydrogeology course in the Geography and Geology Department
- Ensured the successful completion of the field aspects of the hydrogeology course by

- leading field trips to surface and ground water sites where hydrology/hydrogeology techniques and equipment were demonstrated to enhance the knowledge of the students
- Supported the UWI sponsored workshop “*Advanced Materials*” held in Ocho Rios on 2010 August 16 through a presentation on flooding and floodplain mapping by Mr. Lawrence Barrett, Water Resources Engineer.
 - Assisted a post graduate student with her project on the flood evaluation of Port Maria, St Mary for her thesis.
 - Hosted in conjunction with Mona Geoinformatics Institute, a workshop in November 2011 on the impacts of Tropical Storm Nicole
 - Collaborated in the re-establishment of the Water Resources Management (WRM) Course and the preparation of a Terms of Reference for the determination of the qualifications, skill, knowledge and experience for and identification of a candidate for the Chair in WRM.
 - Prepared and published with the assistance of Mona Geoinformatics the Water Resources Fact Book of Jamaica which was launched on World Water Day 2011 March 22.

Meetings of the steering committee are scheduled for identification and implementation under the MOU of other mutually beneficial projects.

Appointment of MD to Board of International Centre for Water Hazard and Risk Management (ICHARM)

In July 2010 the UNESCO International Hydrologic Programme (IHP) Inter-Governmental Council appointed the Managing Director of the Water Resources Authority, Mr. Basil Fernandez, to the Advisory Board of the International Centre for Water Hazard and Risk Management (ICHARM) in Tsukuba, Japan. The appointment is for a four (4) year period.

ICHARM is a Category II Centre of Excellence under the auspices of UNESCO and was established as a part of the Public Works Research Institute (PWRI) of Japan on 6 March 2006.

The Managing Director attended the ICHARM-UNU Joint International Symposium, the ICHARM Advisory Board meeting and a field visit for the Advisory Board members over the period 28 to 30 September 2010 in Tokyo and Tsukuba, Japan.

The ICHARM-UNU Joint International Symposium titled “*Floods-A Global Problem that needs Local Solutions*” was held on 28 September 2010 at the U Thant International Conference Hall, United Nations University, Tokyo, Japan. The Managing Director made a presentation at the symposium on “*Floods-A Global Problem that needs Local Solutions: The Case of Jamaica – A Caribbean Small Island State*”

The Third (3rd) Advisory Board meeting was held at the offices of the PWRI in Tsukuba on 29 September. The Managing Director was appointed Vice-Chairman of the Board by the elected Chairman Mr. Keizrul bin Abdullah of Malaysia. The meeting discussed the formation of ICHARM, its objectives and the programmes being implemented to achieve the objectives. Heads of sections of ICHARM made presentations on the work of the various units and the training of students in flood modeling and management. Members of the Advisory Board gave advice to further the work of ICHARM.

The Managing Director recommended that short training programmes be held in the Caribbean rather than bring students to Japan as it will be less costly and more effective. In addition he recommended the concentration on building resilience to flooding and other hazards in light of the projected increased impacts of climate change.

The Managing Director went on to congratulate ICHARM as the work done has been very impressive. He however was of the opinion that there was the need:

- To clarify the position about education possibilities for Caribbean persons.
- To set up an alliance with the Caribbean as ICHARM could contribute significantly to the work of the Small Island Developing States of the Caribbean. Small Island Development States are very vulnerable to several natural hazards such as hurricane, tsunami, volcano, flood, drought and earthquake. Building resilience to deal with the impacts is critical.
- To establish a protocol for communication between the Advisory Board and ICHARM to keep members informed of issues at ICHARM. A group email was suggested as one possible way.

WRA is willing to advance information on and push for cooperation and collaboration with ICHARM in the Caribbean through technical meetings in the region.



Managing Director WRA, at Advisory Board Meeting of ICHARM, Tsukuba, Japan. Chairman of Advisory Board, Mr. Keizrul bin Abdullah of Malaysia, is to the right.

The field trip was held on 30 September to the site of the floodwater master control centre for the city of Tokyo. The flood system collects all rainfall runoff and diverts the flow from the city via underground channels to a river close to its outlet to the sea. It is a most impressive system and took many years to construct.



Managing Director Reviewing Schematic of Tokyo Flood Diversion System

FORUM ON TROPICAL DEPRESSION 16/TROPICAL STORM NICOLE.

The Water Resources Authority in conjunction with Mona Geoinformatics Institute Ltd and the Geography and Geology Department of the University of the West Indies hosted a Forum titled “*An Impact Assessment of the Rainfall of Tropical Storm Nicole*” on the Mona Campus of the University on November 11, 2010. The other agencies that were involved include the Office of Disaster Preparedness and Emergency Management (ODPEM), the MET Office, the National Works Agency (NWA), the National Water Commission (NWC), Local Government and the National Environment and Planning Authority (NEPA). The Chief Technical Director of the Ministry of Water and Housing brought greetings from the Permanent Secretary who was unavoidably absent.

The forum consisted of presentations by Mona Geoinformatics Institute (on the rainfall) and the Water Resources Authority (on the flooding) followed by an open discussion with panelists from the NWA, MET Office, WRA, ODPEM, Local Government and the Disaster Risk Reduction Centre of UWI. The forum was well attended with representation from private sector, academia and other public sector agencies. Professor Simon Mitchell of the Geography and Geology Department gave the closing remarks.



Mr. Lawrence Barrett, Water Resources Engineer-WRA, making his presentation on flooding at Newmarket and Chigwell.



Mr. Michael Wilson, Hydrologist-WRA, making a presentation at the TS Nicole Forum



Panelists at the Forum on TS Nicole-UWI, Mona - 11 November 2010.

The Forum received good media coverage from JNN of the RJR Group and JIS.

WORLD WATER DAY 2011

WATER FOR CITIES: MEETING THE URBAN CHALLENGE

The **United Nations General Assembly** in 1993 designated *March 22* of each year as **World Water Day (WWD)**. World Water Day is intended to focus attention on the importance of freshwater and advocating for the sustainable management of freshwater resources. Each year WWD highlights a specific aspect of freshwater. For 2011 the theme of WWD is “*Water for Cities: Meeting the Urban Challenge.*”

The Minister of Water and Housing, Hon Dr. Horace A Chang released the following message for World Water Day 2011 around the theme “*Water for Cities: Meeting the Urban Challenge*”

MESSAGE OF HON. DR. HORACE CHANG
MINISTER OF WATER AND HOUSING
FOR
WORLD WATER DAY
MARCH 22, 2011

The issue of providing fresh water and adequate sanitation for urban areas is critical, especially since half of the world’s population now lives in cities. By the year 2030, it is estimated that the number of urban dwellers is expected to rise to nearly 60 percent.

The theme for this year’s World Water Day, “Water for Cities...Meeting the Urban Challenge” recognizes that the rapid growth in size and number of the world’s cities has serious implications for the provision of adequate water and sanitation for urban dwellers.

A ready supply of fresh, clean water and adequate sanitation can mean the difference between clean, attractive cities ripe with the potential for further economic growth, or filthy, economically stagnant areas.

Like many cities around the globe, Jamaica’s urban areas have experienced enormous growth in population and expansion of the built environment. As such, “Responding to the Urban Challenge” has required innovation, creative thinking and serious commitment from the Ministry, its agencies, and partners in the sector.

Three major water supply projects currently underway are aimed at ensuring that there are adequate freshwater supplies and the necessary infrastructure to facilitate growing economic and domestic activity, in the sprawling metropolis of the Corporate Area and Southern St. Catherine.

They are:-

- The US\$85M Kingston Metropolitan Area (KMA) Water Supply which will improve the reliability and quality of the water supply to the Corporate Area, Greater Spanish Town and South East St Catherine

- The Kingston and St. Andrew (KSA) Water and Sanitation Project which will rehabilitate the potable water supply facilities, sewerage infrastructure and sewage treatment for the KSA; and
- The Jamaica Water Supply Improvement project (JWSIP)

Of this lot, the flagship project is undoubtedly the JWSIP which is the most ambitious water supply project undertaken to date.

When completed, this US\$210m project will add nearly 20 million gallons per day of potable water to the targeted areas. It will also reduce system losses and improve the operating efficiencies of the island's major water provider, the National Water Commission.

The JWSIP also incorporates a number of water supply projects in several other parishes in rural Jamaica.

We are currently at one of the most crucial stages of the JWSIP which is the replacement of the old Rio Cobre asbestos cement pipeline, which brings water from Bog Walk along the Gorge to the KMA. Although it may create some inconvenience for motorists and residents in the area, this upgrade is necessary as it will ultimately reduce leaks and improve the reliability of supply to the KMA.

As these projects demonstrate, the Ministry its agencies and partners are “Responding to the Urban Challenge”, and by partners I also mean you, the citizens of this country. The extent of our ability to deliver potable water to you is dependent in large measure, on your ability to keep our freshwater sources as pollution free as possible.

As we observe World Water day, the words of Hydrologists Frank and Francis Chapelle come to mind. They state, and I quote “The Romans realized, as have every civilized people since, that living in cities is impossible, if the water supply is not reliably clean and fresh.”

Let us all work together in “Meeting the Urban Challenge”, so that our cities will be thriving meccas of social and economic growth and opportunity.

World Water Day 2011 Activities

The Ministry of Water and Housing, Water Resources Authority (WRA), National Water Commission (NWC), National Irrigation Commission (NIC), Rural Water Supply Limited (RWSL) and the Meteorological Service of Jamaica jointly hosted the activities to mark World Water Day 2011 on March 22, 2011 at the Girl Guide Association Headquarters at 2 Waterloo Road Kingston 10, between 10am and 3pm.

The day's activities included the following:

- Live interview on CVM TV “Sunrise” morning programme at 6.30am (Interviewee Herbert Thomas of WRA)
- Live interview on TVJ “Smile Jamaica” morning programme at 7.30am (Interviewee B. Fernandez of WRA)
- Outside Broadcast (OB) on Power 106FM with Ronnie Thwaites from 5.30am to 9.45am from the offices of the Water Resources Authority (various interviewees including Minister and Chairman)

The following presentations at the Girl Guide Headquarters:

- The Water and Education Programme by the Water Resources Authority
- The Jamaica Water Supply Improvement Project (JWSIP) by the Minister
- Plans for the development of water supply by the NWC
- Launch of the Fact Book on the Water Resources of Jamaica by WRA
- Exhibitions by NWC, WRA, Rural Water Supply and NIC
- NWC Customer Care Centre – Bill and development applications queries.

The day’s activities were widely and highly supported by UNESCO, schools from Kingston and Spanish Town and the general public. Media coverage was good as seen in the photo display below.



Minister of Water and Housing-Dr Horace Chang with children at the NWC display booth.



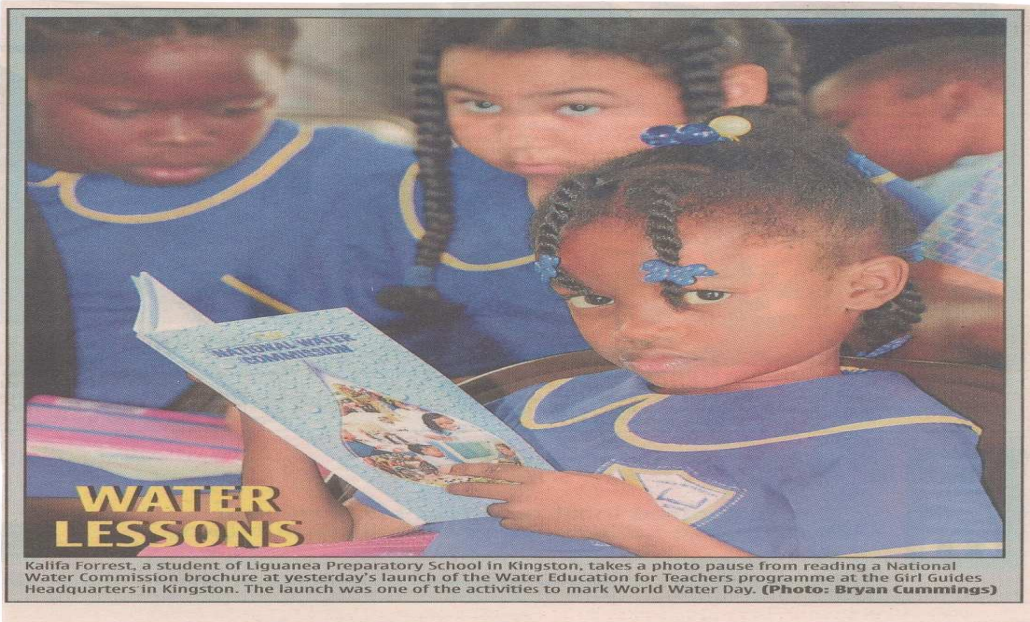
Minister reviewing the Ministry's display on Rainwater Harvesting



Rajas Ricketts and Vanessa Scully, both students of Our Lady of the Angels Preparatory School, look at a water habitat model at the Girls' Guide Headquarters in Kingston on March 22, World Water Day. (Photos: Bryan Cummings)



Basil Fernandez (left), managing director of the Water Resources Authority, and Cesar Toro, programme specialist for natural science at UNESCO's Kingston office, are caught in conversation during World Water Day activities, held at the Girls' Guide Headquarters in Kingston.



Kalifa Forrest, a student of Liganea Preparatory School in Kingston, takes a photo pause from reading a National Water Commission brochure at yesterday's launch of the Water Education for Teachers programme at the Girl Guides Headquarters in Kingston. The launch was one of the activities to mark World Water Day. (Photo: Bryan Cummings)



Doing the "Rainmaker" for World Water Day

Managing Director of the Water Resources Authority (WRA), Mr. Basil Fernandez, joins students from Corporate Area Schools in doing the "rainmaker" during the World Water Day celebrations at the Girl Guides Headquarters in Kingston yesterday. The "rainmaker" is a simulation of the sounds of rainfall. The Forum was addressed by the Minister of Water and Housing, Dr. Horace Chang, and UNESCO Natural Science Specialist, Mr. Cesar Toro and featured presentations from the National Water Commission and other water agencies.

ADVERT



Mr. Michael Samuels of the WRA discussing the groundwater model with students from Hillel Academy

WORLD METEOROLOGICAL DAY

World Meteorological Day 2011 was celebrated on March 23 the day following the World Water Day event. The theme for the World Met Day 2011 was “*Climate for You*” and the day’s events were hosted by the National Meteorological Service of Jamaica at the Jamaica Conference Centre. The events consisted of a series of presentations on climate and how it impacts on the public with special emphasis on Tropical Storm Nicole and flooding, a panel discussion on climate change and an exhibition by several agencies including the Water Resources Authority.

The Water Resources Authority participated in the presentations with Mr. Lawrence Barrett, Water Resources Engineer, making a presentation titled “*Jamaica Floods-Why?*” dealing with the causes for flooding across the island and the projected impacts of climate change on flooding.

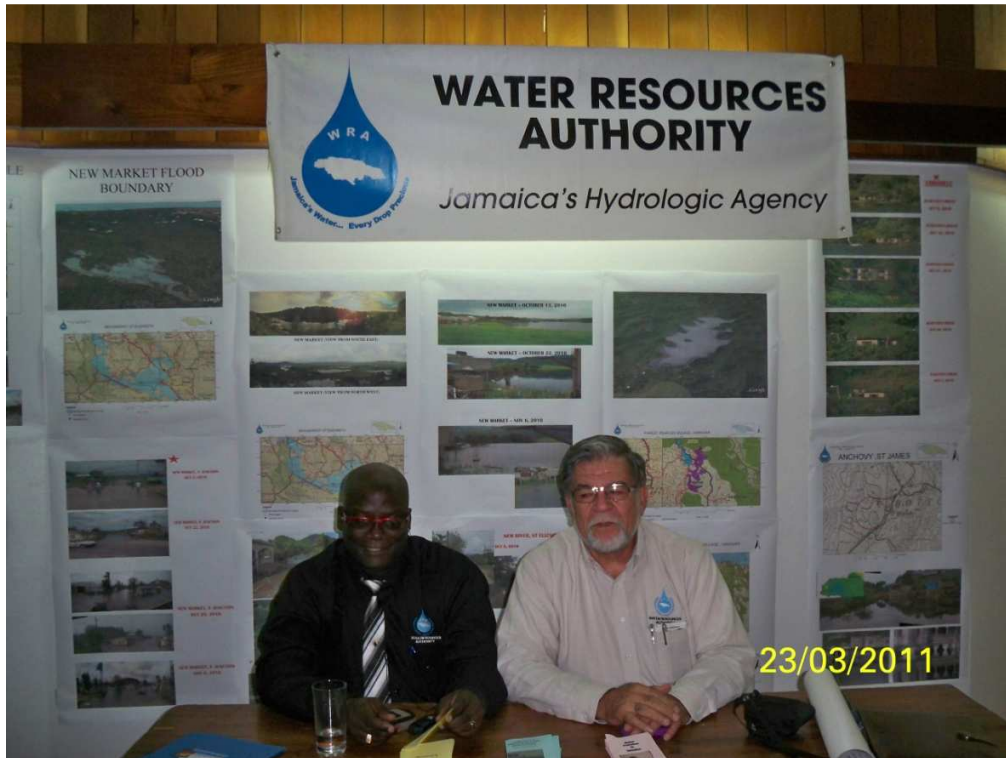
The Managing Director of the Authority, Mr. Basil Fernandez, participated in the panel discussion on weather, climate and flood forecasting.

Mr. Michael Wilson of the Authority prepared and manned the WRA display outside the conference room.

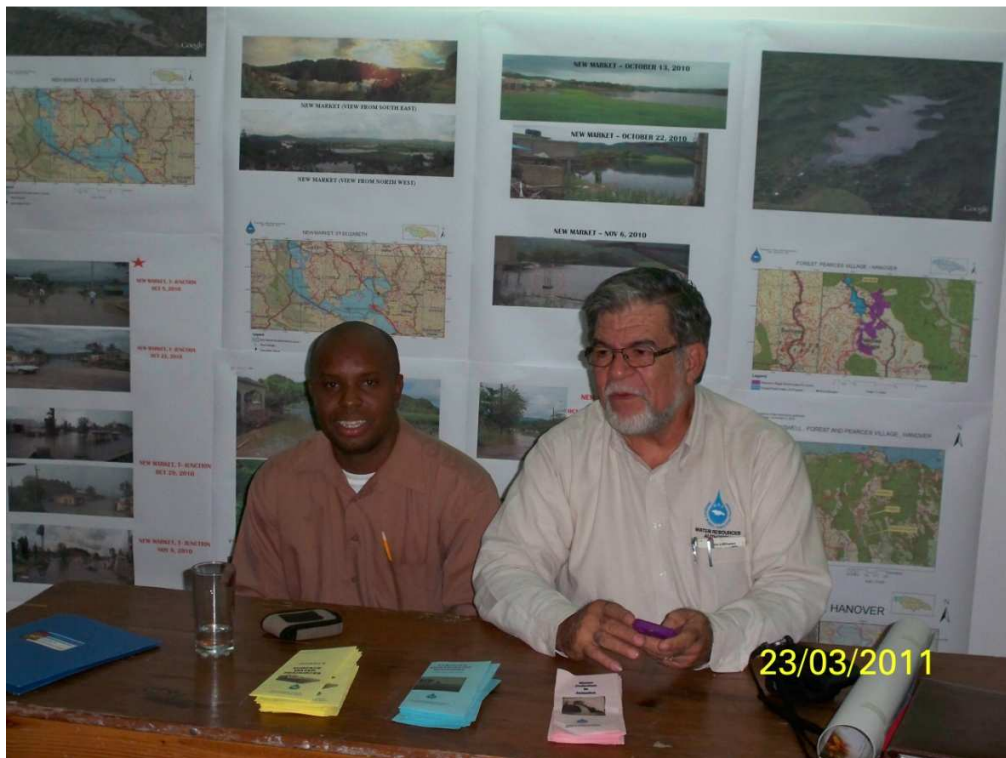
It was good support by the WRA for the Met Office its sister agency under the World Meteorological Organization (WMO).



WRA Display at World Met Day Celebrations 23 March 2011



MD-WRA with Michael Wilson at Display for World Met Day 23 March 2011



MD-WRA with Lawrence Barrett at Display for World Met Day 23 March 2011.

TECHNICAL REPORTS

PERMITS AND LICENCES UNIT

The objective of the unit was linked to the Vision 2030, National Outcome 15: *Urban and rural water and sanitation needs are met using modalities that are safe and sustainable*. The strategies (#1:3) were:

1. Ensuring equitable allocation of water resources in each hydrological basin,
2. Increasing the rate of compliance of abstractors with the WRA Act (1995) and of the licensees with the conditions of licences and permits issued and
3. Creating the enabling environment for the implementation of IWRM (integrated water resources management): demand management and water conservation.

Major Tasks and targets for the unit were:

1. Allocation of surface and groundwater resources,
2. Maintenance of water allocation, water production and well status datasets; and
3. Performing site investigations and assessments including down-the-hole camera investigations.

ALLOCATION OF SURFACE AND GROUND WATER RESOURCES

The planned target for 2010-2011 was 100% of licence, permit and renewal applications received by the Authority processed within 60 days of receipt of the application. Ninety-one (91) applications of a total of one hundred and six (106) applications received or 86% were processed within 60 days of the receipt of the application; the details of which are tabulated below.

APPLICATION SUMMARY <i>2010-2011</i>	APPLICATION TYPES			
	<i>Licence</i>	<i>Permit</i>	<i>Renewal</i>	Total
Number of applications received	55	17	34	106
Number of application processed within 60 days of receipt	45	17	29	91
Percentage of applications processed within 60 days of receipt	82%	100%	85%	
Number of applications granted	29	13	20	62
Number of applications received in previous years granted in 2010-2011	3			3
Total volume Granted (cubic metres per day)	2,635,107.80			
Number of applications refused	0	0	0	0
Number of pending applications	23	4	14	41

ALLOCATION REVIEW

Licences –

Of the thirty-two (32) applications granted within the period 2010-2011, thirteen (13) represented allocation of new sources of water, while nineteen (19) represented regularization of existing abstraction. The total volume allocated for the period was 2,634,233.80cubic metres of water per day. Of the total volume of water allocated 99% (2,607,891.46cubic metres per day) represented regularization of existing abstraction and as such does not reflect the allocation of new resources. New sources represented 1% (26,342.34cubic metres per day) of the allocation.

Of the total volume allocated, 99% (2,607,891.46cubic metres per day) represented allocation from rivers and springs while 1% (26,342.34cubic metres per day) represented groundwater abstraction via wells.

The industrial sector was allocated the largest volume of water of 98% (2,581,549.1cubic metres per day) primarily to JPSCO to regularize existing abstraction for hydropower generation. Domestic use was allocated 0.5% (15,805.40cubic metres per day for water supply), irrigation 0.8% (21,073.87cubic metres per day), tourism 0.1% (2,634.23cubic metres per day for cooling systems) and the multi-users 0.4% (10,536.93cubic metres per day, for domestic-industrial, domestic-ecotourism, domestic-irrigation, domestic-recreational uses.

The twenty-three (23) licence applications pending required the following to complete the processing:

- non-submission of information requested for processing (8No)
- additional technical investigations and data analysis to be undertaken by the Authority (8No)
- objection raised-review (3No)
- processed after 2010-2011 period (4No).

The fourteen (14) renewal applications pending required the following:

- submission of information by applicant for processing (8No),
- additional technical investigations and data analysis to be undertaken by the Authority (6No).

Permits-

Of the thirteen (13No) applications approved for permits to drill new wells

- four (4No) were for industrial use (bauxite production/ St. Ann and block making/ St. Catherine, St. Thomas, Abattoir/ Westmoreland),
- four (4No) for domestic use (water supply; Clarendon-National Water Commission, St. Ann-Sandals Resorts, St. James-domestic use for Irwin Estate subdivision, Kingston-Food processing),

- three (3No) for irrigation (irrigation water supply-National Irrigation Commission/Manchester & St. Thomas; and
- two (2No) multi-use -industrial-domestic/Kingston and domestic-irrigation/St. Catherine.

Four (4) applications pending resulted from requirement for additional technical investigations and data analysis to be undertaken by the Authority.

INCREASING COMPLIANCE RATE OF LICENSEES

Increase compliance of licensees by 50% to conditions of the licences/permits as stipulated by the Water Resources Act 1995 was attempted utilizing a public education campaign and notification programme. This has been the most challenging task for the unit with only fifty-three percent (53%) of licensees submitting abstraction/water production data and less than thirty percent (< 30%) water quality data as stipulated by the licence conditions and regulations.

A public awareness campaign in April 2010 was conducted via a radio drama series programme called "Under the Law". The programme was aired on Thursday on Nationwide 90FM April 1, 8, 15, 22 and 29, 2010. The programme was aired four (4) times daily. Whilst the public education campaign raised awareness of the listeners and generated queries/responses via telephone to the Authority, there was no significant increase in new applications submitted.

Notification of expiration and renewal of licences due in 2010 were dispatched in December 2010. A total of thirty-two (32) licensees were notified.

MAINTENANCE OF DATASETS

The unit updates the licence allocation register with sources granted permits/licence, an inventory of production, a list of wells and the well records.

Update of the licence allocation records were completed quarterly, the inventory of production within 30 days of receipt of the information and the well list and well records when the information became available from field well verification exercise or well drilling reports.

The licence allocation register was updated with 71 sources totalling 361 valid licences for the period 2010-2011 and the inventory of production was updated with 507 sources (Primarily National Water Commission; NWC submitted data for 422 unlicensed sources).

A challenge for continuous update of the well records and the licence allocation register is the incompatibility and programme glitches of software used to store and manage the datasets. A review and upgrade of the software for the management of datasets will be completed in the new financial year.

A total of 135 wells were verified in the field using GPS under the well verification programme. The following hydrological basins were visited; Rio Minho basin (74No), Rio Cobre (47No) Blue Mountain South (14No). Additionally, 200 sources which were verified in the field during 2009-2010 were checked/edited and the well lists updated.

A demonstration for the implementation of a document management system (DMS) using DSPACE open source software was completed by the unit in November 2010. The DMS will be utilized in the upcoming financial year to convert the paper application files to digital. This conversion will preserve paper files between 1960's to present, and to allow for optimal management of application files, related data and information.

INVESTIGATIONS

Major tasks and targets for the unit under the strategy '*enabling environment for the implementation of IWRM by implementation of demand management and water conservation*' were performing technical assistance through site investigations and assessments including down-the-hole camera investigations.

- ▶ *Technical Assistance* - The Unit continued to provide technical assistance through nineteen (19) small investigations including monitoring of well drilling activities and yield testing of wells for the public and private sectors. One hundred and three (103) requests for data and information were also provided to the public by the unit. The newly acquired Solinst lever loader logger (which allows continuous water level measurements during pumping/yield testing of wells) was utilized at the Berrydale #7 well (Noranda Bauxite) in St. Ann. [See photos below]



Figure 1: Solinst lever loader logger in well for continuous pump testing



Figure 2: Solinst lever loader logger (right) with hand held device (left) and laptop for data retrieval/storage (centre)

- ▶ *Telelogging* - The Permits and Licences Unit operates the down-the-hole video camera, a diagnostic tool used to evaluate the condition of wells and recommend measures for rehabilitation in support of well applications. A total of fourteen (14) wells were logged totalling 798.35metres. A total of \$1,308,836.39 was collected from the telelog investigations during the period.

STAFF/TRAINING

During the financial year one (1) member of the three-member staff unit retired. In November 2010 a new member was added to the team.

Training for unit members included the use of pressure transducer in well pumping/yield testing. This was sponsored by ALPART/Schlumberger (Waterloo Hydrogeologic out of Canada).

The unit is expecting to continue these activities in the next financial year.

COMPUTER / GIS UNIT

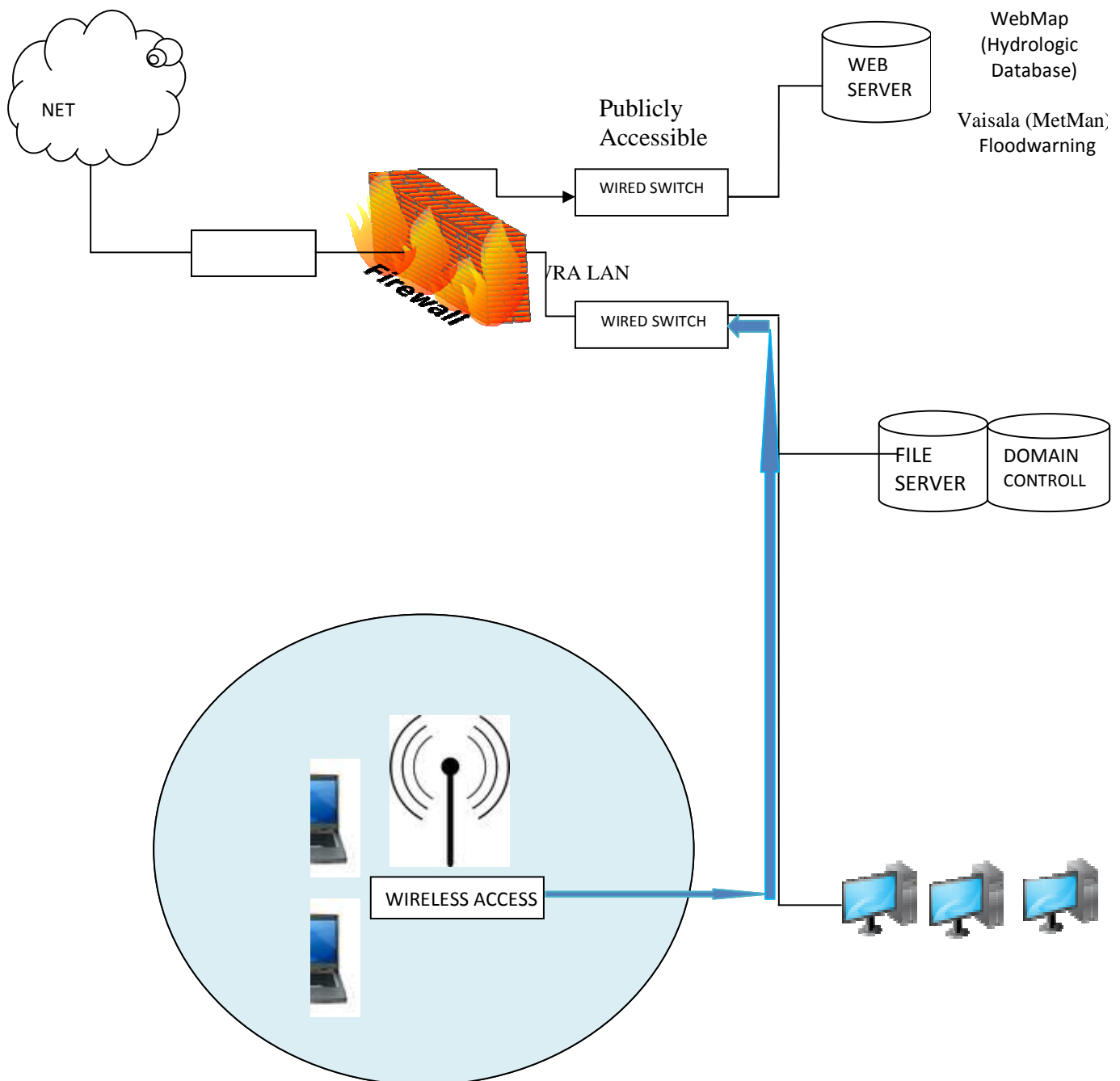
WATER RESOURCES AUTHORITY MANAGEMENT INFORMATION SYSTEM (WRAMIS)

During the period under review the Computer/GIS unit achieved the following:

- Upgrading of some support Software/Hardware, including the accounting software, anti-virus software and GIS software licences.
- Purchased, installed and configured wireless router to implement wireless infrasture as an overlay to the wired network
- Designed and commissioned leave entitlement software.
- Design and commissioned motor vehicle and general expenditures software.
- Purchased replacement parts which include laptop battery, CPU power supply and repair to the heavy duty laser printer.
- Purchased New multimedia projector, fax machine and a large dot metric printer for the Accounts Unit .
- The hydrologic Webmap database was updated to 2009 with 120 streamflow and groundwater stations
- Enable data and information from the Ministry of Health Wastewater Treatment Plants project (175 monitoring stations) available to the public online through the Hydrologic Webmap Database.
- Settled Internet website hosting, maintenance services and ADSL account for period
- Flood Data Dictionary completed and upload to GPS
- Produce water quality interactive maps for 10 basins
- Improved the Licences and Permit well application assessment process and flooding GIS map dataset by developing interactive maps to be use as a planning tool.
- Setup Facebook account and create page to highlight World Water Day 2011.

WIRELESS INFRASTRUCTURE

With the demand for network access growing and the cost associated with installing cables when new users are to be added to the network, make a wireless infrastructure a must as a part of the overall network architecture; moreover given an environment where IT budgets are constricting. The wireless layer illustrated in the diagram below is now a part of the WRA local area network (LAN) “wired” architecture.



LEAVE MANAGEMENT SOFTWARE

The Unit has developed a leave management software program that gives the HR Unit a snapshot on a daily basis and monitors the leave balance of all staff members as leave is taken or an application submitted.

**WATER RESOURCES AUTHORITY
LEAVE SUMMARY SHEET
YEAR 2010
January to December**

	NAMES	LEAVE ENTITLEMENT					LEAVE TAKEN			BALANCE		
		CASUAL	SICK	B/F	CURRENT	TOTAL	CASUAL	SICK	VACATION	CASUAL	SICK	VACATION
1	GLORIA ABBOTT	10	10	29	15.00	44.00	10	3	29	0	7	15.00
2	ROSHELLE ARCHER-JAMES	10	10	32	20.00	52.00	10	5	15	0	5	37.00
3	LAWRENCE BARRETT	10	10	23	20.00	43.00	10	6	20	0	4	23.00
4	CLYDE BLAKE	10	10	85	15.00	100.00	6	7	18	4	3	82.00
5	WILFRED CAMERON	10	10	78	15.00	93.00	9	10	16	1	0	77.00
6	OSBOURNE CARTER	10	10	19	15.00	34.00	0	0	10	10	10	24.00
7	KEVIN CHAMBERS	10	10	6	15.00	21.00	10	10	15	0	0	6.00
8	CONSTANTINE CLARKE	10	10	10	15.00	25.00	2	0	0	8	10	25.00
9	MAUREEN CLARKE	10	10	11	15.00	26.25	0	0	15	10	10	11.25
10	LESLIE CYRIL	10	10	11	15.00	26.00	9	10	5	1	0	21.00
11	STERLING DAVIS	10	10	15	15.00	30.00	0	0	10	10	10	20.00
12	CHRISENDEEN DOUGLAS	10	10	1	15.00	16.00	10	6	12	0	4	4.00
13	ERROL DOUGLAS	10	10		15.00	15.00	0	0	0	10	10	15.00
14	HERMINE DOWNER	10	10	84	25.00	109.00	8	4	29	2	6	80.00
15	SHONEL DWYER	10	10	16	20.00	36.00	10	7	20	0	3	16.00
16	SONIA FENNELL	10	10	12	15.00	27.00	10	3	10	0	7	17.00
17	NATALIE FERGUSON	10	10	18	20.00	38.00	10	2	21	0	8	17.00
18	BASIL FERNANDEZ	10	10	2	15.00	17.00	4	3	14	6	7	3.00
19	ALWYN FRANCIS	10	10	30	15.00	45.00	6	2	9	4	8	36.00
20	GILMORE FRASER	10	10	21	15.00	36.00	10	7	35	0	3	1.00
21	ERICA GENTLES	10	10	13	15.00	28.00	10	9	15	0	1	13.00
22	ANGELIA GRHAM	10	10	11	20.00	31.00	10	4	16	0	6	18.00

LEAVE ENTRY FORM

Each staff member has a leave profile form as indicated below which is filled in as the leave application request is received.

VACATION & SICK LEAVE RECORD
For the period ending January 1 - December 31, 2010

NAME: **1 MURIEL ABBOTT**
TITLE: **OFFICE ATTENDANT**
DATE OF HIRE: **Yes FULL TIME**
MAXIMUM VACATION ACCUMULATION: **30.00 DAYS**
NEXT CHANGE IN ACCUM. RESPECTIVE: **Annually 30.00 DAYS**
MAXIMUM VACATION ENTITLED: **15 DAYS**
MAXIMUM CASUAL ENTITLED: **10 DAYS**
MAXIMUM SICK ENTITLED: **5.00 DAYS**

MONTH	BEG. OF MONTH BALANCE	EARNED	USED	END OF MONTH BALANCE	From	Dates Taken To	Days Taken
JAN	29.00	1.00	0.00	30.00	Monday, 26 July, 2010	Monday, 05 September, 2010	29
FEB	30.00	2.00	0.00	32.00			
MAR	31.00	2.00	0.00	33.00			
APR	32.75	2.00	0.00	34.75			
MAY	34.00	2.00	0.00	36.00			
JUN	35.75	2.00	0.00	37.75			
JUL	36.00	2.00	5.00	33.00			
AUG	32.75	2.00	20.00	14.75			
SEP	14.00	2.00	4.00	12.00			
OCT	11.00	2.00	0.00	13.00			
NOV	12.00	2.00	0.00	14.00			
DEC	13.75	2.00	0.00	15.75			
				15.00			

*** CASUAL ***

MONTH	BEG. OF MONTH BALANCE	EARNED	USED	END OF MONTH BALANCE	From	Dates Taken To	Days Taken
JAN	0.00	0.00	0.00	0.00			
FEB	0.00	0.00	0.00	0.00	Friday, 26 March, 2010	Friday, 26 March, 2010	1
MAR	0.00	0.00	1.00	0.00	Wednesday, 05 May, 2010	Wednesday, 05 May, 2010	1
APR	0.00	0.00	1.00	0.00	Friday, 18 June, 2010	Friday, 18 June, 2010	1
MAY	0.00	0.00	0.00	0.00	Thursday, 30 September, 2010	Thursday, 30 September, 2010	1
JUN	0.00	0.00	1.00	0.00	Wednesday, 17 November, 2010	Wednesday, 17 November, 2010	1
JUL	0.00	0.00	1.00	0.00	Thursday, 02 December, 2010	Thursday, 02 December, 2010	1
AUG	0.00	0.00	0.00	0.00	Friday, 17 December, 2010	Friday, 17 December, 2010	1
SEP	0.00	0.00	1.00	0.00	Wednesday, 29 December, 2010	Friday, 31 December, 2010	3
OCT	0.00	0.00	0.00	0.00			
NOV	0.00	0.00	1.00	0.00			
DEC	0.00	0.00	5.00	0.00			
				10.00			

*** SICK ***

MONTH	BEG. OF MONTH BALANCE	EARNED	USED	END OF MONTH BALANCE	From	Dates Taken To	Days Taken
JAN	0.00	0.00	0.00	0.00			
FEB	0.00	0.00	0.00	0.00			
MAR	0.00	0.00	0.00	0.00			
APR	0.00	0.00	0.00	0.00			
MAY	0.00	0.00	0.00	0.00			
JUN	0.00	0.00	0.00	0.00			
JUL	0.00	0.00	0.00	0.00			
AUG	0.00	0.00	0.00	0.00			
SEP	0.00	0.00	0.00	0.00			
OCT	0.00	0.00	0.00	0.00	Tuesday, 05 October, 2010	Thursday, 07 October, 2010	3
NOV	0.00	0.00	0.00	0.00			
DEC	0.00	0.00	0.00	0.00			
				0.00			

MOTOR VEHICLE AND GENERAL EXPENDITURES SOFTWARE

This program tracks fuel, groceries, repairs and other services purchased for the general office and summarizes payments under the various accounts object (expenditure codes). The report below illustrated one type of information the system generates.

Transaction Screen

WRA Motor Vehicle & General Expenditures

Delete Record Exit

Code: CF0628 WRA_TOYOTA Hilux 2005

Date: 01/05/2010 dd/mm/yyyy

Invoice #: 00669363

Expenditure Code: 25/08

Amount: J\$24,389.43

Description: Fuel

Supplier: Manufacturers Credit & Information Services

Next Previous NEW

Water Resources Authority
General Expenditures

REPORT

WRA_TOYOTA Hilux 2005 CF0628

Date	Invoice Number	Object	Description	Amount	Subject
01/05/2010	00669363	25/08	Fuel	J\$24,389.43	WRA_TOYOTA Hilux 2005
16/05/2010	00669917	25/08	Fuel	J\$21,145.83	WRA_TOYOTA Hilux 2005
				\$45,538.26	

FOR MONTH ENDING: May 2010

TRANSACTION WRA_TOYOTA Hilux 2005 CF0628

SUMMARY

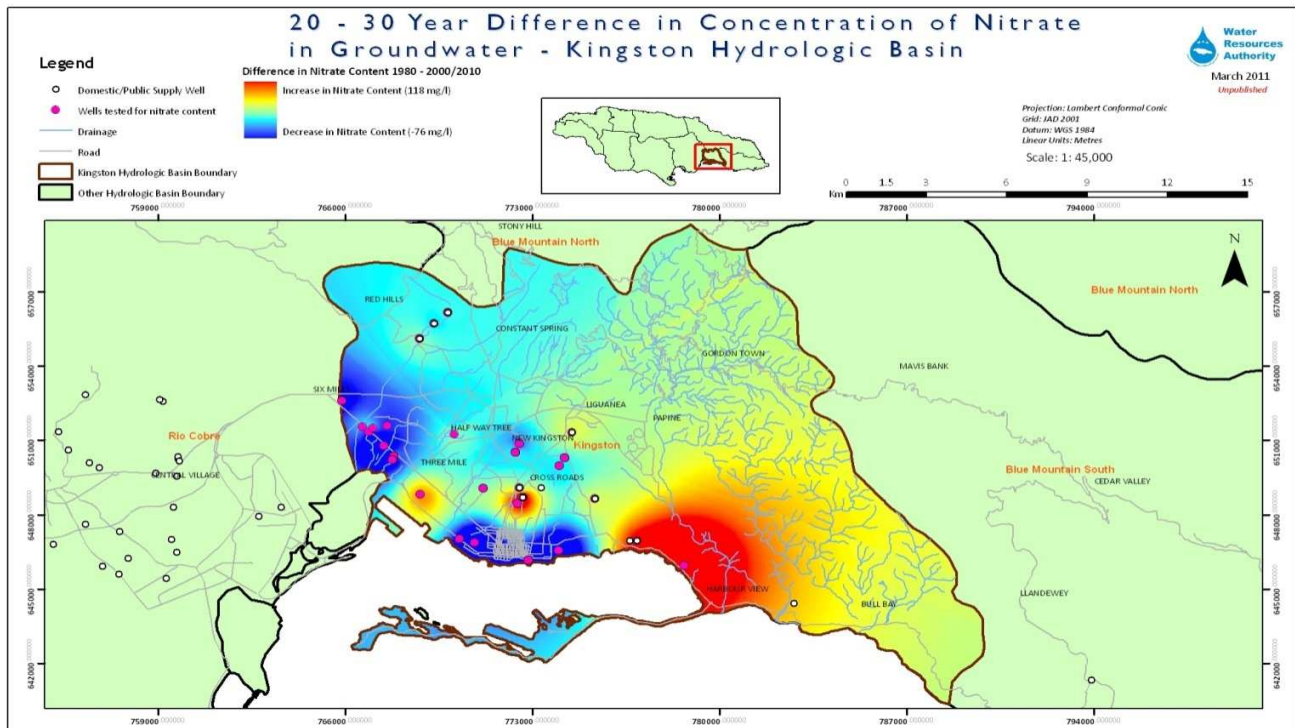
EXPENDITURE BUDGET	\$0.00
ACC. EXPENDITURE:	\$154,299.84
BALANCE	(\$154,299.84)

<i>Object</i>	<i>Sum</i>	
2508	J\$45,538.26	

Start Date: 1-05-2010 THROUGH End Date: 30-05-2010

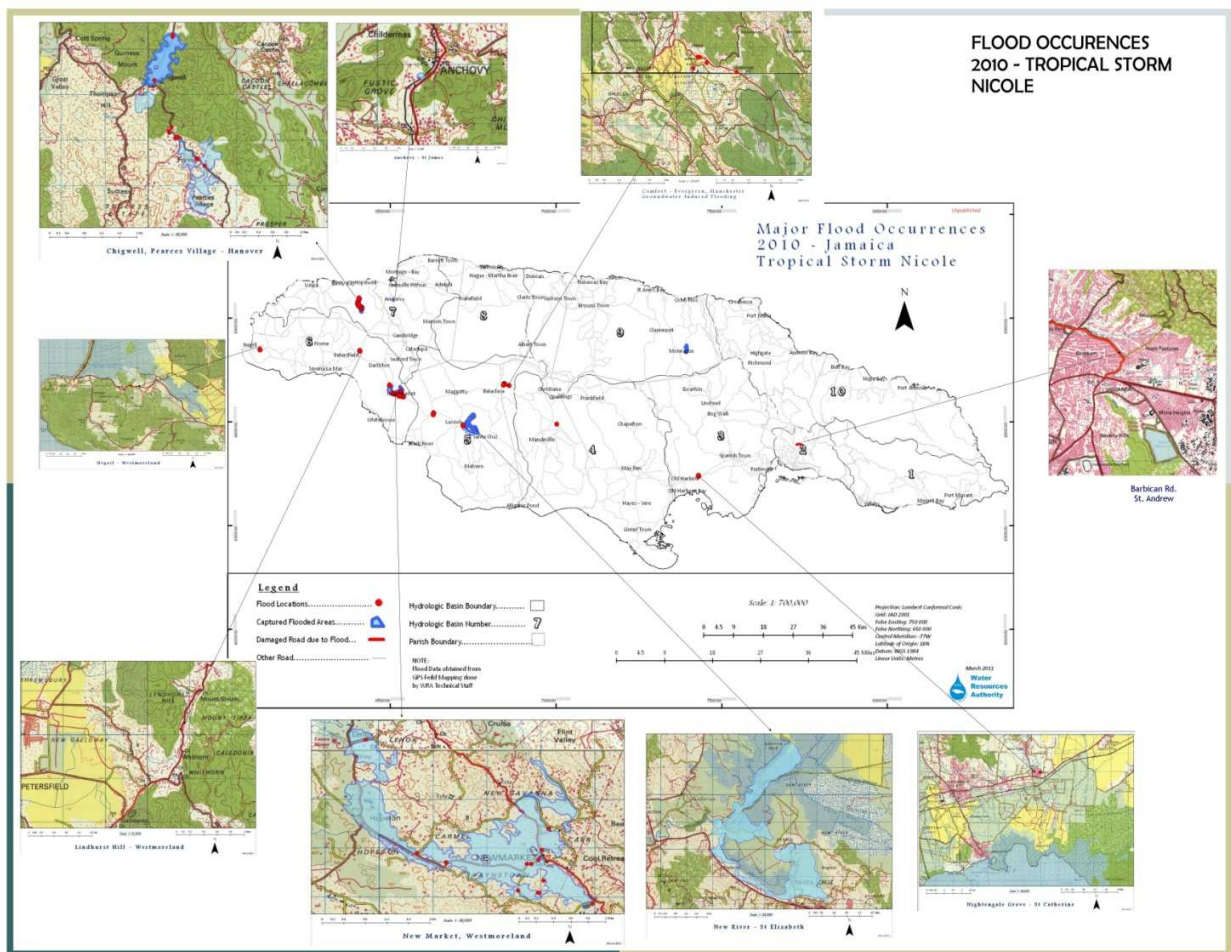
WATER QUALITY INTERACTIVE MAPS

The water quality interactive maps for 10 basins has been produced (*unpublished*) - Surface and ground water quality shape files for all basins have been completed and available. One of three maps of Kingston Basin showing difference of nitrate concentration between 1980 and the period 2000-2010 is shown here.



MAP OF FLOOD OCCURRENCES ---TROPICAL STORM NICOLE

The Unit gathered flood data for 2010 and the information was used to produce the map showing flood occurrences after the passage of Tropical Storm Nicole in November of 2010. Other flood data were compiled and added to the database and can now be used for flood analysis and planning as well as in future flood plain mapping.



CHALLENGES

Frequent and prolong power outages causes webserver to be inaccessible to the public for long periods.

Some computers on the network are becoming obsolete and cannot adequately handle the newer software.

Training needs of the unit were not addressed due to the high cost of the courses on offer.

MEETINGS AND SEMINARS

The Authority was represented at the monthly LICJ meetings.

The Unit participated in the annual GIS Day activities hosted by the LICJ at the UWI in November 2010.

The Unit Attended and presented at the MOH Wastewater Project seminar on January 24, 2011

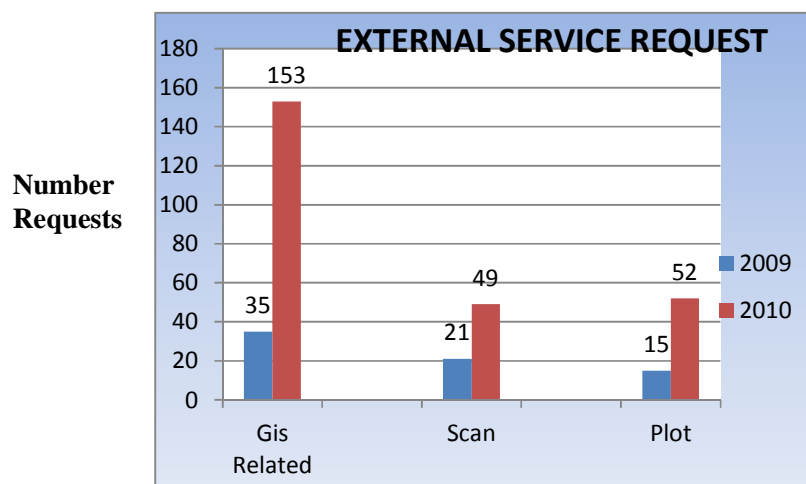
The GIS Specialist attended National Spatial Plan technical committee meeting at Ministry of Agriculture Rural Physical Planning office in January

The Systems Manager, GIS Specialist and the Systems Analyst attended a number of National Spatial Plan workshops at the Pegasus Hotel.

The GIS Specialist represented and made a presentation at the GEOSUR Seminar at the Knutsford Court Hotel and will be attending training workshop at the GEOSUR Headquarters in Sioux Falls, South Dakota in July 2011.

ASSISTANCE TO EXTERNAL AGENCIES

The unit assisted several agencies, both public and private, through the provision of large scale maps, scanning, cartographic and other GIS services. With the employment of a GIS specialist we were able to respond to more of these request.



PROJECTIONS (APRIL 1, 2011– MARCH 31, 2012)

The unit is projecting that for the next financial year the following will be accomplished:

- Further enhancement of the capabilities of the WRAMIS.
- Make more updated data and information from the Ministry of Health Wastewater Treatment Plants project available to the public online through the hydrologic web database
- Establishing a classification of potential for Rainwater Harvesting of the agricultural lands in Jamaica
- Develop GIS maps identifying the established classes with companion thematic maps
- Develop in-house training programs in GIS and computer technology for all staff
- Acquisition of more GIS Tools to improve the productivity of the technical and professional staff.

PLANNING AND INVESTIGATION UNIT

The Planning and Investigation Unit functions under the Authority's mandate to guide the assessment, management and development of the island's water resources in a context of an integrated framework. In this regard the unit had responsibilities in the following areas:

- Major Projects
- Hydrological Assessments
- Technical Assistance/ Technical Support
- Data Provision

MAJOR PROJECTS

The major projects that the unit was involved in 2010- 2011 were:

- Aquifer Vulnerability Mapping
- Assessment of the Water Resources of the Cabarita Hydrologic Basin.
- Development of a groundwater management model of the Yallahs River alluvium aquifer, for assessing climate change impacts on the water resources in the alluvium aquifer.
- Mapping the potential for rainwater harvesting in Jamaica

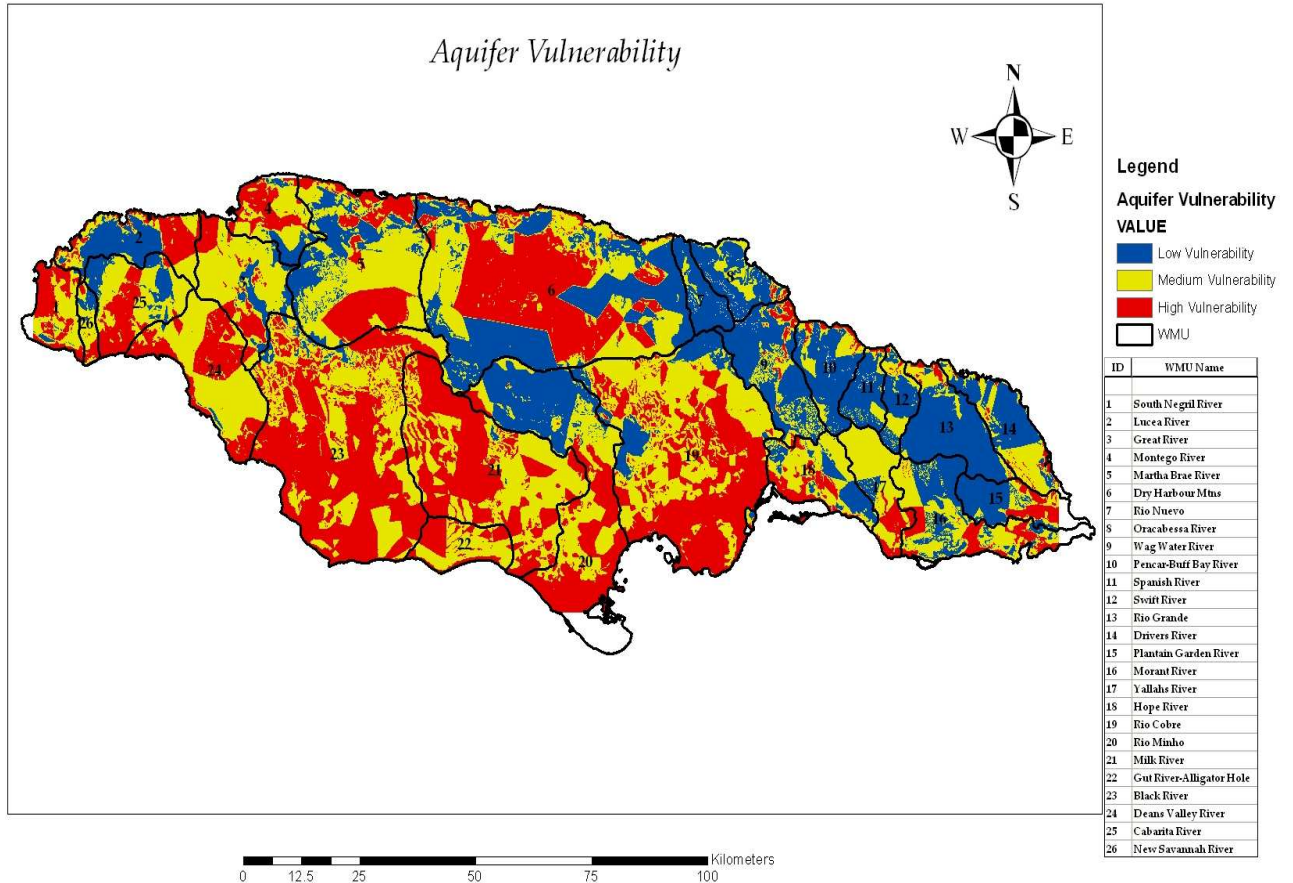
AQUIFER VULNERABILITY MAPPING AND THE IDENTIFICATION OF WATER QUALITY CONTROL ZONES.

The aim of this project is to develop a groundwater information system for the hydrological basins across the island. It is proposed to employ the groundwater information system to formulate aquifer protection zones and identify and delineate water quality control zones within each basin. A modified DRASTIC approach in conjunction with the use of ARCVIEW was used in the mapping of aquifer vulnerability.

DRASTIC is a groundwater quality model for evaluating the pollution potential of large areas using the hydrogeologic settings of the region. This model employs a numerical ranking system that assigns relative weights to various parameters that help in the evaluation of relative groundwater vulnerability to contamination. In the determination of the vulnerability of the aquifer, the DRASTIC methodology include various factors such as [D] Depth to water table,[R] Recharge (Net),[A] Aquifer Media,[S] Soil Media,[T] Topography (Slope),[I] Impact of Vadose Zone and [C] Conductivity (Hydraulic) have been collated. Each factor has been assigned a weight based on its relative significance in affecting the pollution potential.

A draft vulnerability map has been produced for the island (Fig. 1). The map produced outlines the areas that exhibit low, medium and high vulnerability. The map has been reviewed and is currently being revised.

Fig.1 Aquifer vulnerability Map of the island



ASSESSMENT OF THE WATER RESOURCES OF THE CABARITA HYDROLOGIC BASIN.

This project is a collaborative project between the WRA and the National Water Commission (NWC) and it is aimed at assessing the Water Resources of the Cabarita Hydrologic Basin (Fig. 1). The major tasks include quantification of water inputs, outputs and storage; determination of groundwater safe yield and reliable streamflow; assessment of the status of the water quality, forecasting of water sector demands, identification of trends and relationship between hydrologic data and water availability.

An assessment of the water demand indicated that Environmental Demand represented the sector with the highest demand followed by municipal water demand, then demand for irrigation. A review of the availability vs. demand within this basin indicated that there is no existing and projected water deficit for this basin (Table 2).

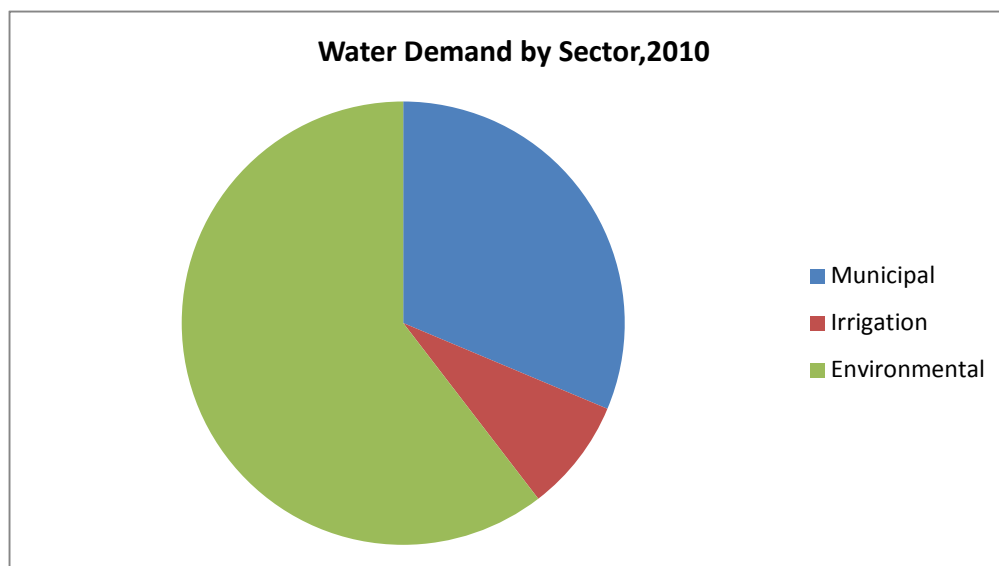


Fig 2. Water Demand by Sector

Sector Demand	Water Demand	
	Mm3/yr	Percentage (%) Water Demand
Municipal	11.4	31
Irrigation	3	8
Environmental	22	60

Table 1- Sectoral Water Demand

WMU's of the Cabarita Basin	Sector Demand				Available Resources			Percent age Deficit/ Surplus
	Municipal	Irrigation	Environmental	Total	Reliable Surface Water	Safe Ground Water	Total Resources	
Deans Valley	4	1.1	0.4	5.5	4.1	60.4	64.5	8.5
Cabarita River	3.8	1.9	20.6	26.3	108.8	143.5	252.3	10.4
New Savannah River	0.7	0	0.1	0.8	0.5	41.5	42	1.9
S. Negril-Orange River	2.9	0	0.9	3.8	5.7	57.3	63	6.0

Units Million cubic meter/year

Table 2- Water Resources Surplus/Deficit -2010

It was noted that when the results of the water quality sampling conducted on May 2009 (Fig. 3) was compared with the IJAM Drinking Water Standard only five (5) surface water sources met the IJAM Standard. These sources are located in the Deans Valley River Subwatershed Management Unit. The parameter that did not meet the standard were predominantly the pH which consistently fell in the 6.3-6.9 range which is below the lower IJAM limit of 7.

Fig. 3 Map showing distribution of sample points - May 2009

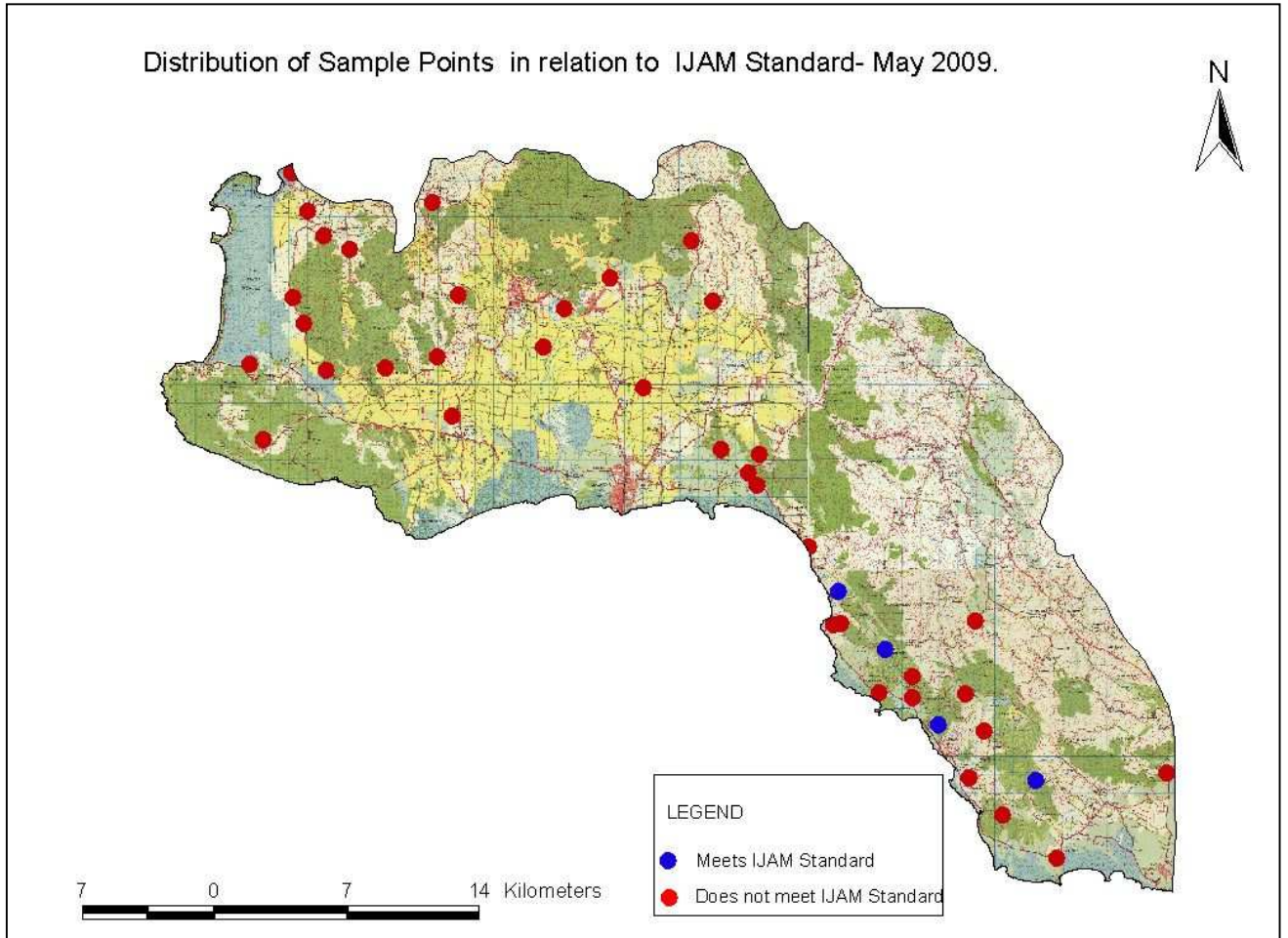
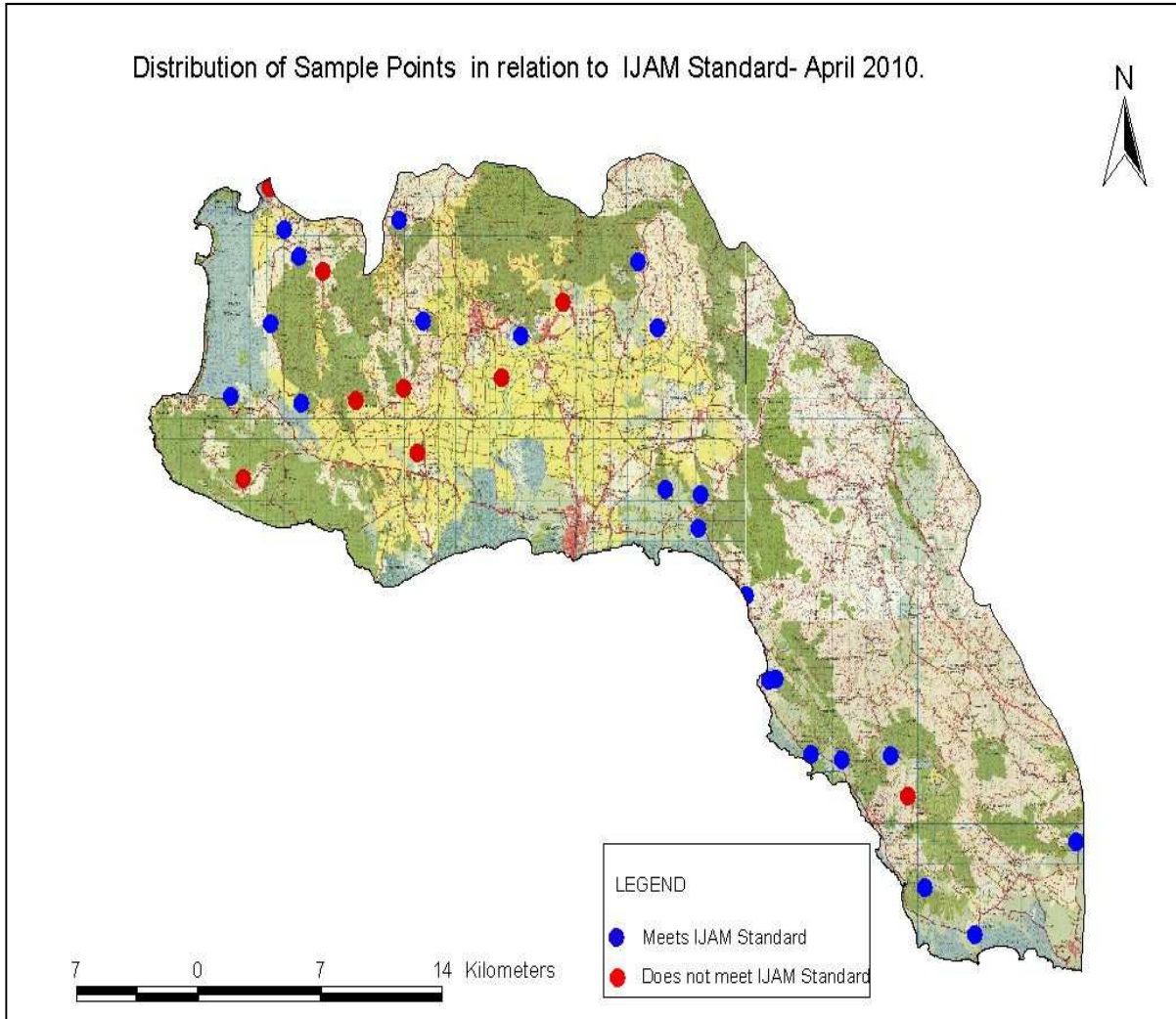
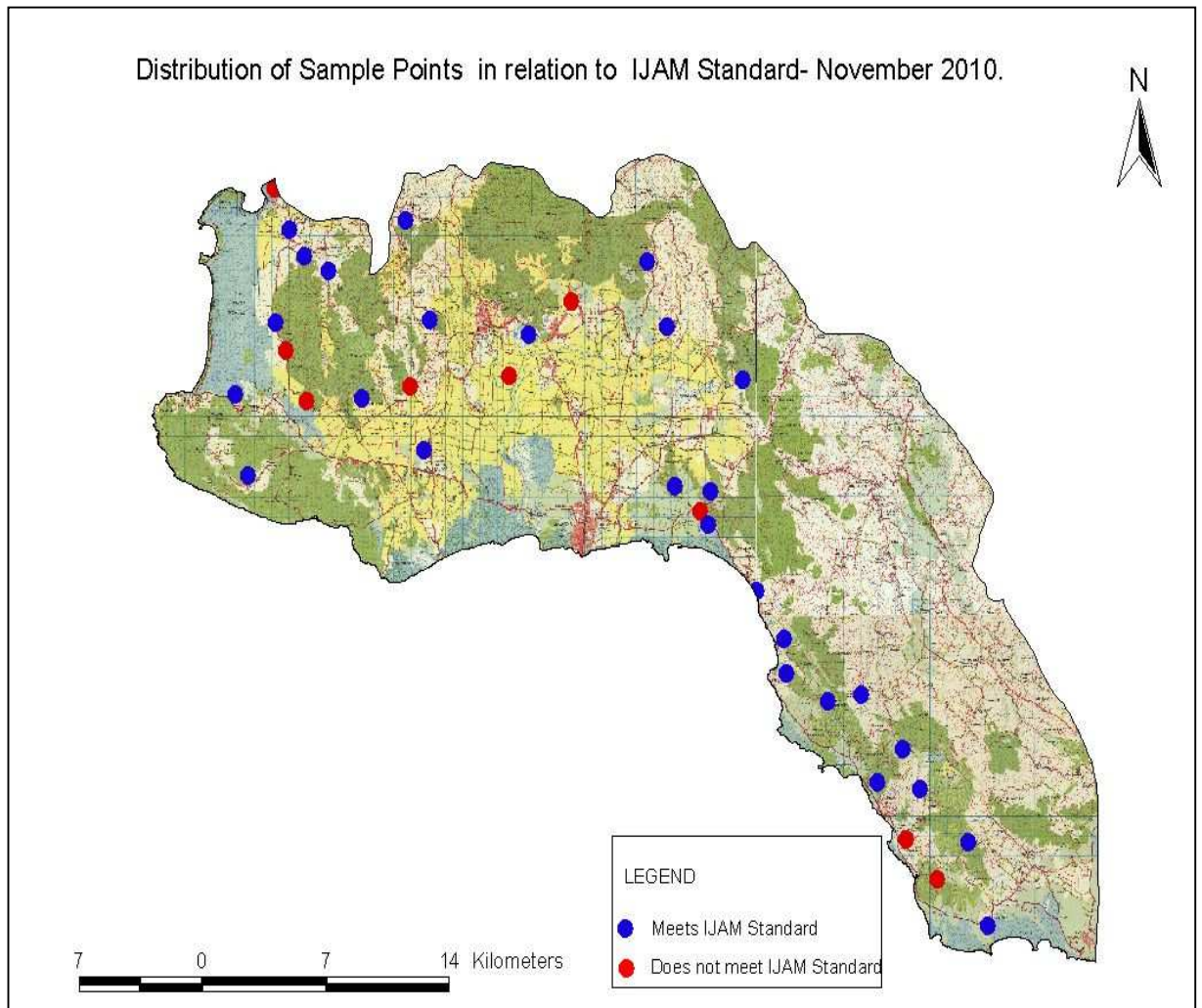


Fig. 4: Map showing distribution of sample points - April 2010



A review of the second set of water quality results in April 2010 indicated that thirty (30) of the samples met the IJAM Water Quality Standard. Of the 30 sample sets 10 were groundwater sources and 20 were surface water sources. The parameters that did not meet the IJAM Standard were pH and Manganese.

Fig. 5 MAP showing distribution of sample points- November 2010



The third water quality results indicate that only 9 sample points did not meet the IJAM Standard. These sources were predominantly groundwater sources where the level of Manganese was higher than the upper IJAM limit of 0.05mg/l.

DEVELOPMENT OF A GROUNDWATER MANAGEMENT MODEL OF THE YALLAHS RIVER ALLUVIUM AQUIFER, FOR ASSESSING CLIMATE CHANGE IMPACTS ON THE WATER RESOURCES IN THE AQUIFER.

Background

UNESCO-IHP, IMET and the WRA are involved in a project which seeks to assess the water resources of the Alluvium Aquifer of the Yallahs River WMU and to determine the possible impacts of climate change on these resources.

The Alluvium Aquifer of the Yallahs WMU covers about 22 km² or slightly over 11% of the WMU. The available water resources of the WMU have been quantified at 82.7 Mm³/yr of which 29 Mm³/yr is currently being abstracted.

The southern section of the aquifer is bounded by the coast (Fig.) and this is the area in which most of the wells are located. Because of this there is the need to determine the safe yield of the aquifer to safeguard against over pumping of the aquifer which may lead to seawater intrusion. Due to the coastal nature of the aquifer, the impact of climate change i.e. sea level rise and variability in rainfall patterns will have serious impact on the availability of fresh water resources.

A Model using the software MODFLOW was developed to simulate the actual conditions existing in the aquifer. Climate data, topographic elevation, water levels, wells, boundary conditions and aquifer parameters were entered into the software. The Model was run to reflect steady-state conditions. A graph of the simulated water levels can be seen in Fig.7 A graph indicating the error between the actual water levels and that calculated by the model can be seen in Fig.8; the correlation coefficient is 0.89. The Model input parameters are currently being modified to obtain a better correlation coefficient.

Fig. 6 Monitoring Network- Yallahs Basin

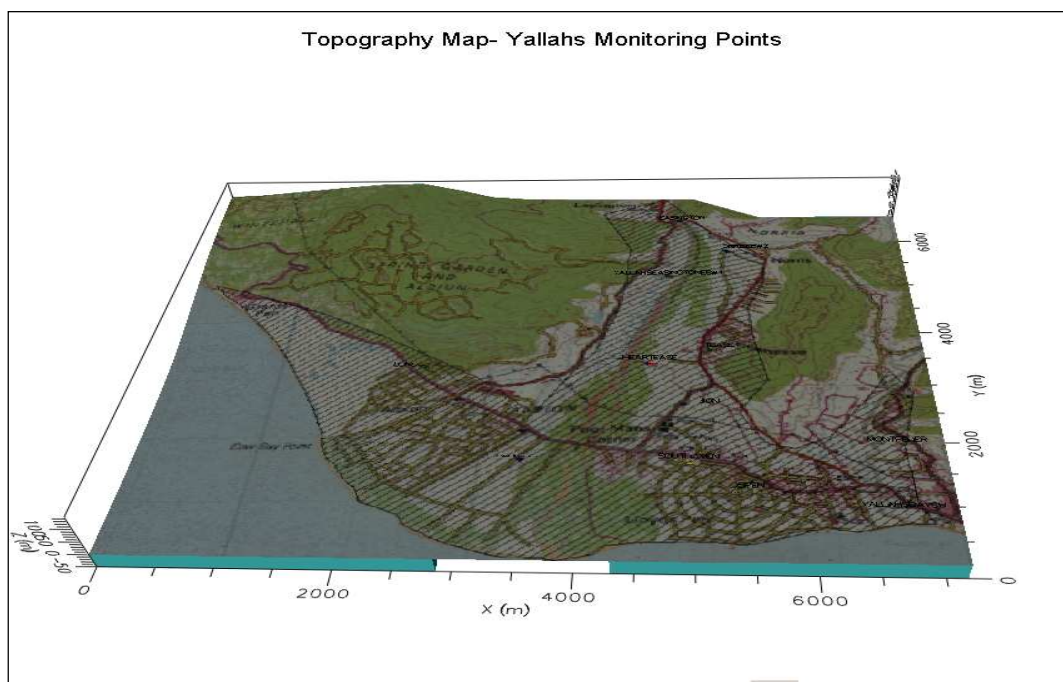




Fig. 7 Simulated groundwater levels produced by the MODFLOW Model

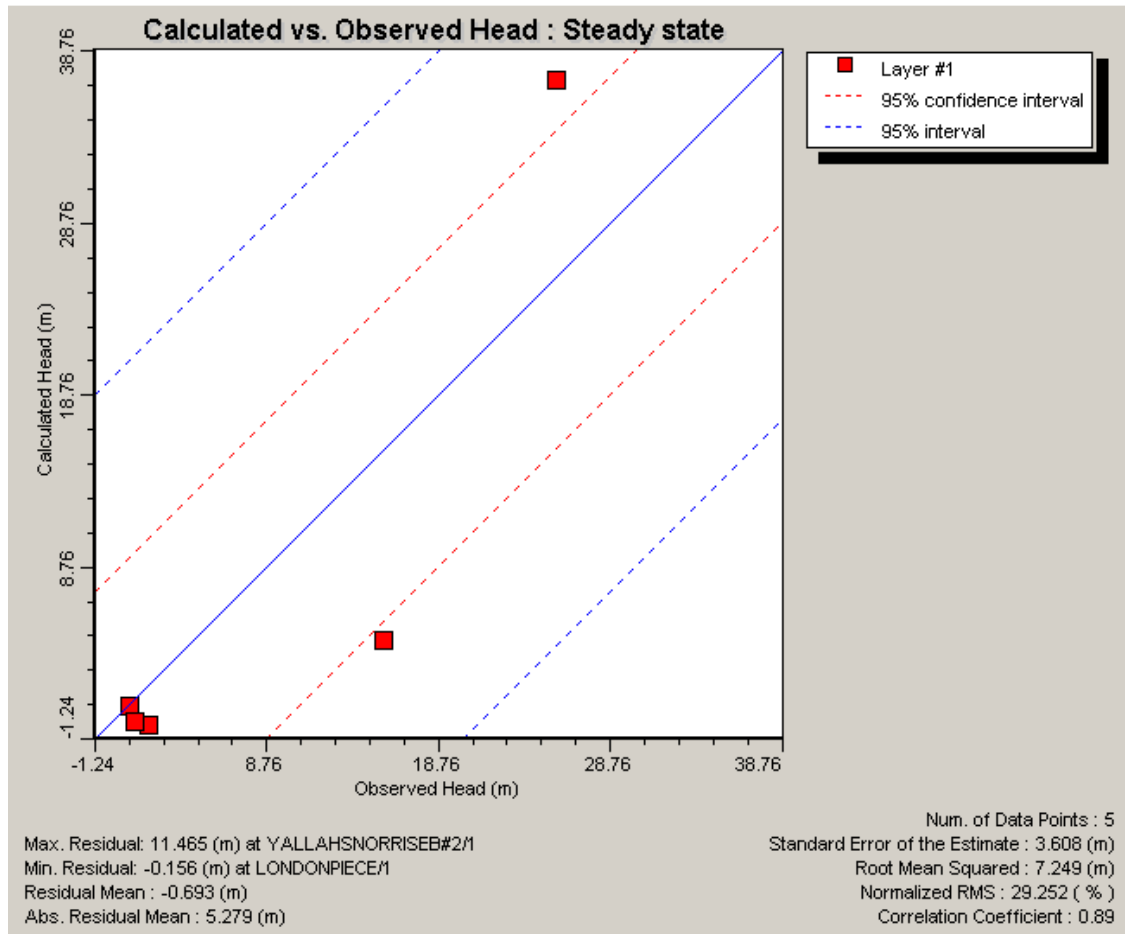


Fig. 8 Calculated vs. Observed Head- Steady State

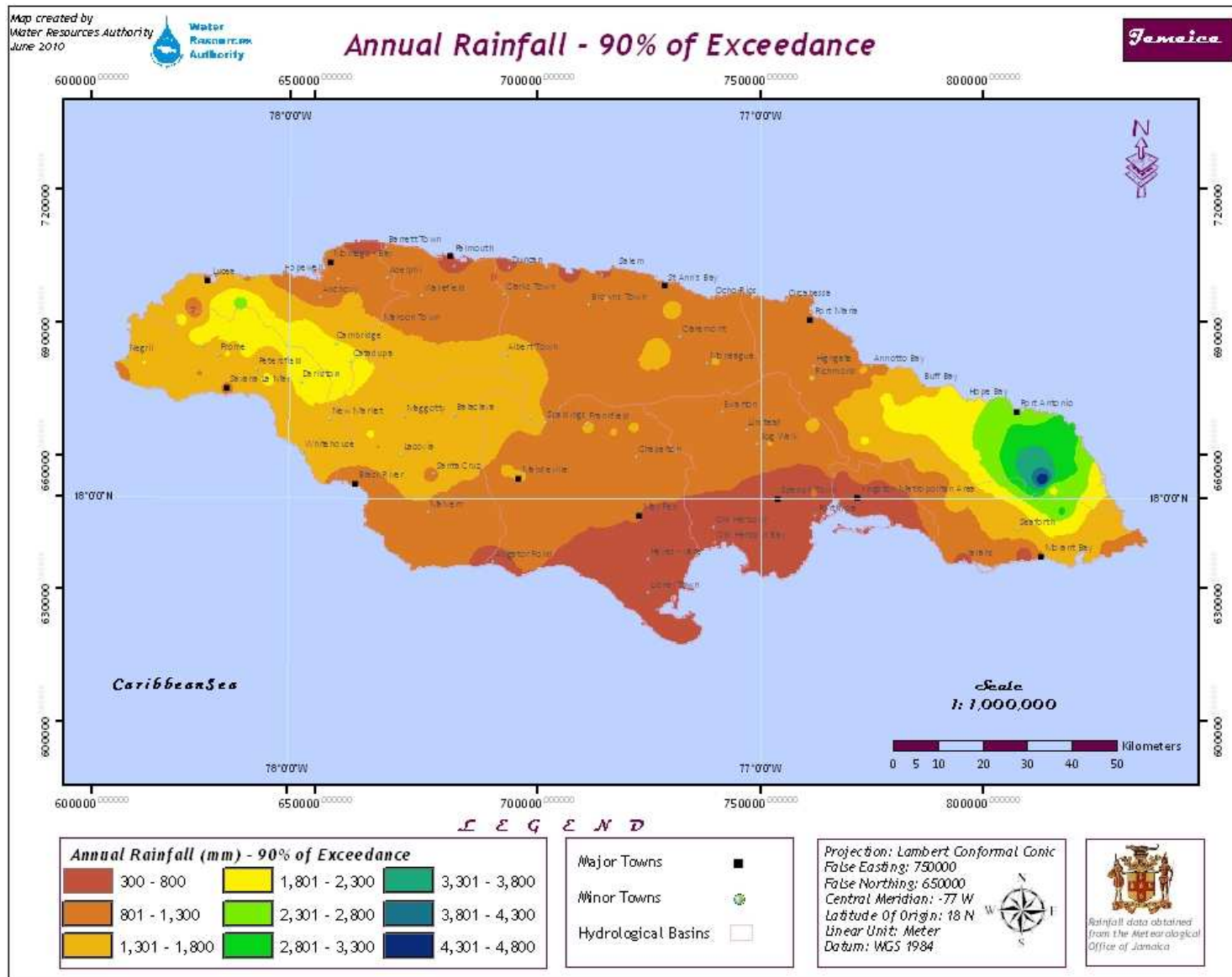
MAPPING THE POTENTIAL FOR RAINWATER HARVESTING IN JAMAICA

The Rainwater Harvesting Project is aimed at determining the potential to harvest rainfall across the island. Some of the objectives include the development of a GIS database of RWH potential in each hydrologic basin of Jamaica for selected RWH technologies (Rooftop RWH and Surface runoff RWH) and to provide basin level GIS database showing RWH potential.

The approach to meeting these objectives includes 1) the production of a rainfall reliability map for the island and 2) establish methodology for mapping the rainwater harvesting potential.

The RAINBOW software has been identified as being the most suitable to determine the rainfall reliability with a 50 %, 75 % and 90% probability (See Figures 3-5). It was decided to use the 90% probability to calculate the storage requirement for each of the 380 rainfall stations across the island and the example of a storage requirement graph is shown below (Fig. 10) with explanatory notes.

Fig.9 Annual Rainfall Map-90% Exceedance



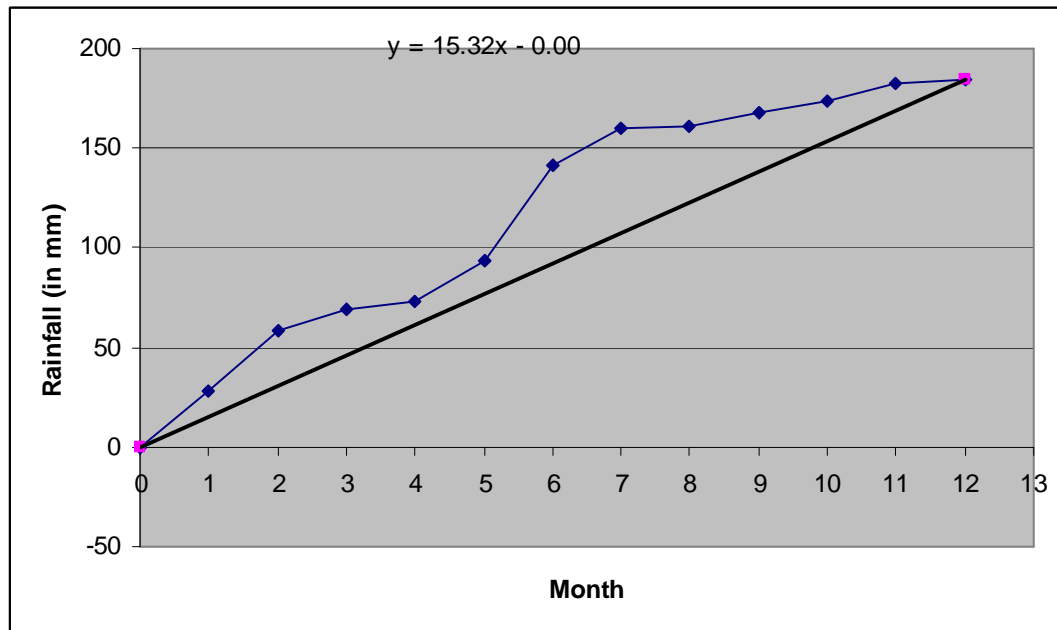


Figure 10. Graph showing cumulative rainfall harvested and average rate of draw-off (in the determination of storage requirements)

For Albert Town rainfall station in the Martha Brae hydrologic basin. The trendline illustrates average drawoff per month. The mass curve indicates that there is so seasonal deficit throughout the year. As a result the largest requirement for storage is equal to the maximum drawoff rate of **15.32 m³/month**. See the table below for the temporal distribution of annual rainfall.

Albert Town						
Month	Rainfall (mm)	Rainfall Harvested (m3)		Cumulative rainfall harvested	Drawoff line	Deficit
			0	0	0	0
April	222	27.7722	1	27.7722	15.32475	12.44745
May	247	30.8997	2	58.6719	30.6495	28.0224
June	84	10.5084	3	69.1803	45.97425	23.20605
July	34	4.2534	4	73.4337	61.299	12.1347
August	164	20.5164	5	93.9501	76.62375	17.32635
September	378	47.2878	6	141.2379	91.9485	49.2894
October	146	18.2646	7	159.5025	107.27325	52.22925
November	9	1.1259	8	160.6284	122.598	38.0304
December	56	7.0056	9	167.634	137.92275	29.71125
January	49	6.1299	10	173.7639	153.2475	20.5164
February	66	8.2566	11	182.0205	168.57225	13.44825
March	15	1.8765	12	183.897	183.897	0

Table 3. Calculation of Storage Requirement for a typical household of 5.

HYDROLOGICAL ASSESSMENTS

The Unit conducted hydrological assessments for both private and public sector agencies

Organization	Description of Task/Request
Government	Hydrological assessment of the Appleton Spring – St. James
Government	Hydrological investigation of springs at Gutter and Wales Pond – St. James
Government	Hydrogeological assessment of the Colbeck Machado- St. Catherine
Government	Conduct hydrogeological assessment of the Marine Terminal Replacement Well- Proposed source for the Longville Housing Scheme
Government	Hydrological assessment of springs at Maybole and Ginger Hill – St. Elizabeth
Government	Hydrogeological assessment of a well at Friendship- St. Elizabeth
Government	Hydrogeological assessment of The Caymanas Well – St. Catherine
Government	Hydrogeological assessment of the Cotton Tree and Wakefield Wells – St. Catherine
Government	Water Resources Development option to determine a water source to irrigate field at Greenfield - Trelawny
Government	Hydrogeological investigation into the cause of flooding at Lime Hall- St. Ann
Government	Hydrological investigation of the Nodewood Spring - St. James
Government	Hydrological investigation of surface sources at Canewood/Black Hill- Portland
Government	Hydrogeological assessment of Mile Gully- Manchester
Government	Hydropower feasibility studies of the Great River- St. James
Government	Hydrological investigation of a spring at Free Hill- St. Ann
Government	Hydrological investigation of a well at Lydford- St. Ann
Government	Hydrogeological investigation and well siting at Pepper- St. Elizabeth.
Government	Hydrological assessment to determine the reliability of a spring at White Hall- St. Thomas
Government	Hydrogeological investigation of groundwater resources to supply a Housing Development at Longville Park- Clarendon
Government	Hydrogeological investigation of the Coolshade Spring- St. Ann.

Hydrological Assessments 2010/2011 continued

Organization	Description of Task/Request
Private	Hydrological assessment of a spring at Cave Valley- Westmoreland
Private	Hydrological assessment of a spring at Shettlewood- St. James
Private	Hydrological investigation of spring sources at Mount Rosser/Ewarton- St. Catherine
Private	Well investigation at Escher- St. Mary
Private	Hydrological assessment of springs at Accompong – St. James
Private	Hydrological investigation of spring sources at Mount Rosser/Ewarton- St. Catherine
Private	Hydrological investigation of groundwater resources in the vicinity of Rio Minho- Clarendon.
Private	Hydrogeological assessment in the vicinity of Temple Hall- St. Mary
Private	Hydrogeological information for Mango Valley- St. Mary.
Private	Hydrological assessment of a spring at Garlands- St. James
Private	Hydrogeological assessment to investigate the upwelling of water at New Bowens -Clarendon
Private	Hydrogeological assessment to investigate the upwelling of water at Bull Bay- St. Thomas
Private	Hydrological assessment of a spring at Montpelier- St. James
Private	Hydrological assessment of a spring at Reading St. James
Private	Hydrological investigation of a spring at Rowlandsfield- St. Thomas

TECHNICAL ASSISTANCE/ TECHNICAL SUPPORT

The Unit offered Technical assistance/ Technical Support to several government agencies and private sector organizations in support of national development. Some of the investigations required a long-term support from the WRA staff. The unit responded to seventy-one (71) such requests. It must be noted that there has been a consistent increase in requests from the National Housing Trust and the Rural Water Supply Ltd. where these organizations have requested the WRA's input in determining the feasibility of establishing housing developments and identifying potential abstraction sites

Government	Provided hydrogeological information for a proposed housing development site at Salisbury- St. Mary
Government	Provided hydrogeological information for a proposed housing development site at Hodges- St. Elizabeth
Government	Provided hydrogeological information for a proposed housing development site at Robins River- St. Mary
Government	Provided hydrogeological information for a proposed housing development site at Merrywood/Top Hill- Trelawny
Government	Provided hydrogeological information for a proposed housing development site at Robins River- Westmoreland
Government	Provided hydrogeological information for a proposed housing development site at Corletts Road – St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Caswell Farm, Cremona and 164 Brunswick Avenue– St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at 27 Jobs Lane – St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Crooked River – St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Gibraltar – St. Mary
Government	Provided hydrogeological information for a proposed housing development site at Seville Tenement – St. Ann
Government	Provided hydrogeological information for a proposed housing development site at Angels 1-St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Vanzie Lands – Trelawny
Government	Provided hydrogeological information for a proposed housing development site at 25 Penwood Road –St. Andrew
Government	Provided hydrogeological information for a proposed housing development site at Pemberton Valley- St.Mary
Government	Provided hydrogeological information for a proposed housing development site at Rosetown- St. Andrew
Government	Provided hydrogeological information for a proposed housing development site at Whitehall- Westmoreland
Government	Provided hydrogeological information for a proposed housing development site at Snow Hill- Portland

Government	Provided hydrogeological information for a proposed housing development site at Crooked River – St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Pemberton Valley- St. Mary
Government	Provided hydrogeological information for a proposed housing development site at Dundee- Trelawny
Government	Provided hydrogeological information for a proposed housing development site at Angels 1-St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at 25 Penwood Road –St. Andrew
Government	Provided hydrogeological information for a proposed housing development site at Pemberton Valley- St.Mary
Government	Provided hydrogeological information for a proposed housing development site at Rosetown- St. Andrew
Private	Provided hydrogeological information in the vicinity of Sandals- Montego Bay, St.James
Private	Provided hydrogeological information for a proposed Housing Development at Balaclava- St. Elizabeth.
Government	Provided hydrogeological information for a proposed housing development site at Hartfield and Ironshore- St. James
Government	Provided hydrogeological information for a proposed housing development site at Green Park – Clarendon
Government	Provided hydrogeological information for a proposed housing development site at Longville Phase IV- Clarendon
Government	Provided hydrogeological information for a proposed housing development site at Jobs Lane- St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Whitewing- St. Andrew
Government	Provided hydrogeological information for a proposed housing development site at Bottom Pen- St. James
Government	Provided hydrogeological information for a proposed housing development site at Canterberry- St. James
Government	Provided hydrogeological information for a proposed housing development site at Saltspring- St. James
Government	Provided hydrogeological information for a proposed housing development site at Angels #1- St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Seville- St. Ann
Government	Provided hydrogeological information for a proposed housing development site at 28 Penwood Road- Kingston
Government	Provided hydrogeological information for a proposed housing development site at Vanzie Land- Trelawny
Government	Provided hydrogeological information for a proposed housing development site at Crooked River Caswell Farm- St. Catherine
Government	Provide information such as water level, water quality, hydrogeology etc for input into a proposed Parish Development Plan for St. Thomas
Government	Provided hydrogeological information for a proposed housing development site at Gibraltar – St. Mary
Government	Provided hydrogeological information for a proposed housing development site at Spanish Village- St. Catherine

Government	Provided hydrogeological information for a proposed housing development site at Whitehall- Westmoreland
Government	Provided hydrogeological information for a proposed Marine Park in Ocho Rios- St. Ann.
Government	Provided hydrogeological information for Sheekles Pen- Clarendon.
Government	Provided hydrogeological information for Port Royal and Kingston.

Government	Provided data on wells in the vicinity of Caymanas- St. Catherine and its Environs.
Government	Provided hydrogeological information for on the Wallens Well in St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Salisbury- St. Mary
Government	Provided hydrogeological information for a proposed housing development site at Hodges- St. Elizabeth
Government	Provided hydrogeological information for a proposed housing development site at Robins River- St. Mary
Government	Provided hydrogeological information for a proposed housing development site at Merrywood/Top Hill- Trelawny
Government	Provided hydrogeological information for a proposed housing development site at Robins River- Westmoreland
Government	Provided hydrogeological information for a proposed housing development site at Corletts Road – St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Caswell Farm, Cremona and 164 Brunswick Avenue– St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at 27 Jobs Lane – St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Crooked River – St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Gibraltar – St. Mary
Government	Provided hydrogeological information for a proposed housing development site at Seville Tenement – St. Ann
Government	Provided hydrogeological information for a proposed housing development site at Angels 1-St. Catherine
Government	Provided hydrogeological information for a proposed housing development site at Vanzie Lands – Trelawny
Private	Provided hydrogeological information for Spanish Town Road and its Environs.
Private	Provided Hydrogeological information for sections of St. Catherine, Kingston and Manchester.
Private	Provided water level and water quality data on wells in St. Thomas.
Private	Provided hydrogeological information for a property on 89 Half Way Tree Road- St. Andrew
Private	Provided hydrogeological information for a proposed development site at Mezgar Content -St. Thomas

Private	Provided hydrogeological information for a property on Hagley Park Road- St. Andrew
Private	Provided hydrogeological information for Marcus Garvey Drive area of Kingston
Private	Provided hydrogeological information for Spanish Town- St. Catherine
Private	Provided hydrogeological information for a property at Mango Valley- St. Mary

DATA PROVISION

The unit responded to three (3) requests for hydrologic data. The requests were from government and private agencies. The table below summarizes the data that was made available.

Government	Provided data on wells in the vicinity of Caymanas- St. Catherine and its Environs.
Government	Provided hydrogeological information for on the Wallens Well in St. Catherine
Private	Provided water level and water quality data on wells in St. Thomas.

Members of the Planning and Investigation Unit



Front-Angella Graham-Unit Head; Shonel Dwyer and Anika Sutherland.

Back-Geoffrey Marshall, Michael Wilson and Donald Hardware

WATER QUALITY AND ENVIRONMENT UNIT

REVIEW OF ENVIRONMENTAL PERMIT APPLICATIONS

The Unit continues to pursue the objective of protecting water quality by reducing the risk of contamination which could be caused by development activities. As one of the *commenting agencies* in the development application review process, the Water Quality and Environment Unit, received, reviewed and commented on a total of three hundred and eight (308) development applications during this year. Of the total number of applications received, 92% (284) were reviewed and comments dispatched within the requisite thirty (30) day period.

The Unit continues to be constrained by the human resource limitations; however our role in the development application review process is deemed a priority and treated as such. The consequence is that other projects/ programmes which should be advanced by the Unit have either progressed very slowly or have been deferred.

BAUXITE ALUMINA INDUSTRY – SHUT DOWN MODE

At the start of this period, operations at three (3) bauxite/alumina processing plants across the island were shut down. An inter-agency committee was established to oversee and guide the process and activities associated with the closure period. The Unit was directly involved with the Environmental Monitoring Group which had responsibility for ensuring that personnel, operating procedures and necessary resources were put in place to properly monitor and manage waste disposal facilities, during the shut down phase. Routine monitoring of ground and surface water quality and effluent containment systems (i.e. mud lakes and effluent holding ponds) was a requirement. The management strategy for reporting and monitoring during rainy periods was also reviewed in preparation for the rainy seasons.

One of the three alumina plants, Ewarton Works re-opened during this year; consequently several meetings were convened to brief and familiarize the new staff of the alumina company with the environmental management procedures/requirements.

TROPICAL STORM NICOLE - WATER POLLUTION ISSUES

During heavy rainfall events, factories/facilities which operate open wastewater holding ponds are faced with the challenge of maintaining levels below the designed spillways. Often the holding ponds overflow and the effluent reports to sinkholes, rivers and gullies. The threat is contamination of both ground and surface water resources, threatening the integrity of domestic water supply sources and aquatic ecosystems.

During the months of September and October 2010, heavy rains associated with Tropical Storms Nicole created several water pollution incidents at bauxite/alumina facilities and rum distilleries.

The primary pollutant from alumina plants is caustic effluent and caustic red mud, characterized by high pH >10.5 units (alkaline) and high sodium concentrations > 5,000mg/l. The high pH in

river systems can lead to fish kills. High pH is also unacceptable for drinking water treatment plants.

Dunder is a brown liquid organic waste of very high strength, generated from the rum distillery process. It is characterized by a pungent odor and when released into ground or surface waters, reduces oxygen levels in receiving waters and often results in fish kills or degraded aquatic ecosystems.

For each facility/factory, there are established monitoring and reporting procedures aimed at ensuring that all relevant regulatory agencies are informed, the level of impact is assessed and appropriate mitigation measures are instituted in a timely manner.

For the Rio Cobre Basin the Unit was instrumental in monitoring the relevant sites at the Windalco Ewarton Works, evaluating the status of the waste ponds, recommending mitigation strategies to minimize the negative impacts, as well as communicating with the relevant downstream users including the National Water Commission (NWC) and National Irrigation Commission (NIC). Through effective communication and timely updates to all key stakeholders, the impact of the pollution incidents on domestic supplies was minimal. Representatives of the Unit attended several meetings to address the related issues: meetings were held with regulatory agencies, the political directorate, the alumina and rum industries and the affected communities.

Alumina Plant at Jamalco, Hayes, Clarendon

Caustic effluent from the Storm Lake (see photo below) overflowed via the designed spill-way and entered the Webbers Gully, which flows to the Rio Minho.

The Rio Minho River into which the Webbers Gully flows was in spate (high flows) at the time resulting in significant dilution of the contaminants. As such the tests and observation of the river system suggested no evident negative impact.



Photo taken- Oct 2, 2010

Storm Lake:
Stores caustic contaminated runoff water emanating from within the Jamalco alumina plant, Hayes, Clarendon



Storm Lake:
Showing spill-way with significant free board at the time the photograph was taken – Oct 2, 2010

Rio Minho was experiencing high flow contributing to dilution of the wastewater.

Photo taken- Oct 2, 2010

Alumina Plant at Winalco Kirkvine, Manchester

Caustic effluent escaped from a small holding pond (East Pond), flowed out of the plant site, across the main road to Shooters Hill and into a sinkhole in the Content community. Quick action was taken by Winalco to stop this escape of effluent. The pond was pumped to reduce water levels and a berm constructed to block the outflow.

Alumina Plant at Winalco Ewarton, St Catherine

The Effluent Holding Pond that collects caustic effluent runoff from the drying beds at the Mud Stacking and Drying site at Ewarton Works overtopped the spillway, releasing caustic effluent to the Old John and Byndloss Gullies which drain to the Rio Cobre. The NWC Spanish Town Water Treatment plant is located down gradient of this site and receives water from the National Irrigation Commission's (NIC) main canal below the Rio Cobre diversion dam. The farmers and other users of irrigation water from the NIC canal were also at risk from this incident.



Caustic Effluent in the Holding Pond at Ewarton Works, Charlemont, St Catherine Exceeds its holding capacity and overflows via the spillway. Sand bags used to obstruct flow through the spillway. Photo taken October 2010

In response to the pollution incident, several meetings were convened to discuss the short, medium and long term plans of Winalco for managing and containing its wastewater and reducing the likelihood of pollution incidents. To date, despite these meetings, an effective strategy for containing wastewater during expected rainy seasons has not been proposed or implemented. The reasons cited are cost factors and short term planning horizons of the company.



Another Contaminated Wastewater Stream from Ewarton Alumina Plant flows through Jericho, St Catherine. The contaminated stream is being diluted by Winalco's Well water as it flows toward the Rio Cobre.
Photo taken October 2010

Alumina Plant at Alpart, Nain, St Elizabeth

September 30, 2010 when contacted by government regulators, Alpart advised of breaches which had occurred at two sections of their waste containment system; the Collection Basin and the Western Expansion of the mud lake. The Collection Basin overflowed near the spillway, releasing effluent which flowed to a sinkhole.

The requisite sampling of designated monitoring wells was not conducted and Alpart was instructed to effect monitoring including sampling of monitor wells immediately.

Collection Basin at Alpart, Nain St Elizabeth



Photo taken- Oct 2, 2010

Collection Basin at Point of Breach



Sand bags used to block outflow of effluent from the Collection Basin

Photo taken- October 2, 2010

Rum Distillery at Appleton, St Elizabeth

As far back as 2001, the Water Resources Authority advised that the Nassau Valley, the area in which Appleton Rum Distillery and the dunder holding ponds are located, is a natural flood plain for the rivers which flow through it; Black River and One Eye River and as such, open wastewater ponds and high strength organic waste applied to cane fields, would present an unacceptably high risk of contamination of water resources. The rains during this year, again, highlighted the pollution risk associated with the vulnerability of this area to flooding. The dunder ponds were observed to overflow on two separate occasions during this year. The second incident resulted in extensive flooding of the entire area around the holding ponds, as the rivers overtopped their banks and for several days the area was inundated.



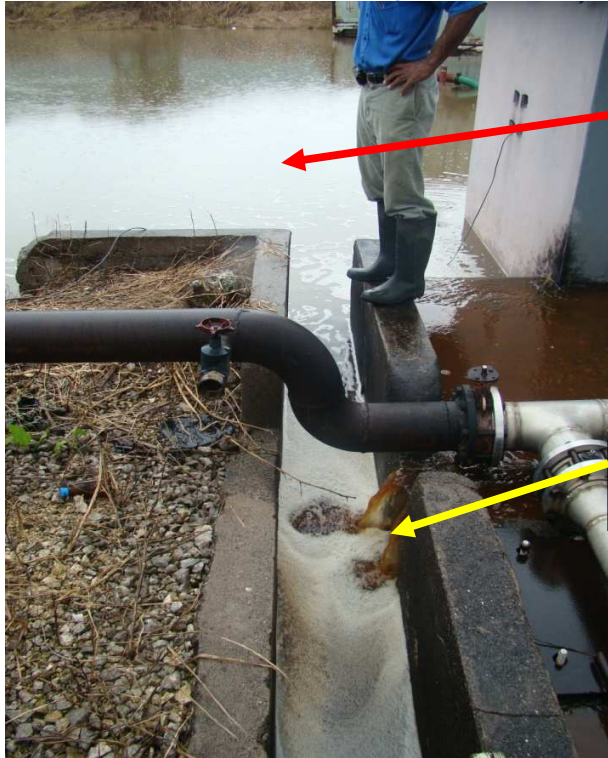
*Dunder Ponds Exceed Design Holding Capacity and Spill To the Environment
Photo Taken July 2010*

Dunder Holding Pond Full & Overflowing



Photo taken- October 2, 2010

Dunder Holding Pond Overflowing



Flooded open area around holding pond. Dunder spreads into this body of standing water.

Dunder flowing out of the holding pond



Dunder Holding Ponds.

Surrounding area completed flooded

Photos taken- Oct 2, 2010

Tanker trucks were used to draw down the level of the wastewater in the pond and the dunder was transported to the New Yarmouth rum distillery in Clarendon and stored in the newly constructed wastewater (dunder) holding ponds.

On the instruction of the Office of the Prime Minister, a permit was issued to Appleton for the construction of two new dunder holding ponds at Appleton and a license to discharge untreated dunder to the canefields (referred to as ferti-irrigation). Further, a decision was taken during this year to establish what is referred to as the Sugarcane Industry Regulatory Committee comprised of eleven (11) agencies (SIRI, NEPA, RADA, PCA, NIC, WRA, EHU, NLA, RPPD, EMD/OPM and Spirits Pool Association SPA). The Draft Terms of Reference indicates that this committee is expected to be the primary oversight body for the industry, with functions including monitoring sugar factories and rum distilleries, assessment of impacts, providing technical guidance, preparing progress reports, providing trouble shooting options and others. During the fourth quarter, the committee has met four (4) times and several subcommittees/working groups have been named to address areas including Land Use & Zoning, Waste Management, Policy, Research and Compliance.

It is interesting to note that the sector being regulated by this committee is also a member of this committee and acts as Chair of one of the working groups. Concern was expressed by WRA to NEPA regarding the conflict of interest.

Sugar Factory at Appleton, St Elizabeth

Approximately eight (8) cane wash ponds are constructed behind the sugar factory and designed to effect some level of treatment of wastewater generated by the sugar factory. Several of these ponds have been completely inundated by the overflow from the Black River and there is no distinction between the river and the holding ponds. (See photo below showing a single body of water spread over a large area, including the canefields).



Several Cane Wash Ponds Behind Sugar Factory at Appleton Completely Inundated by overflow from Black River

Photo taken October 2, 2010

MOUNT ROSSER MUD LAKE CLOSURE PROJECT

The Mt Rosser Red Mud Lake, an abandoned waste containment facility of the alumina plant at Ewarton, is to be formally closed as a waste storage site. As such an environmental permit was obtained and work to close the facility commenced.

The Unit was integral in the development of guidelines, standards and monitoring programmes related to the closure of the Mt Rosser Waste Containment Facility and during this year several meetings and site visits were conducted to monitoring the closure activities and assess the impact of the activities on ground and surface water quality.

Generally, the closure activities have been progressing well and the company (Rio Tinto Alcan) has adhered to the established guidelines, monitoring and reporting requirements.

Mt Rosser Mud Lake, St Catherine- Effluent Levels Continue to Fall Exposing More Mud



Photo taken April 2011

Mt Rosser Mud Lake, St Catherine



Islands
emerge and
expand as
effluent
levels fall
within the
Mt Rosser
mud lake

Photo taken April 2011

ALPART MUD LAKE CLOSURE PROJECT

Through several written communications, the Authority has been insisting that the work related to closure of the abandoned red mud pond and other waste containment facilities at Alpart commence, as closure work has been long overdue. During this year, there were further technical reviews of Closure Plans, which were previously deemed unsatisfactory in terms of the approach being proposed by the company. The Unit continued to attend several meetings to highlight the inadequacies of the plan and to press for agreement on appropriate i.e. environmentally sound closure. Coming out of the meetings there was some agreement on the way forward and some closure activity/work has commenced.

The Unit continues to participate in the review and monitoring of the closure activities.

TERTIARY (TREATMENT OF SEWAGE) ZONES- A WATER QUALITY PROTECTION STRATEGY

One of the more significant threats to the quality of Jamaica's freshwater (ground and surface waters) as well as coastal marine waters, is the inadequate treatment and disposal of sewage.

Onsite sewage systems are by far the most common means of sewage disposal in Jamaica, as approximately 82% of the population treats and disposes of sewage via onsite systems. Central sewage will remain impractical due to the economics for the vast majority of the population for several years to come. Therefore, efforts to address the problem must include the 82% of the population served by onsite sewage systems.

Before the 1990s, onsite sewage systems in Jamaica, usually provided primary level treatment and the methods of treatment were limited to a) absorption pits b) a combination of septic tank followed by absorption pit for homes with piped water and c) dry pit latrines for homes without piped water. In several areas across the island, these primary level treatment systems, absorption pits in particular, have been deemed inadequate for the protection of drinking water sources, springs/streams and groundwater quality and even coastal marine water quality.

In an effort to reduce the risk of water contamination as well as the risk to public health, a higher level of sewage treatment, (i.e. tertiary) is being recommended in designated areas. These designated areas are being referred to as tertiary zones.

During this year the Unit continued to research and examine several methods and approaches used to delineate these spatial units/zones, and commenced the application of a methodology for establishing zones designated as requiring the treatment of sewage to the tertiary level.

This proposed water quality protection strategy requires that for any new development

- a) which has water closets (i.e. piped water supply to the building/toilets)
- b) which generates sewage to be disposed of onsite; and
- c) which is located within a *designated tertiary zone*

sewage should be treated to the tertiary level.

Work continued with developing tertiary zone maps for St Catherine and Kingston and St Andrew, however not much progress was made due to the human resource limitations and the priority given to the review of development applications.

DATA COLLECTION AND RESOURCE MANAGEMENT UNIT

The objective of the Data and Resource Management Unit is to provide timely and accurate hydrological data to guide decisions with regard to the allocation, conservation and protection of the island's water resources as well as to mitigate the impact of flood disasters and droughts.

The primary responsibilities of the Unit are as follows:

- a) To collect, analyze, compile, store and disseminate hydrological data
- b) To monitor the status of the island's surface and groundwater resources
- c) To update and maintain an accurate and reliable hydrological database
- d) To maintain the national hydrometric network
- e) To monitor and report on extreme hydrological events such as floods and droughts

The Unit was involved in the following activities during the financial year 2010/2011:

- ✓ The Routine monitoring of surface and groundwater under normal and extreme conditions
- ✓ The Maintenance, rehabilitation, upgrade and expansion of the national hydrometric network
- ✓ Improved licensing and control of water resources
- ✓ Response to requests for data and technical assistance
- ✓ Response to requests for technical training and educational support
- ✓ Strengthening technical capabilities through subject-specific training
- ✓ Participation in local/international seminars/workshops/conferences
- ✓ Celebration of special water/environment days
- ✓ Flood Warning Projects.

ROUTINE MONITORING OF SURFACE AND GROUND WATER UNDER NORMAL AND EXTREME CONDITIONS

The WRA, through its Data and Resource Management Unit, monitors the island's surface and groundwater resources with monthly visits to each monitoring point (stream gauging stations and monitoring wells) under both normal and extreme hydrological conditions. During extreme hydrological conditions, temporary monitoring points may be introduced and the frequency of monitoring may be increased at these temporary monitoring points as well as at permanent monitoring points to capture data for the analysis of the hydrological event and to advise the government and the general public as to the status of the event.

In addition to the monitoring of the surface and ground water resources, the WRA monitors nineteen (19) rainfall stations and seven (7) Flood Warning Systems across the island. The network of rainfall stations monitored by the WRA will be increased as soon as funds are available. The intention is to have at least one rainfall intensity station in each of the 26 Watershed Management Units (WMUs) covering the island.

Monitoring activities are organized into three monitoring areas as shown in Table (a). Three teams comprising 12 technicians carried out routine monitoring activities across the island including the processing and computerization of the data. With respect to surface water monitoring, the teams were assisted by fifty-six (56) local observers who read staff gauges daily where there are no automatic/recording gauging stations. The information collected by the local observers provide vital information on the daily flows of the rivers. An additional five (5) temporary local observers were employed over a period of 2 to 4 months to assist in the monitoring of flooding in western Jamaica associated with Tropical Depression (TD) #16 which later became Tropical Storm Nicole.

Table (a)

Monitoring Areas and Hydrometric Network

Monitoring Areas	Parishes	Stream Flow Gauging Stations (+ Spot Measurements)	Groundwater Monitoring Wells	Rainfall Gauges	Flood Warning Systems
Area 1	St. Catherine, Clarendon, St. Ann Manchester	22(+14)	135	8	2
Area 2	St. Elizabeth, Westmoreland, Hanover, St. James, Trelawny	32 (+2)	87	6	1
Area 3	St. Thomas, St. Ann, Kingston & St. Andrew, St. Mary, Portland	34 (+22)	55	5	4
	JAMAICA	88 (+38)	277	19	7

The performance of the Data and Resource Management Unit is summarized in Table (b). The table shows that the Unit was on target in its surface water and groundwater monitoring activities missing its surface water performance target by only 1% and exceeding its groundwater performance target by 7%. Computations of the annual pages (tables of computed daily streamflow from automatic gauging stations) were below target at 55%. This was primarily due to time spent by staff responding to the impact of TD #16 on the hydrometric network and monitoring activities. As shown in the table, no less than 15 high flow measurements were done

across the island with 5 of those measurements being the highest flow ever recorded at some of the stations.

Table (b)

Unit's performance in the collection and processing of hydrological data

Activities	Annual targets	Performance Indicator	Achievement
Surface Water Monitoring			
Streaflow measurements	1536 (100%)	1307 (85%)	1296 (84%)
High flow measurements*			15
Annual pages	1056 (100%)	898 (85%)	(581) 55%
Computerization			581
Groundwater Monitoring			
Water level measurements	3336 (100%)	2836 (85%)	3065 (92%)
Computerization			3065

* All achieved after the passage of Tropical Depression #16 which later developed into Tropical Storm Nicole

Rains associated with Tropical Depression (TD) #16 which later developed into Tropical Storm Nicole affected the entire island in September/October 2010. The western part of the island was the worst affected with flooding in several communities in St. James, Hanover, Westmoreland and St. Elizabeth. Some of the worst affected communities were Chigwell, Forest, Pearces Village, New Market and New River.

The flood rains associated with TD #16 severely damaged or destroyed a number of our gauging stations. Several staff gauges were also washed away. Photo 1 below shows damage done to the gauging station at Blakes Bridge on the Wag Water River in St. Mary.

The WRA also carried out extensive monitoring of flooding across Jamaica which included surveying of water levels, mapping of flood extents etc. Photos 2 and 3 show flood levels being monitored in Pedro River, St. Ann and water levels being surveyed in New Market, St. Elizabeth respectively. Map 1 shows flood extent maps for Chigwell, Forest and Pearces River in Hanover that was done. Updates were provided to the general public through presentations, press releases, radio and television interviews and documentaries produced by media houses.



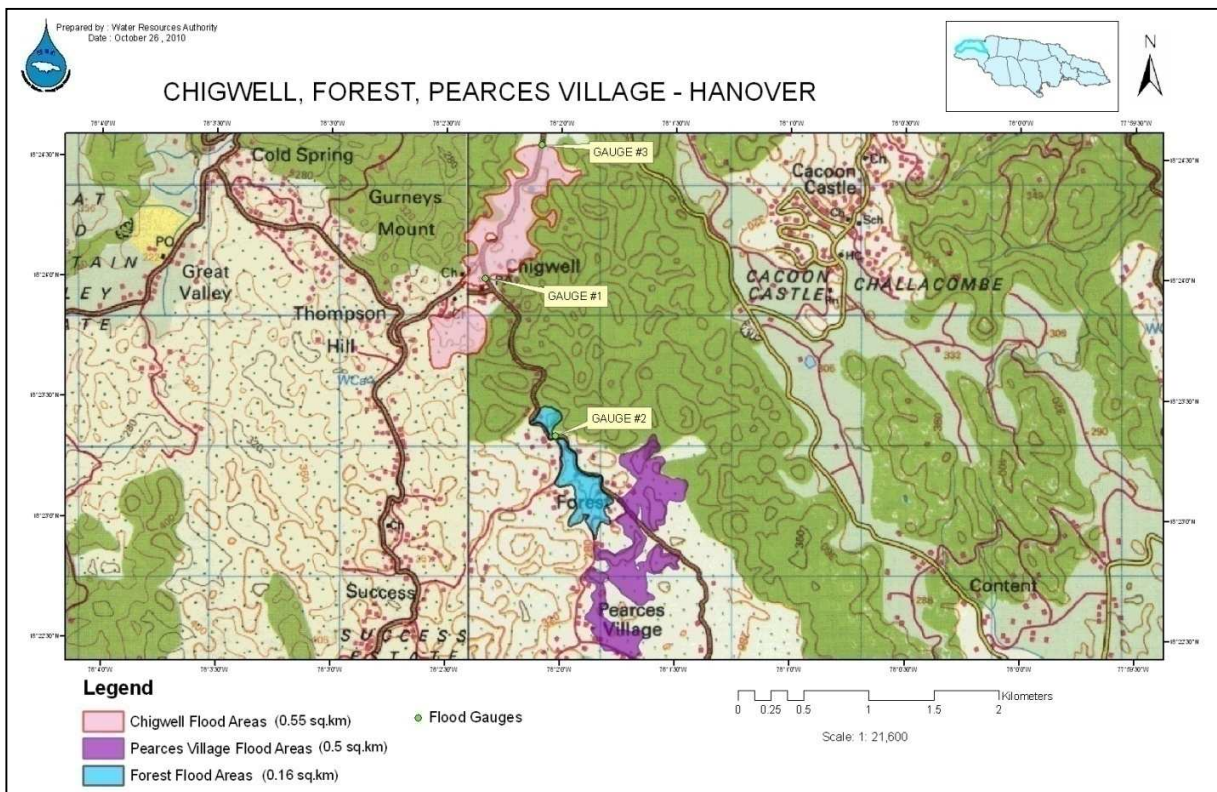
Photo 1: Damaged gauging station at Blakes Bridge on the Wag Water River in St. Mary



Photo 2: Pedro River Community Flood Gauges



Photo 3: Officers surveying water levels in New Market



Map 1: Flood maps produced by the WRA for Chigwell, Forest and Pearces Village in Hanover

The upgrading of the Rio Cobre Flood Warning System is still experiencing problems and the WRA is working with Vaisala Inc. to rectify the problem in the shortest possible time. The WRA had received funding under Capital A budget to upgrade the Rio Cobre Flood Warning System. A competitive bidding process was undertaken and the contract was awarded to Vaisala Inc. from Finland with offices in the USA. The equipment was delivered and installed in March 2010 but the system has failed to operate in a satisfactory manner. The WRA continues to press for a solution with Vaisala.

CARIB-HYCOS PROJECT

The Carib-HYCOS project is to create a network of stations within the Caribbean that are feeding real time hydrologic data/information into a regional database held at the IRD in Martinique and accessible via the internet. Jamaica is a signatory under the project and is expected to benefit from an upgrade of some of its hydrometric stations as well as new hydrometric database software. The project is funded by the EU and the French Government.

The Hydrological database software was installed on the WRA's server and provided training to WRA's computer unit in the installation of the database and access to the software on designated work stations. The installation was completed by the WRA's computer unit. The WRA's current database files which are managed in another software are being reconfigured for compatibility with the newly installed software. Three officers will attend training in the use of the database in April 2011 in Barbados. Upgrading of stations and the reconfigured database are expected to be completed in the 2011-2012 financial year.

REQUESTS FOR DATA AND TECHNICAL ASSISTANCE

The unit received and responded to approximately nineteen (19) requests for data, information, and technical assistance. Details of the some of the requests are presented in Table (c).

REHABILITATION, UPGRADE AND EXPANSION OF THE NATIONAL HYDROMETRIC NETWORK

There was no budgetary support for Capital A projects for the 2010-2011 financial year. A limited allocation of funds, from income generation activities, was provided for the construction of six rain gauges across the island however permission to build at the proposed sites has not yet been received from several of the property owners.

INVESTIGATION OF LONG-TERM TRENDS IN HYDROLOGICAL DATA

Long term trends are evaluated via monthly bulletins placed on the Authority's web site for 26 rivers and 178 wells.

Table (c)

Requests for data, information and technical assistance

Organisation	Nature of request	Description
UWI	data request	water levels and abstraction rates Kingston wells (Mandal-UWI)
SRC	data request	rainfall data St. Elizabeth (SRC)
Student (UWI)	data request	shape files for Temple Hall (Andrew Edwards-UWI-Sustainable Development MSc. Programme)
AF Engineering	data request	Pepper NWC well data
St. Ann Constituency Office	technical assistance	site investigation Twickenham spring (Spicy Hill Spring), St. Ann by constituency office
CEAC	data request	logger data martha brae Martha Brae (CEAC Solutions)
NWC	technical assistance	site investigation Crystal Springs (NWC)
Loxley Jownson	technical assistance	site investigation Irwin, St. James (Loxley Johnson)
ODPEM	technical assistance	site investigation installation of flood gates at Rio Cobre
Student (UTECH)	data request	rainfall Grove (Nicholas Dell-UTECH)
NIC	data request	Yallahs at Easington streamflow (NIC)
Student (UWI)	technical assistance	support to UWI student, streamflow/survey Port Maria (Outram River)
NWA	technical assistance	hydro map for Goshen area for (NWA Lorette Scarborough)
MoWH	technical assistance	attend commissioning of Hopewell well in St. Elizabeth (Ministry)
PCJ	technical assistance	support in surveying area for construction of hydroelectric plant at Great River (PCJ)
MGD	educational support	workshop organized by MGD in Yallahs area
NEPA	educational support	educational support in relation to Drivers River watershed
CIMH	educational support	training in hydrometry and data computations

REQUESTS FOR TECHNICAL TRAINING AND EDUCATIONAL SUPPORT

The WRA hosted **the** Caribbean Institute for Meteorology and Hydrology (CIMH) lecturers **(2No)** and students **(2No)** for 2 weeks practical training in hydrometry and data computations and quality assurance testing. This is an ongoing collaboration between the WRA and the CIMH whereby, at the request of the CIMH, the WRA provides practical training to its students in streamflow measurement and data processing and computations. The WRA is also working closely with the CIMH in their efforts to develop early warning systems for the region.

The Unit also responded to the following requests for educational support:

- ✓ World Water Day Activities
- ✓ ODPEM's Hurricane Awareness Week
- ✓ GIS Day activities at WRA

PARTICIPATION IN LOCAL/INTERNATIONAL SEMINARS/WORKSHOPS/CONFERENCES

One officer attended meetings in Marseille and Geneva in relation to the tender for the database software under the Carib-HYCOS project.

DOCUMENTATION CENTRE

The WRA's Document Centre/Library is home to over 3500 books and journals. The Document Centre is a member of the Scientific and Technical Information Network (STIN) and the Library and Information Association of Jamaica (LIAJA).

The main objective of the Doc Centre is to acquire and disseminate current and relevant information in the appropriate format in a timely manner to assist in making informed decisions. In 2010 the services of the Doc Centre were accessed by staff, students, researchers and consultants, both locally and overseas. The requests focused on general water related issues but were more biased towards flooding and water pollution. Not only was the Doc Centre able to respond to walk in clients but also to requests received via email and telephone. Email and telephone requests were facilitated by digitizing information previously available in hard copies.



The year also saw the continuation of the drive to have the Doc Centre catalogue automated and available on the Authority's website. In this regard, over 1300 publications were accessioned and added to the WINISIS database. Financial constraints curtailed the purchase of new publications however, 18 new publications were received including an historical publication from 1927 given as a gift to the Managing Director.

The Doc Centre also participated in a number of exhibitions across the island in a quest to increase awareness of the organization. Three new posters were created and while no new brochures were created over 600 brochures were distributed.

In assisting with the development of trained library professionals the Doc Centre provided an internship and training for one student from the University of the West Indies, Department of Library and Information Studies for six (6) weeks

ADMINISTRATION AND HUMAN RESOURCE DEVELOPMENT

ADMINISTRATION**Staff Promotions**

The following staff promotions were made effective 01 April 2010.

Name of Officer	Present Position	New Position
Michael Wilson	Assistant Hydrologist	Hydrologist
Horace Roper	Assistant Hydrologist	Senior Assistant Hydrologist
Paul Henderson	Senior Technical Assistant	Assistant Hydrologist
Steve-Dale Hudson	Technical Assistant	Senior Technical Assistant
Mrs Charmaine James	Senior Secretary	Executive Secretary

Effective 7 June 2010 Mrs Colene Pitter-Mignott was promoted to the position of Office Manager. Mrs Mignott was formerly assigned to the Accounts Department.

Increase in Health Insurance Premiums

Effective 01 August 2010 Sagicor, the health insurance carrier, increased the rates for premiums by 38% despite a low use factor. The Authority's Broker met and after discussion with Sagicor the rates were lowered and the increased capped at 25%. Staff was informed and some persons choose to reduce or remove their dependents on the plan due to affordability.

Procurement Committee

Effective 03 June 2010 a new Procurement Committee was appointed due to the retirement of two members of staff from the WRA who were members of the Procurement Committee. The new committee members are:

- Mr Gilmore Fraser-----Chairperson
- Mrs Colene Pitter-Mignott
- Mr Lawrence Barrett
- Mr Wilfred Cameron
- Miss Carmela Spence
- Miss Gloria Williams----Secretary to the Committee

Governor General's Award

Mr. Ramone McPherson, Technical Assistant, was the recipient of the Governor General's Award for Community Service in the County of Surrey. This award is given to individuals who rise above economic and social barriers to contribute to the development of their community and growth of the country. Giving back to our communities impacts our nation and is a commendable attribute we all inadvertently benefit from.

Mr. McPherson was sent a letter of congratulations on behalf of the Board and Management of the Authority. The letter also encouraged Mr. McPherson in his further endeavours. A memo informing staff of the award was circulated and placed on the notice board.

WELL DONE RAMONE

Re-assignment of Staff

Effective 01 November 2010 the following staff members were re-assigned as shown. This resulted from the resignation/retirement of two members of staff.

- Mr. Lawrence Barrett, Water Resources Engineer, was assigned to the Planning and Investigation Unit.
- Mr. Leslie Cyril, Senior Technician, was assigned to the Permits and Licences Unit.

HRD Report for Period 01 April 2010 to 31 March 2011				
2010	2010 March 9-11	Barrett	Lawrence	Workshop: Flood Mapping and Rainfall Intensity Duration Frequency Curves - CROSQ Secretariat, Barbados
	2010 November 2-5	Barrett	Lawrence	Technical Cooperation Workshop: Development of the Caribbean Regional Cooperation Programme in Multi-Hazard Early Warning Systems - Christ Church, Barbados
	2010 November 24-25	Barrett	Lawrence	Workshop: Introduction to the GOJ Procurement Policies & Procedures - Management Institute for National Development (MIND)
	2010 December 12-16	Barrett	Lawrence	Workshop: Water Programme for Environmental Sustainability (WPAII): Towards Adaptation Measures to Human and Climate Change Impacts - Port of Spain, Trinidad
	2010 June 24	Blake	Clyde	Yallahs River Quarries' Seminar - Yallahs, St. Thomas
	2010 June 6-11	Dwyer	Shonel	2010 WAS*IS Caribbean Workshop - San Juan, Puerto Rico
	2010 October 11-14	Ferguson	Natalie	First Training Workshop for Regional Facilitators of the UNESCO-IHP/ Project WET Water and Education Programme - Jiutepec, Mexico
	2010 September 28-30	Fernandez	Basil	International Symposium on "Floods - A global problem that needs local solutions" - UNU and third ICHARM International Advisory Board - Tsukuba
	2010 June 24	Graham	Angella	Yallahs River Quarries' Seminar - Yallahs, St. Thomas
	2010 August 19 - September 4	Graham	Angella	Water Resources Management for Responding to Climate Change - Republic of Korea
	2010 December 12-16	Graham	Angella	Workshop: Water Programme for Environmental Sustainability (WPAII): Towards Adaptation Measures to Human and Climate Change Impacts - Port of Spain, Trinidad

*Water Resources Authority
Annual 2010/2011*

2010	2010 September 21-22	Haiduk	Andreas	Country Work Programme for Disaster Risk Reduction in Jamaica 2011-2014 - Ritz Carlton, Montego Bay, St. James
	2010 June 24	Hudson	Steve-Dale	Yallahs River Quarries' Seminar - Yallahs, St. Thomas
	2010 January 4 - February 15	James	Charmaine	Certificate in Administrative Management - Level 2 - MIND
	2010 June 8-9	Marshall	Geoffrey	Regional Workshop for LAC: Challenges and Opportunities in Climate Change Adaptation for the Water Sector: Elements for a Regional Agenda Mexico City
	2010 October 11-12	Marshall	Geoffrey	Workshop on Coastal Aquifer Management in Small Island Developing States
				States of the Caribbean: Challenges and New Directions - Saint Kitts and Nevis
	2010 November 22-26	Marshall	Geoffrey	International Course: Towards Mitigation of Risks from Natural Disasters in the Caribbean Basin, Knowledge and Applying Strategies - ESAP University, Cali, Columbia
	2010 August 24-27	Sutherland	Anika	Inter-Regional Workshop: "Development of Guideline for Implementing Integrated Water Resources Management (IWRM) for Small Island Developing States (SIDS) - St Lucia
	2010 September 7	Thomas	Herbert	Seminar: "Expert and Ministerial Panel on Water Adaptation to Climate Change: Prospects and Challenges for Latin America and the Caribbean Region"- Stockholm, Sweden

2010	2010 October 15	Thomas	Herbert	Course: "DevInfo v 5.0 User & Database Administration" - JamStats
	2010 June 21-24	Watts	Michelle	5th Caribbean Environmental Forum & Exhibition (CEF-5) and 2nd Caribbean Sustainable Energy Forum (CSEF-2) - Montego Bay, Jamaica
	2010 December 1-2	Watts	Michelle	Integrated Assessment Conference - UWI Mona
	2010 April 15 - May 5	Wilson	Michael	Caribbean Defense and Security Course (CDSC) - Protection of Jamaica's Water Resources - National Defense University, Washington DC
2011	2011 March 14-15	Graham	Angella	Workshop organized by UNESCO-IHP/IMET - Port of Spain, Trinidad & Tobago
	2011 March 22-23	Marshall	Geoffrey	Capacity-Building Workshop on Climate Change Adaptation and Water Resources - Port of Spain, Trinidad and Tobago
	2011 February 9	Pennant	Joseph	Workshop: "Rio Tinto Mt Rosser Closure" - Ocho Rios, Jamaica
	2011 February 2-3	Pitter-Mignott	Colene	Introduction to the GOJ Procurement Policies and Procedures - MIND
	2011 February 9	Watts	Michelle	Workshop: "Rio Tinto Mt Rosser Closure" - Ocho Rios, Jamaica

**WATER RESOURCES AUTHORITY
FINANCIAL STATEMENTS
YEAR ENDED MARCH 31, 2011**



C.R. Hylton & Co.
CHARTERED ACCOUNTANTS

CHARLTON R. HYLTON, F.C.C.A.

HAYSEWORTH HYLTON, A.C.C.A.

SUNIL I.R. DANIELS, A.C.C.A.

47 Hall Boulevard, Kingston 8, Jamaica, W.I. ~ Tel: 925-1857 ~ Cell: 386-2618 ~ Email: crhylton@yahoo.com

Auditor's Report
To the Directors of
Water Resources Authority

Report on the Financial Statements

We have audited the accompanying financial statements of Water Resources Authority which comprise the balance sheet as at 31 March 2011, the income statement and cash flow statement for the year then ended, and a summary of significant accounting policies and other explanatory notes.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with International Financial Reporting Standards and the Companies Act 2004. This responsibility includes the design, implementation and maintenance of internal controls relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error; the selection and application of appropriate accounting policies; and the making of accounting estimates that are reasonable in the circumstances.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance that the financial statements are free from material misstatement. An audit involves performing procedures to obtain audit evidence regarding the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal controls.

REPORT OF THE INDEPENDENT AUDITORS - CONT'D
TO THE DIRECTORS OF
WATER RESOURCES AUTHORITY

Opinion

In our opinion, the financial statements give a true and fair view of the financial position of the Authority's affairs as at 31 March 2011 and of its financial performance and its cash flows for the year then ended in accordance with International Financial Reporting Standards and comply with the provisions of the Jamaican Companies Act 2004 and the Water Resources Act 1995.

Report on additional requirements of the Companies Act

We have obtained all the information and explanations which, to the best of our knowledge and belief, were necessary for the purposes of our audit.

In our opinion, proper accounting records have been maintained, so far as appears from our examination of those records, and the accompanying financial statements are in agreement therewith, and give the information required by the Companies Act 2004 and the Water Resources Act 1995 in the manner so required.



C.R. HYLTON & CO
CHARTERED ACCOUNTANTS

47, Hall Boulevard
Kingston 8, Jamaica
18 November 2011

FINANCIAL STATEMENTS
WATER RESOURCES AUTHORITY
31 MARCH, 2011

C.R. HYLTON & CO.
CHARTERED ACCOUNTANTS
JAMAICA

**WATER RESOURCES AUTHORITY
YEAR ENDED 31 MARCH, 2011**

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Water Resources Authority
Statement of Comprehensive Income
Year ended 31 March 2011

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	Note	2011 \$	Restated 2010 \$	Restated 2009 \$
Income				
Subventions		138,153,442	133,730,980	138,313,000
Other Operating Income	14	<u>6,584,424</u>	<u>6,668,877</u>	<u>7,297,540</u>
		144,737,866	140,399,857	145,610,540
Expenditure				
Administrative & other expenses	15	<u>147,482,654</u>	<u>139,106,193</u>	<u>160,345,077</u>
Total income/(loss) and comprehensive income / (loss) for the year		<u>(2,744,788)</u>	<u>1,293,664</u>	<u>(14,734,537)</u>

Water Resources Authority

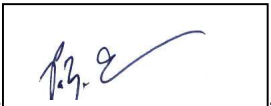
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Balance Sheet


31 March 2011

	Note	2011 \$	Restated 2010 \$	Restated 2009 \$
Assets				
Cash and cash equivalents	6	39,962,321	42,891,985	40,307,195
Investment securities	7	3,638,895	3,453,204	3,037,713
Accounts receivable	8	6,481,415	4,892,230	4,807,411
Prepayments		1,272,694	847,882	642,098
Intangible assets	5a	426,220	1,153,475	1,884,467
Property, plant and equipment	5	105,769,205	102,331,099	97,236,662
Total Assets		<u>157,550,750</u>	<u>155,569,874</u>	<u>147,915,546</u>
Reserves				
Reserves and Accumulated Funds				
Capital project subvention	9	804,966	2,947,502	5,653,652
Capital project grant	10	3,589,137	3,724,495	3,920,892
Other projects fund	11	1,586,350	637,776	624,001
Accumulated surplus	12	44,056,241	47,575,110	48,656,446
Revaluation reserve	17	103,000,000	95,000,000	85,000,000
		153,036,694	149,884,883	143,854,991
Current liabilities				
Payables & accruals	13	4,514,056	5,684,991	4,060,555
		4,514,056	5,684,991	4,060,555
Total Reserves and liabilities		<u>157,550,750</u>	<u>155,569,874</u>	<u>147,915,546</u>

Approved for issue on behalf of the Board of Directors on 16th November, 2011 and signed on its behalf by:

..... 

Parris Lyew-Ayee---Chairman

..... 

Basil Fernandez---Managing Director

Water Resources Authority
Notes to the Financial Statements
31 March 2011

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	Note	2011 \$	2010 \$
Cash Flows from Operating Activities			
(Deficit)/Surplus for the year		(2,744,788)	1,293,664
Adjustments			
Depreciation		5,990,901	3,784,712
Depreciation transferred from capital grant		(135,358)	(196,397)
Adjusted surplus for the year		3,110,755	4,881,979
Decrease/(Increase) in current assets			
Receivables		(1,589,185)	(84,819)
Prepayments		(424,812)	(205,783)
Short-term investment		(185,691)	(415,491)
Increase in current liabilities			
Payables and accruals		(1,945,017)	1,624,435
Net cash flow from operation		(1,033,950)	5,800,321
Cash Flows from Investing Activities			
Additions to property, plant and equipment		(701,752)	(587,158)
Net cash flow from investing activities		(701,752)	(587,158)
CASH FLOW FROM FINANCING ACTIVITIES			
(Decrease)/Increase in capital projects subventions		(2,142,536)	(2,706,151)
Decrease in other projects fund		948,575	13,776
Net cash flow from financing activities		(1,193,961)	(2,692,375)
Increase / (Decrease) in cash resources		(2,929,663)	2,520,788
Cash and Cash Equivalent at Beginning of Year	6	42,891,983	40,371,195
Cash and Cash Equivalent at End of Year	6	39,962,321	42,891,983

Water Resources Authority

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Notes to the Financial Statements

31 March, 2011**1. The Authority**

The Water Resources Authority was established under the Water Resources Act of 1995. The Act became effective as of April 7, 1996.

Its main objectives were to promote the conservation and proper use of underground water resources and to control the exploitation of such water resources.

In July 1985 the functions and duties of the authority were transferred from the Ministry of Public Utilities and Transport to the Ministry of Agriculture. However in 1989, the Ministry of Public Utilities and Transport again assumed responsibility for the Authority. Water Resources Authority is currently being funded by subventions from the Ministry of Water and Housing.

The registered office of the Authority is situated at Hope Gardens, Kingston 7, Jamaica.

2. Reporting currency

These financial statements are expressed in Jamaican Dollars.

3. Adoption of Standards, Interpretations and Amendments**A. Basis of Preparation**

These financial statements have been prepared in accordance with International Financial Reporting Standards (IFRS), and have been prepared under the historical cost convention as modified by the revaluation of available-for-sale investment securities and other financial assets.

The preparation of financial statements in conformity with IFRS requires the use of certain critical accounting estimates. It also requires management to exercise its judgement in the process of applying the Authority's accounting policies. Although these estimates are based on management's best knowledge of current events and actions, actual results could differ from those estimates.

B. Interpretations and amendments to published standards effective in the current year:

Certain new interpretations and amendments to existing standards have been published that became effective during the current year. The Authority has assessed the relevance of all such new interpretations and amendments and has put into effect the following IFRS, which are immediately relevant to its operations.

Water Resources Authority

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Notes to the Financial Statements

31 March, 2011

3. Adoption of Standards, Interpretations and Amendments (Cont'd):

B. Interpretations and amendments to published standards effective in the current year:

IAS 1 (Amendment) – Presentation of financial statements.

The amended standard clarifies that the potential settlement liability by the issue of equity is not relevant to its classification as current or non-current. By amending the definition of current liability, the amendment permits a liability to be classified as non-current (provided that the entity has an unconditional right to defer settlement by transfer of cash or other assets for at least 12 months after the accounting period) notwithstanding the fact that the entity could be required by the counterparty to settle in shares at any time. The adoption of this amendment did not have any effect on the Authority as there were no transactions to which it applied.

The amendment clarifies that it is possible for there to be movements into and out of the fair value through profit or loss category where:

- A derivative commences or ceases to qualify as a hedging instrument in cash flow or net investment hedge.
- Financial assets are reclassified following a change in policy by an insurance company in accordance with IFRS 4.

The definition of financial asset or financial liability at fair value through profit or loss as it relates to items that are held for trading is amended.

This clarifies that a financial asset or liability that is part of a portfolio of financial instruments managed together with evidence of an actual recent pattern of short-term profit taking is included in such a portfolio on initial recognition. There is also the removal of a segment as an example of what may be considered a party external to the reporting entity.

When re-measuring the carrying amount of a debt instrument on cessation of fair value hedge accounting, the amendment clarifies that a revised effective interest rate (calculated at the date fair value hedge accounting ceases) is used.

C. Standards, interpretations and amendments to published standards which are not yet effective

At the date of authorisation of these financial statements, certain new standards, amendments and interpretations to existing standards have been issued which are mandatory for the company's accounting periods beginning on or after 1 January 2011 or later periods, but were not effective at balance sheet date, and which the company has not early adopted. The company has assessed the relevance of all such new standards, interpretations and amendments, has determined that the following may be relevant to its operations, and has concluded as follows:

Water Resources Authority

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Notes to the Financial Statements

31 March, 2011

Adoption of Standards, Interpretations and Amendments (Cont'd):**C. Standards, interpretations and amendments to published standards which are not yet effective (Cont'd)**

IFRS 9, Financial instruments part 1: Classification and measurement (effective for annual periods beginning on or after 1 January 2013) was issued in November 2009 and replaces those parts of IAS 39 relating to the classification and measurement of financial assets. Key features are as follows:

Financial assets are required to be classified into two measurement categories: those to be measured subsequently at fair value, and those to be measured subsequently at amortised cost.

The decision is to be made at initial recognition. The classification depends on the entity's business model for managing its financial instruments and the contractual cash flow characteristics of the instrument.

An instrument is subsequently measured at amortised cost only if it is a debt instrument and both the objective of the entity's business model is to hold the asset to collect the contractual cash flows, and the asset's contractual cash flows represent only payments of principal and interest (that is, it has only 'basic loan features'). All other debt instruments are to be measured at fair value through profit or loss.

All equity instruments are to be measured subsequently at fair value. Equity instruments that are held for trading will be measured at fair value through profit or loss. For all other equity investments, an irrevocable election can be made at initial recognition, to recognise unrealised and realised fair value gains and losses through other comprehensive income rather than profit or loss. There is to be no recycling of fair value gains and losses to profit or loss. This election may be made on an instrument by-instrument basis. Dividends are to be presented in profit or loss, as long as they represent a return on investment.

While adoption of IFRS 9 is mandatory from 1 January 2013, earlier adoption is permitted. The Authority is considering the implications of the standard, the impact on the Authority and the timing of its adoption.

The IASB has updated IFRS 9, 'Financial instruments' to include guidance on financial liabilities and derecognition of financial instruments. The accounting and presentation for financial liabilities and for derecognising financial instruments has been relocated from IAS 39, 'Financial instruments: Recognition and measurement', without change, except for financial liabilities that are designated at fair value through profit or loss. This is effective for annual periods beginning on or after 1 January 2013.

Water Resources Authority

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Notes to the Financial Statements

31 March, 2011

Adoption of Standards, Interpretations and Amendments (Cont'd):

Standards, interpretations and amendments to published standards that are not yet effective (Cont'd)

IFRS 9, Financial instruments part 1: Classification and measurement (effective for annual periods beginning on or after 1 January 2013) (Cont'd)

Key features are as follows:

The requirements in IAS 39 regarding the classification and measurement of financial liabilities have been retained, including the related application and implementation guidance. This means that there continues to be two measurement categories for financial liabilities:

- fair value through profit or loss (FVTPL)
- and amortised cost.

The criteria for designating a financial liability at FVTPL also remain unchanged.

Entities are still required to separate derivatives embedded in financial liabilities where they are not closely related to the host contract. The separated embedded derivative continues to be measured at FVTPL, and the residual debt host continues to be measured at amortised cost.

Under the new standard, entities with financial liabilities designated at FVTPL recognise changes in the fair value due to changes in the liability's credit risk directly in other comprehensive income (OCI).

There is no subsequent recycling of the amounts in OCI to profit or loss, but accumulated gains or losses may be transferred within equity.

However, if presenting the change in fair value attributable to the credit risk of the liability in OCI would create an accounting mismatch in profit or loss, all fair value movements are recognised in profit or loss. An entity is required to determine whether an accounting mismatch is created when the financial liability is first recognised, and this determination is not reassessed.

Management is currently considering the implications of the standard, the impact on the Authority and the timing of its adoption by the Authority

Water Resources Authority

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Notes to the Financial Statements

31 March, 2011

4. Statement of Compliance, Basis of Preparation and Significant Accounting Policies:

- a) **Statement of compliance and basis of preparation –**
The financial statements have been prepared under the historical cost convention. Preparation is in accordance with International Financial Reporting Standards (IFRS) and their interpretations adopted by the International Accounting Standards Board (IASB), and comply with the requirements of the Companies Act.
- b) **Use of estimates and judgements –**
The preparation of financial statements in accordance with International Financial Reporting Standards requires the Management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. These estimates are based on historical experience and the Management's best knowledge of current events and actions and are reviewed on an ongoing basis. Actual results could differ from those estimates.
- c) **Financial investments –**
Investments are held mainly in the categories held-to-maturity and available-for-sale. Management determine the appropriate classification of investments at the time of purchase.
Available-for-sale securities are those intended to be held for an indefinite period of time and which may be sold in response to needs for liquidity or changes in interest rates, foreign exchange rates or market prices. They are initially recognised at cost, which includes transaction costs, and subsequently remeasured at fair value based on quoted bid prices or amounts derived from cash flow models. Unrealised gains and losses arising from changes in fair value of available-for-sale securities are recognised in the income statement.

Non-derivative financial assets with fixed or determinable payments which the Fund Manager has the intent and ability to hold to maturity are classified as held-to-maturity and are included in financial investments (medium-term). Held to maturity investments are measured at amortised cost. In the event that management has to sell one of these instruments before maturity other than an insignificant amount or in an isolated case, the entire portfolio will be reclassified as available for sale for the current and next two financial years.
All purchases and sales of investments are recognised on the trade date, which is the date that the company commits to purchase or sell the asset. Costs of purchase are included in transaction costs.
- d) **Foreign currency translation-**
Assets and liabilities denominated in foreign currencies are translated into Jamaican dollars at the exchange rates prevailing at the statement of net assets available for benefits date. Gains and losses arising from fluctuations in exchange rates are included in the Statement of changes in net assets available for benefits.

Water Resources Authority

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Notes to the Financial Statements

31 March, 2011

**4. Statement of Compliance, Basis of Preparation and Significant Accounting Policies
(Cont'd):**

e) Cash and cash equivalents –

Cash and cash equivalents are carried in the statement of net assets available for benefits cost. It comprises cash on hand, deposits held on call with banks and other short-term highly liquid investments. In the statement of net assets available for benefits, bank overdrafts are included in borrowings in current liabilities.

f) Short-term investments –

Short-term Investments comprise deposits with commercial and merchant banks. It also includes government securities which will be redeemed in the next twelve (12) months. They are stated at cost and accrued interest is reflected in the statement of changes in net assets available for benefits.

g) Provisions –

Provisions are recognised when the fund has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources will be required to settle the obligation, and a reliable estimate of the amount can be made. Where the fund expects a provision to be reimbursed the reimbursement is recognised as a separate asset but only when the reimbursement is virtually certain.

h) Revenue recognition –

Interest income:

Interest income is recognized in the statement of income and expenditure for all interest bearing instruments on the accrual basis using the effective yield method based on the actual purchase price. Interest income includes coupons earned on fixed investments and discount or premium on financial instruments.

i) Investments –

Investments in local registered stocks are stated at fair value. Changes in the carrying amount of marketable securities are credited /charged to the statement of changes in net assets available for benefits.

Investments in government securities are stated at fair value. The assumption made by the the Authority is that these investments are held to maturity. The Authority calculates fair value for its investments, using the trade date accounting method.

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Notes to the Financial Statements

31 March, 2011**4. Statement of Compliance, Basis of Preparation and Significant Accounting Policies (Cont'd):****(j) Impairment**

Assets that have an indefinite useful life are not subject to amortisation and are tested annually for impairment. Assets that are subject to amortisation are reviewed for impairment losses whenever events or changes in circumstances indicate that the carrying amount may not be recoverable.

Impairment losses are immediately recognised as an expense in the profit and loss account unless the particular asset is carried at a revalued amount in equity in which case the impairment loss is treated as a revaluation decrease through equity.

Where an impairment loss subsequently reverses, the carrying amount of the asset is increased to the revised estimate of its recoverable amount to the extent of impairment losses recognised in prior years. A reversal of impairment loss is recognised as income unless previously recognised through equity in which case the reversal is treated as a revaluation increase in equity.

(k) Comparative information –

Where necessary, comparative figures have been reclassified to conform to changes in presentation in the current year. In particular, comparatives have been adjusted to take into account the requirements of IFRS.

(l) Taxation

The Authority is exempt from income tax by virtue of its approval by the Commissioner of Taxpayer Audit and Assessment under Section 44 of the Income Tax Act.

(m) Provisions

Provisions are recognized when the Authority has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources will be required to settle the obligation, and a reliable estimate of the amount can be made.

Where there are a number of similar obligations, the likelihood that an outflow will be required in settlement is determined by considering the class of obligations as a whole. A

provision is recognised even if the likelihood of an outflow with respect to any one item included in the same class of obligations may be small.

Water Resources Authority

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Notes to the Financial Statements

31 March, 2011

**4. Statement of Compliance, Basis of Preparation and Significant Accounting Policies
(Cont'd):**

n) Pension Scheme costs

The Authority participates in a defined contribution pension scheme, the assets of which are held separately from those of the Authority. Contributions to the Scheme by the Authority are charged to the statement of income and expenditure when due.

o) Property, plant and equipment:

- (i) Items of property, plant and equipment are stated at cost, less accumulated depreciation and impairment losses. The directors however, revalued the building during the current year to show its true value which was materially understated.
- (ii) Depreciation is calculated on the straight-line basis at annual rates to write down the assets to their estimated residual values over their expected useful lives. The depreciation rates are as follows:

Computer hardware	25%
Computer software	25%
Technical and scientific equipment	20%
Furniture and fixtures	10%
Motor vehicles	20%
Capital projects	2.5%
Buildings	2.5%

Land is not depreciated and is stated at cost. Depreciation rates, estimated residual values and expected useful lives are re-assessed at each balance sheet date.

Water Resources Authority
Notes to the Financial Statements
31 March 2011

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5. Property, Plant and Equipment

	Opening Cost \$	Closing Cost \$	Opening Accumulated Depreciation \$	Charge for the year \$	Closing Accumulated Depreciation \$
At cost :					
Building	100,383,635	108,383,635	6,231,758	2,709,591	8,941,349
Furniture & fixtures	8,024,416	8,492,107	6,141,592	330,157	6,471,749
Computer Hardware	15,171,139	15,242,143	12,974,804	1,152,633	14,127,437
Technical & Scientific Equipment	6,616,169	6,779,226	3,122,454	474,330	3,596,784
Motor Vehicles	8,969,165	8,969,165	8,362,817	596,936	8,959,753
	<u>139,164,524</u>	<u>147,866,277</u>	<u>36,833,425</u>	<u>5,263,647</u>	<u>42,097,072</u>

	Opening Net Book Value \$	Closing Net Book Value \$
Building	94,151,877	99,442,286
Furniture & Fixtures	1,882,824	2,020,358
Computer Hardware	2,196,335	1,114,706
Technical & Scientific Equipment	3,493,715	3,182,443
Motor vehicles	606,348	9,412
	<u>102,331,099</u>	<u>105,769,205</u>

5a. Intangible Assets:

	Opening Cost \$	Closing Cost \$	Opening Accumulated Depreciation \$	Charge for the year \$	Closing Accumulated Depreciation \$
At cost :					
Computer Software	5,889,463	5,889,463	4,735,988	727,255	5,463,243
	<u>5,889,463</u>	<u>5,889,463</u>	<u>4,735,988</u>	<u>727,255</u>	<u>5,463,243</u>

	Opening Net Book Value \$	Closing Net Book Value \$
Computer Software	1,153,475	426,220
	<u>1,153,475</u>	<u>426,220</u>

Water Resources Authority

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Notes to the Financial Statements

31 March 2011

6. Cash and Cash Equivalent

	2011	2010
	\$	\$
Bank of Nova Scotia - Current Account	5,881,555	6,478,090
Bank of Nova Scotia - Savings Accounts :		
Motor Vehicle Repair Loan Savings Account	4,944,538	4,663,628
Capital Projects Account	22,605,384	25,620,742
Petty Cash	10,000	10,000
Foreign Currency Savings Account	5,392,438	5,323,204
Computer Loan- Savings Account	1,113,578	781,591
TCC Savings Account	14,828	14,731
	<u>39,962,321</u>	<u>42,891,985</u>

7. Investment Securities

Investments comprise the following:

	2011	2010
	\$	\$
Held to maturity -		
Government of Jamaica -		
Local Registered Stock	3,638,895	3,453,204
	<u>3,638,895</u>	<u>3,453,204</u>

8. Accounts Receivable

	2011	2010
	\$	\$
Motor vehicle repair loans	4,325,394	2,486,263
Computer loans	264,322	349,236
Staff loans	139,172	322,267
Withholding tax recoverable	659,919	546,437
Interest receivable	440,905	764,115
GCT refundable	462,052	234,262
Other receivables	189,651	189,650
	<u>6,481,415</u>	<u>4,892,230</u>

Water Resources Authority
Notes to the Financial Statements
31 March 2011

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9. Capital Projects Subvention

	2011 \$	2010 \$
Balance of Subvention Funds at April 1, 2010	2,947,502	5,653,653
Add : Fund Received		<u>3,073,633</u>
	<u>2,947,502</u>	<u>8,727,286</u>
Less : Projects Expenditure for year		
Carib Hyco	(44,921)	570,179
Water Resources assessment	-	(9,100)
Hope Garden New Road	-	(571,133)
Caberita Hydrological Basin	(1,326,414)	(1,760,147)
Hydrometric Network Upgrade	(9,861)	(1,544,221)
Flood Warning	-	(1,794,000)
Cariwin project	(155,207)	(136,458)
IMET Project	(606,133)	(534,905)
	<u>(2,142,536)</u>	<u>(5,779,785)</u>
Balance for Capital Funds - Projects	<u>804,966</u>	<u>2,947,502</u>

10. Capital Project Grant

	2011 \$	2010 \$
Balance at beginning of year	3,724,495	3,920,892
Less : Transfers to other income :		
Other Assets	(767)	(61,806)
Hubert Chin Building	(134,591)	(134,591)
	<u>3,589,137</u>	<u>3,724,495</u>

These represent the value of assets transferred to the authority, which were purchased and used by various projects and also includes capital grant received for the construction of the Hubert Chin Building. This account is being written down by an amount equivalent to the depreciation charged on these assets, and is included in other operating income.

Water Resources Authority
Notes to the Financial Statements
31 March 2011

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11. Other Projects Fund

	2011	2010
	\$	\$
UNDP/GOJ Project	428,420	428,420
MACC	694,944	694,944
UNDP Radar	(3,336)	(3,336)
MACC Project - Clarendon	(665,513)	183,260
Rainwater Harvesting-FAO	385,875	-
Hunslow Project	745,960	(665,512)
	<u>1,586,350</u>	<u>637,776</u>

12. Accumulated Surplus

	2011	2010
	\$	\$
Balance at beginning of year	47,575,110	48,656,446
Operating Surplus for the year	(2,744,788)	(1,081,336)
	<u>44,830,322</u>	<u>47,575,110</u>

13. Payables and Accruals

	2011	2010
	\$	\$
P.A.Y.E.	-	368,172
Education tax	-	(222,788)
Insurances	-	107,903
Credit Union	-	3,000
N.I.S.	-	112,257
Consultants and professional fees	-	793,986
Subsistence, overtime and salaries	-	96,146
Accounting fees	511,000	120,000
Projects	1,802,000	2,752,456
Electricity, water and insurance	-	27,710
Administrative expenses	1,426,975	1,526,149
	<u>3,739,975</u>	<u>5,684,991</u>

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Notes to the Financial Statements

31 March 2011

14. Other Operating Income

	2011	Restated 2010	Restated 2009
	\$	\$	\$
Transferred from capital project	135,358	196,607	196,607
Investment Income	342,135	533,231	419,208
Other Income	109,595	46,013	49,648
Well applicant fees	2,985,000	3,250,000	1,715,000
Reimbursements	2,095,579	577,613	1,709,824
Interest Income	916,756	2,065,413	2,248,951
Gain on disposal of fixed assets	-	-	90,995
Gain on foreign exchange	-	-	867,307
	<u>6,584,424</u>	<u>6,668,877</u>	<u>7,297,540</u>

15. Administrative and Other Expenses

	2011	2010	2009
	\$	\$	\$
Salaries and related costs	89,561,275	85,609,172	97,515,409
Staff Benefits	7,252,593	5,687,846	7,401,024
Pension- employer's contributions	7,916,024	8,224,528	8,420,074
Accommodation and Machine Rental	1,587,203	1,388,408	1,717,639
Telephone	784,173	723,732	872,780
Utility expenses	3,380,786	3,612,944	3,390,996
Motor vehicle expenses	3,155,360	3,471,202	2,796,591
Repairs, materials and related expenses	2,180,645	1,158,258	1,369,100
Construction materials	164,578	160,872	457,791
Security	1,252,039	1,310,700	1,200,480
Postage, Stationery and printing	1,513,469	1,631,523	1,441,081
Donations and Subscriptions	116,033	176,166	226,397
Consultants Fees	448,848	235,922	1,030,667
Accounting Fees	370,039	456,031	717,000
Foreign Travel	151,085	305,880	2,739,343
Travel and subsistence	19,366,215	18,530,641	20,436,396
Bank Charges	73,080	45,271	65,217
Miscellaneous purchases	495,740	462,749	601,815
Depreciation	5,990,901	6,159,712	6,348,531
Insurance - property	1,385,326	1,089,344	1,066,814
Advertising	337,242	1,040,292	529,932
	<u>147,482,654</u>	<u>141,481,193</u>	<u>160,345,077</u>

Water Resources Authority
Notes to the Financial Statements
31 March 2011

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16. Restatement

The financial statements for the years 2010 and 2009 were restated to reflect the impact of revaluing own use property to reflect market value. The prior years fixed asset value, depreciation charge and revaluation reserve accounts were affected.

17. Revaluation reserve

The revaluation reserve was as a result of revaluing the office bulidings. The movement on the resrve account was as follows:

	2011 \$	2010 \$	2009 \$
Opening balance	95,000,000	85,000,000	-
Change during the year	<u>8,000,000</u>	<u>10,000,000</u>	<u>85,000,000</u>
Closing balance	<u><u>103,000,000</u></u>	<u><u>95,000,000</u></u>	<u><u>85,000,000</u></u>

**DIRECTORS AND SENIOR EXECUTIVE COMPENSATION
2010/2011**

DIRECTORS COMPENSATION 2010/2011

Position of Director	Fees (\$)	Motor Vehicle Upkeep/Travelling or Value of Assignment of Motor Vehicle (\$)	Honoraria (\$)	All Other Compensation including Non-Cash Benefits as applicable (\$)	Total (\$)
Dr. Parris Lyew-Ayee-Chairman	156,000.00	-		-	156,000.00
Ms. Camiek Blair	76,000.00	20,748.00		-	96,748.00
Dr. Geoffrey Williams	65,500.00	154,028.00		-	219,528.00
Mrs. Cheyenne McClarthy	81,500.00	15,785.00		-	97,285.00
Mr. Alexander Williams	70,000.00	2,520.00		-	72,520.00
Ms. Sandra Buchanan	76,000.00	3,168.55		-	79,168.55
Dr. Willard Pinnock	77,500.00	-		-	77,500.00

Notes

1. Where a non-cash benefit is received (e.g. government housing), the value of that benefit shall be quantified and stated in the appropriate column above.

SENIOR EXECUTIVE COMPENSATION 2010/2011

Position of Senior Executive	Salary (\$)	Gratuity or Performance Incentive (\$)	Travelling Allowance or Value of Assignment of Motor Vehicle (\$)	Pension or Other Retirement Benefits (\$)	Other Allowances (\$)	Non-Cash Benefits (\$)	Total (\$)
Managing Director	5,747,000	1,431,308	398,250	-	-	-	7,576,558
Deputy Managing Director	3,453,228	-	796,500	-	-	-	4,249,728
Director Finance & Accounts	2,957,042	-	796,500	-	-	-	3,753,542

Notes

1. Where contractual obligations and allowances are stated in a foreign currency, the sum in that stated currency must be clearly provided and not the Jamaican equivalent.

2 **Other Allowances (including laundry, entertainment, housing, utility, etc.)**

3 **Where a non-cash benefit is received (e.g. government housing), the value of that benefit shall be quantified and stated in the appropriate column above.**