



e-Source

Hurricane Maria Recovery in Dominica



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CAWASA Secretariat News

BWS Electrical Team dispatched to Dominica to assist with Hurricane Relief to restore water systems



L-R: Fredrick Sandiford, Russel Young, Ignacio Belisle and Edmond Pandey



STIHL Chain Saw

Today, Monday November 13, 2017, our BWS team arrived in Dominica after travelling the entire weekend to assist with restoration efforts after damages experienced due to the recent hurricane activities in the Caribbean. The team comprises: Mr. Frederick Sandiford, Resident Engineer Consultant and Electrical Engineer, Russell Young M&E Supervisor, Edmond Pandey, and Ignacio Belisle, Senior Electricians. These employees willingly responded to a call for assistance from the Dominica Water and Sewage Company (DOWASCO), which was channeled through the Caribbean Water and Wastewater Association (CWWA) of which BWS is a member.

Minister Reginal Austria, Minister responsible for water in Dominica, reached out to the CWWA last week requesting urgent help to connect eleven (11) standby/mobile generators to power their treatment plants and pumping stations. Dominica does not expect to have electricity supply fully restored for months, and desperately needs to restore a full potable water supply to the population to ensure clean and healthy living conditions.

The call was well received by BWS, who within days organized and mobilized our experienced team to the island. The Team left Belize on Saturday and had to overnight in Miami and then again in St.

Lucia, before taking a four-hour boat ferry to arrive in Dominica as all available flights to Dominica were fully booked out.

Dowasco has also requested some crucial electrical items such as transfer switches which are not available in Dominica at this time. The team had to carry all this extra overweight of equipment on their adventurous journey along with tools and the other items deemed necessary to assist them with working in the recovery environment.

BWS has also separately donated some essential supplies and equipment to DOWASCO, including:

- 1500 Glove latex 18 mil lined latex rolled cuff embossed grip;
- 100 Glove power flex Natural rubber 206402-9;
- 25 box Tyvek coverall zipper front elastic cuff & ankle white X-large box;
- 6 chain saw STIHL MS 251 W/18" Bar;
- 6 Saw cutoff gas powered STIHL TS420 CUTQUIK.

BWS is proud our team, whose members all answered the call to serve as our ambassadors. They were willing and ready to serve at a moment's notice. They exemplify those attributes and core values we all must promote as we journey to attaining our vision to be the leading utility in the developing world.

2017 A Year of Accomplishments and Challenges



Ignatius Jean Executive Director CAWASA

This first issue of our quarterly publication, E-Source, gives us the opportunity to reflect on the past year and to give a sneak peek into 2018. The year 2017 was mixed with significant accomplishments and challenges for our Association. The devastation caused by the mega storms, Irma and Maria, are now etched in the annals of history with many important lessons for us all.

These severe events highlighted both longstanding and acute needs to improve water and wastewater infrastructure resiliency. As high-intensity storm events like these become more common, there is urgent need for our utilities to establish a structured disaster response mechanism that will enable affected utilities resume normal operations quickly after a catastrophic event.

Catastrophes like Hurricanes Irma and Maria remind us of the common humanity we share. This was manifested through the outpouring of help to the devastated islands. On behalf of our affected utilities, we wish to acknowledge with sincere gratitude the solidarity demonstrated by all our utilities, governments, donor agencies, people and private sector from near and far.

During 2017 we delivered a very successful Water Operators' Conference, launched the online 360 Water Operator training platform, upgraded our website, established several new relationships with external training agencies and registered a few associate members. In the latter part of the year we were actively involved in post hurricane relief and recovery effort for affected utilities in the region.

2018 started with the exciting news of the approval of a US\$149,000 grant from the Caribbean Development Bank (CDB) for hurricane recovery support for the Dominica Water & Sewerage Company (DOWASCO), and the Water and Sewerage Department (WSD) of The British Virgin Islands. We also had good news for our operators who are pursuing the ABC Certification programme, that we will soon transition from paper-based examinations to web-based examinations. In addition, we have intensified the promotion of the ABC Certification programme through outreach to the various utilities beginning with the Barbados Water Authority (BWA) as well as the access to a suite of online study materials.

We take the opportunity to congratulate the Board of Directors, Management and Staff of the Water Authority of the Cayman Islands on the occasion of the 35th Anniversary their utility.

As with any new year, 2018 has arrived with an exciting mix of opportunities and challenges. We promise to improve our support to our utilities in strengthening their capacities, staff training and development, and strengthening the networks among utilities and development partners.

We look forward to your valued contributions to our quarterly newsletter E-Source in 2018 and beyond.

CAWASA Receives CDB Grant of US\$149K for Dominica and BVI Hurricane Recovery

The Caribbean Development Bank (CDB) has approved a grant of US\$149,521 for the implementation of a Hurricane Recovery Project for Dominica and the British Virgin Islands (BVI): "Emergency Relief for Water Supply and Sanitation Services - Hurricane Irma and Maria".

The Project will be managed by CAWASA in collaboration with the beneficiary water utilities and regional partners. The funds will be applied towards the procurement of materials and supplies, transportation and accommodation of work crews from regional utilities.

In September, 2018 Hurricanes Irma and Maria struck the Northern and Eastern Caribbean islands with incredible power and fury, wreaking havoc in communities across the region. Entire neighbourhoods were devastated. Families lost their homes. Businesses were destroyed. Infrastructure was torn apart. It was another major blow to the island of Dominica in particular, that was only just recovering from the devastation caused by Tropical Storm Erika in August, 2015.

In the aftermath of the devastation, it was clear that the region faced a long, hard road to recovery.

The availability of safe water and basic sanitation conditions are fundamental for protecting the health of the people in these islands, particularly in the aftermath of these catastrophic events when people are displaced and vulnerable. Furthermore, the affected utilities were totally overwhelmed by the magnitude of destruction. It is in this regard that CAWASA approached the CDB for financial assistance towards the expeditious restoration of water and sewerage services in affected islands.

CAWASA members as well as other water utilities and key partners such as the Caribbean Water and Wastewater Association (CWWA) and the Caribbean Desalination Association (CaribDA), have all given tremendous support to the recovery programme. CAWASA would like to thank the CDB for funding this project. The CDB is a leading partner in infrastructure development and disaster risk management in the Caribbean.

NAWASA Team Return from Supporting DOWASCO



International Airport by General Manager Mr. Christopher Husbands, Manager and Assistant Manager of Transmission and Distribution Mr. Joel Thomas and Mr. Ernest Bruno, and Human Resource Manager Mrs. Pansy Ventour.

Immediately on his return Kurt Edwards indicated his readiness to return to the Nature Isle to assist in completing the work they have started. "It was good; very challenging as well...I'm

Three National Water and Sewerage Authority (NAWASA) employees are back home, having spent three weeks in Dominica assisting Dominica Water and Sewerage Company (DOWASCO) workers with the restoration of the islands water supply.

NAWASA officials welcomed Gerard Simon, Garvin Jones and Kurt Edwards back to Grenada on Thursday November 23rd, 2017 following their tour of duty in the Hurricane Maria ravaged island of Dominica.

The three employees, who volunteered their time were greeted at the Maurice Bishop

willing to go back and give them the pull out because it has a lot of work still to do." Edwards says he does not mind the hard work and long hours.

In outlining their experience in Dominica, Gerard Simon indicated that they worked along with both DOWASCO and other regional partners to get the job done. "We worked long side and we made things happen because working in the woods with just a bag with some water and a snack and we worked for hours...Saturday, Sunday, every day of the week".

Simon welcomes the opportunity he was

afforded to assist Dominica's nationals.

The third of the three, Garvin Jones, was also grateful for the opportunity to be able to assist. "The place was real destroyed. It brought back memories to how Ivan was...but we did our best and the Dominicans were happy that we came to help them out."

General Manager Christopher Husbands highlights NAWASA's corporate social responsibility and notes that the company stands ready to send another team if a request is made. DOWASCO management indicated that the team did an exceptional job and expressed gratitude for the support. Mr. Husbands notes that as a regional utility and having gone through a similar experience following the passage of Hurricane Ivan, NAWASA understands what it's like to be thrust into that situation. "Certainly, the region as a whole has increased collaboration and support for one another because you never know when any one island can get hit, so we were happy to be able to join the effort."

The three NAWASA employees willingly worked long hours and took pleasure in the joy of residents on having their water supply restored. According to the three, they will not trade the opportunity to come to the aid of those in need for anything. The NAWASA General Manager has indicated that he continues to be in contact with DOWASCO officials and stands ready to send another team to Dominica if a request is made.

WASCO Supports St. Kitts Water Dept in Aftermath of Hurricane Irma

— by T. Denison Paul, Manager/Water Engineer (Ag.), St. Kitts Water Department —

The St. Kitts Water Services Department welcomed a team of technicians headed by Mechanical Engineer Mr. Tera Victor from the Water and Sewerage Company (WASCO) of Saint Lucia on 10th September, 2017, a few days after the passage of Hurricane Irma.

The WASCO Team comprised Mr. Tera Victor, Mr. Anthony Fannis, Mr. Justin Small, Mr. Malone Brouet, Mr. Jameson O'Henry, Mr. Tomy Adolph, Mr. Raphael St. Fort, and Mr. Peter Clifford.

They arrived in St. Kitts on September 10th and departed on September 20th and 22nd.

The team was in St. Kitts based on an offer of assistance from the government of Saint Lucia to help in rehabilitating the drinking water system after the passage of Hurricane Irma.

The team offered invaluable assistance in the following areas:

- Mechanical and electrical repairs to standby generators used to power pumps in wells as power was out for at least one week in some communities.
- Mains repairs, as a result of fallen trees and undermined pipelines.
- The clearing of silted water intakes.

The stay was initially intended to be for one (1) week but was extended to two (2) weeks, but was reduced to ten (10) days. The team was recalled to make preparations in their home country for the impending Hurricane Maria.

The Water Services Department and by extension the Ministry of Public Infrastructure, Posts, Urban Development and Transport and the Government and people of St. Kitts-Nevis want to record our deep appreciation to the Government and people of St. Lucia for this assistance.



CAWASA Secretariat News

APUA Water Technicians Account of the deployment to Dominica

Approximately 5 weeks following the passage of Hurricane Maria, the Antigua Public Utilities Authority (APUA) Water Business Unit, deployed six (6) technicians to assist the Dominica Water and Sewerage Company Limited in restoring the water distribution network. This visit would be the second deployment following a natural disaster, the first being post-Tropical Storm Erika in 2015. The team departed Antigua Monday October 30th and returned on Monday November 13th, 2017.

The team led by Foreman Devon Payne, along with a crew from DOWASCO, conducted a preliminary assessment on a portion of the water distribution network. During the two (2) week period, the mandate of the APUA water technicians was to separate and re-establish linkages on transmission mains, pipe flushing, salvaging and reattaching pipes at various points along the network. The work required caused a period of service disruption to small areas including portions of Roseau.

Unfortunately, a significant amount of tools and machinery were lost during the storm or stolen which affected DOWASA's ability to rebuild the network.

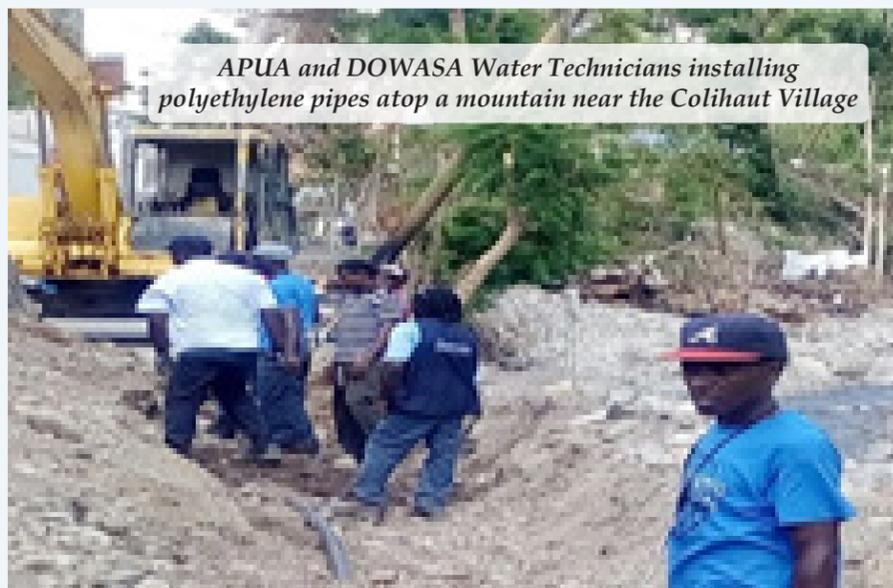
The Dominican water distribution network is primarily a gravity fed system utilizing all natural water sources inclusive of springs and rivers with above ground

transmission mains which make them susceptible to damage from landslides.

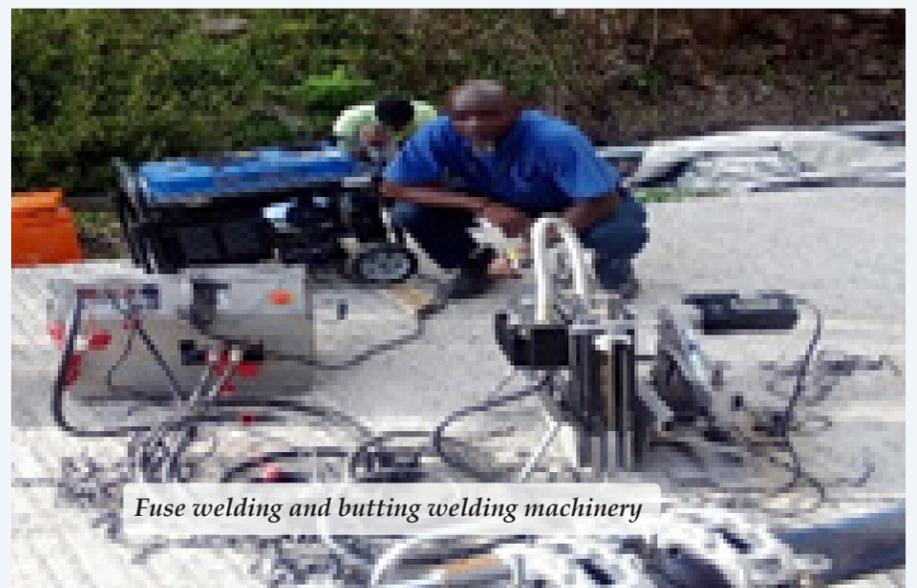
According to APUA Lab technician, Kashif Kelly, the water supply in Dominica is plentiful but says the pipes to the mountainous areas which run from the storage facility were damaged due to landslides. He reports that the lab was without power when the team arrived and they resorted to using the mobile test kit brought over from Antigua. The team tested the water supply for the presence of copper, aluminum, nitrogen magnesium among other compounds. Samples were taken from seven or eight in-takes of water sources and the team reported that the results were satisfactory. The only challenge experienced by the lab technicians was the ability to conduct biological tests to determine the presence of bacteria and the quantity. Kelly assures that this most likely had been completed following the restoration of power to the DOWASA Laboratory.

The APUA Team along with DOWASA was able to restore water distribution to a number of areas including the ravaged Colihaut.

"While there is still much work to be done, the water system has improved and there is a lot of work left to be done. On behalf of my team and I, we are pleased that we were asked to go and assist and restore the water supply in Dominica and we are appreciative of the hospitality that we got," said Payne.



APUA and DOWASA Water Technicians installing polyethylene pipes atop a mountain near the Colihaut Village



Fuse welding and butting welding machinery



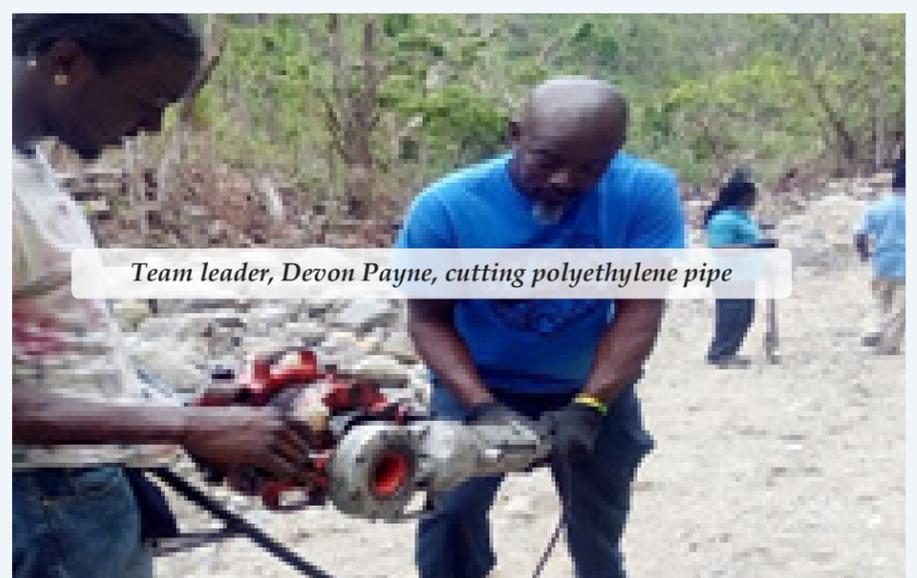
Bonding pipes using the butt welding method



APUA and DOWASA technicians threading 4" galvanize mains



Fuse welding polyethylene pipes



Team leader, Devon Payne, cutting polyethylene pipe

13th High Level Forum of Caribbean Ministers Responsible for Water at CWWA 2017 Conference in Guyana



The 13th High Level Forum (HLF) of Caribbean Ministers with responsibility for Water was held in Georgetown, Guyana, October 17-18, 2017. Participating Ministers included The Honourable Ronald Bulkan of Guyana, The Honourable David Estwick of Barbados, The Honourable Reginald Austrie of Dominica, The Honourable Ezechiel Joseph of Saint Lucia, and The Honourable Claude Hogan of Montserrat. Other key partners represented were the Caribbean Development Bank (CDB), the Inter-American Development Bank (IDB), the Organization of American States (OAS), UN-Habitat's Global Water Operators' Partnerships Alliance (GWOPA), Pan-American Health Organization (PAHO), UNEP ROLAC, United Nations Environment (Caribbean), H.R. Wallingford Consultants, CAWASA, and host, the CWWA.

A Draft White Paper on Governance and Climate Resilience in the Water Sector in the Caribbean was presented by Dr. James Fletcher, former Minister for Sustainable Development and the Environment in Saint Lucia.

Since 2004, the Caribbean Water and Wastewater Association (CWWA) and partners have coordinated and organized the High-Level Forum of Caribbean Ministers Responsible for Water (HLF) on an annual basis. It has become the only dedicated forum for the Caribbean in which high level policy makers, technical experts and development partners meet to discuss critical matters related to Water.

The HLF acts as an information-sharing forum at which there is the expected uptake by all the partners, especially political uptake by CARICOM and others.

The key recommendations of the 13th HLF were:

1. That a discussion take place among the HLF Partners and organs of the Community (CARICOM, OECS and others) about institutionalizing the HLF as a viable and legitimate forum for addressing Water and Wastewater issues for uptake at the political and policy levels.
2. Further refinement of the White Paper which will feed into the Action Plan for presentation to a similar meeting to review the Draft Strategic Action Plan.
3. Establishment and implementation of a Public Awareness and Stakeholder Programme regarding the Caribbean input to the World Water Forum and development of the Caribbean Strategic Action Plan.
4. Continued meeting of the Water Focus Group to provide technical input into the Paper and Action Plan.
5. Involvement of Champion Minister for Water who will engage with fellow Ministers at the political level to endorse/support the process of the development of the Strategic Action Plan.

Successful 2-day Seminar for BWA Staff

The Caribbean Water and Sewerage Association Inc. in collaboration with the Barbados Water Authority (BWA) hosted a successful two-day orientation seminar on the Operators Certification Programme for staff of the Barbados Water Authority. The Seminar was held on February 7 and 8, 2018 at the Barbados Water Authority Training Room Headquarters at Wildey, St Michael.

The Seminar was facilitated by the Executive Director of CAWASA, Mr Ignatius Jean, Programme Officer of CAWASA, Ms Suzanne Joseph, Director of I G Training and Consultancy, Irwin Gill and President/CEO of DBL Group, Mr David Boyce (Chartered Engineer).

A total of 18 participants attended the seminar. The participants were intensely engaged throughout the 2-days and expressed their keen interest in enrolling in the ABC Operators Certification Programme in short order. The experience of the participants ranged from entry-level trainees to 20 year veterans in wastewater operations, laboratory technicians, electrical and mechanical operators, water and wastewater engineers and supervisors.

Topics covered included: (i) Introduction to the ABC Certification Programme (ii) Introduction to the 360 Online Training (iii) Certification Programme Best Practices (iv) Experiences of Veteran Practitioner and the Value of Continuous Education and Professional Development.

Other activities included Revision Exercises, Quizzes and raffling of relevant resource books/material.

The CAWASA Team also met with the Mr. Keithroy Halliday, General Manager of the BWA, who endorsed the training seminar and thought that it was a timely and relevant undertaking which is aligned to the new vision and transformational plan of the BWA.

CAWASA would like to express its appreciation to Mr Keithroy Halliday and management of BWA, the Human Resources Department, particularly Ms. Andrea White - Human Resources Officer - Training and Development, for coordinating the participation of the BWA staff and logistical arrangements for the CAWASA Team.



5th Water Operators' Conference in Dominica

The Caribbean Water and Sewerage Association Inc. (CAWASA Inc), in collaboration with the the Dominica Water & Sewerage Company (DOWASCO), and with the support of the Global Water Operators' Partnerships Alliance (GWOPA), organized the 5th Caribbean Water Operators Conference under the theme "Connecting Water Operators: Strengthening Utilities". The Conference was held at the Fort Young Hotel, Roseau, Dominica from June 29-30, 2017.

Participants were drawn from regional water utilities, Non-Governmental Organizations, the Association of Boards of Certification (ABC), a University and private companies operating in the water and wastewater sector in the Caribbean. A total of forty-seven (47) participants, including presenters attended the conference.

The Key Note Speaker was Mr. Lennox O'Reilly Lewis, professional engineer and Head of the Economic Infrastructure Division at the Caribbean Development Bank (CDB), who emphasized the need for improving the resilience of the Caribbean's water supply systems to the impact of climate change and variability. He was of the view that water operators will have to play a critical role in this regard.

The Permanent Secretary in the Ministry for Housing, Lands and Water Resources Management, Dominica, Mr. Lucien Blackmore delivered remarks on behalf of the Honourable Minister Reginald Austrie, who was unavoidably absent. While CAWASA's President Mr. Christopher Husbands in his remarks, encouraged participants to engage their fellow CAWASA operators for networking purposes. He informed the operators that they are at the heart of the vision for the improved delivery of water and sewerage services in Caribbean utilities.



Mr. Lennox O'Reilly Lewis, professional engineer and Head of the Economic Infrastructure Division at the Caribbean Development Bank (CDB)



Mr. Lucien Blackmore The Permanent Secretary in the Ministry for Housing, Lands and Water Resources Management, Dominica

Water Operators Competition



A distinguishing feature of the Conference is the Water Operators' Competition. This activity gives the operators an opportunity to display their technical skills, forge team spirit and networking. Twelve (12) participants from five (5) countries took part in the competition. The participating utilities were: APUA (Antigua & Barbuda), DOWASCO (Dominica), NAWASA (Grenada), CWSA (St. Vincent & the Grenadines) and WASA (Trinidad & Tobago). The competition took the form of the installation of a 4" valve on a 4" line. The competitors received monetary prizes and trophies as follows:

- **DOWASCO:** First place (monetary prize - US\$500.00 and trophy donated by I Gill Training & Consultancy - Trinidad)
- **NAWASA:** Second place (monetary prize of US\$300.00 donated by CAWASA)
- **APUA:** Third Place (monetary prize of US\$200.00 donated by CAWASA).



Team DOWASCO



Team CWSA



Team Trinidad & Tobago



Team NAWASA



Judges: Montserrat, Bahamas, Saint Lucia

Web-based Operator Certification Exams

CAWASA is pleased to announce that effective February, 2018 **Web-based testing** will be offered to our members and clients.

CAWASA is a member and the sole authorized agents of the Association of Boards of Certification (ABC) of the USA in the Caribbean Region. The ABC offers its members and testing clients three examination modes: **paper-based, computer-based, and web-based**. CAWASA has only utilized the paper-based model.

In preparation for this transition, the ABC conducted a training session for our Proctors and Human Resources Managers on January, 30.

This is a welcome change that will enable us overcome the logistical challenges of couriering packages around the Caribbean as well as associated costs.

With the **computer-based model**, clients can have their exams administered through a network of third-party (PSI) computer-based testing centers. This option is limited to the testing centers PSI has available – they will only open additional centers if there is sufficient existing and sustainable demand.

Web-based testing allows members and testing clients to administer their exams themselves through ABC’s web exam system. ABC host the exam and CAWASA, the testing client/member, effectively connects candidates to that exam while administering/proctoring the exam in accordance with ABC’s policies. This allows a great deal of flexibility but requires a bit more responsibility.

CAWASA and its Members will provide a suitable testing environment with **internet-connected computers** and will work with the ABC to set the exams up. Through this method, CAWASA will oversee all steps in the certification process – ABC is just simply supplying a web-based exam rather than a paper one.

The exam for web-based testing will be similar to the existing paper-based method. Candidates are required to apply or register for the exam through CAWASA.

An exciting feature of the web-based system is the Instant Score Report. On completion of the exam, the system automatically generates a score report that will be sent to the CAWASA and the candidate.

In addition to the instant score report, ABC will provide CAWASA, comprehensive score reporting that can be done on a set schedule. ABC will generate and send these reports on a monthly basis to CAWASA. These reports will include a Mastery Summary Report, Test Statistics Report, and Group Detail Report for each test form administered during the reporting period – these reports will be sent to members. Certificates will be issued by CAWASA.

Submission of Exam Orders

Please note: Web-based exam orders are to be submitted at least 3 weeks before a scheduled exam date. You need to submit to CAWASA the completed Registration Forms so that we can forward the exam order to ABC.

CVQ Pilot in Saint Lucia: Standards for Plumbing Validation



In late 2016, the Secretariat embarked on a pilot project with the Saint Lucia Council for Technical Vocational Education and Training (SLCTVET), through the TVET Unit of the Ministry of Education in Saint Lucia to validate three sets of regionally approved standards for the Caribbean Vocational Qualification (CVQ) for Plumbing for Plant Operators. A Local Industry Advisory Committee (LIAC) was established to undertake inter alia; editing regional standards to be used for training and certification and to recommend these validated standards towards the award of the CVQ for new and existing plumbers in the Water Distribution Occupation inclusive of Pipe laying for water and waste water.

This advisory committee comprised Ms. Ruth Charlemagne, Standards Training Officer, TVET Unit, Ministry of Education; Mr. Anthony Reece, Senior Technician – Water Distribution at WASCO; Mr. Gregory Inglis, Plumber at WASCO in his capacity as the representative of National Workers’ Union; Mr. Justin Sealy, Water & Wastewater Engineer; Mr. Terrence Gailliard, Water Specialist at the National Utilities Regulatory Commission (NURC); Mr. Karl Polius, Managing Director, Plumbing, Building Services & Supplies Limited; Mr. Orjan Joe Linberg, Mechanical, Building Services Engineer and Lecturer in Building Services and Plumbing at the Sir Arthur Lewis Community College (SALCC); and Mrs. Suzanne Joseph, Programme Manager, CAWASA.

We are pleased to report that the validation exercise for the standards of the CVQ is complete for the following occupational areas:

- Pipe-laying (Water and Wastewater) Level 1
- Water Distribution System Operations Level 1
- Plumbing Level 1

The Caribbean Vocational Qualification (CVQ) is an award that represents the achievement of

a set of competencies. These competencies define the core work practices of an occupation; are based on CBET¹ which offers a common approach to training, assessment and certification; and based on regionally approved occupational standards.

Having completed this pilot in Saint Lucia, the Secretariat will use this platform to collaborate with the SLCTVET in Saint Lucia to replicate in other jurisdictions in the Caribbean.

¹Competency Based Education Training

CAWASA/ABC Operator Certification Examinations

Successful Operators July & December 2017 Examinations

July 2017 – December 2017	Antigua & Barbuda	Terry Benjamin	Water Distribution	III & IV
		Jelani Liverpool	Water Distribution	II
	Cayman Islands	Vargas J C Leiva	Water Distribution	I
	Dominica	Edward Jn Baptiste	Water Distribution	I
		Berlvin Gardier	Water Distribution	III
	Trinidad & Tobago	Malanie Eversley	Wastewater Treatment	I
		Ken Marshall	Wastewater Treatment	I
		Brent Morgan	Water Treatment	I
		Devika Rooplal	Wastewater Treatment	III
		David Benny	Water Treatment	III
		Everis Gonzales	Water Treatment	III
		Sinatra Mohammed	Water Treatment	III

Congratulations to

Terry Benjamin

Senior Operator, Water Distribution, APUA, Antigua & Barbuda
Level IV Certification in Water Treatment and Water Distribution

Terry Benjamin began working at the Antigua Public Utilities Authority at the age of 20 with his first role being an Operator in the Electricity Department. He held that position for 19 years, after which he transferred to the Water Department and took up the role of Senior Operator in the Water Distribution Plant. He currently holds the position of Assistant Supervisor of the Shell Beach Reverse Osmosis Plant.

Benjamin has over 29 years’ experience as an operator in both Electricity and Water Departments and credits his success thus far, to discipline and steady determination and a strong work ethic that he has developed over time. It was also due to these factors that he passed both the Level IV Water Treatment Operator Certification and the Level IV Water Distribution Operator Certification in 2015 and 2017 respectively.



CENTRAL WATER & SEWERAGE AUTHORITY ST. VINCENT & THE GRENADINES PUBLIC RELATIONS & MARKETING

2018 THEME:

"INTERNATIONAL YEAR
OF CONSERVATION
AND STORAGE"

This theme was developed and adopted in response to and recognition of the increasing frequency of extreme weather events associated with climate change and the resulting negative impacts on the CWSA's water supply systems and our ability to consistently treat and distribute potable water to our customers

The theme and promotion is intended to create a national awareness among the population and customer base for the importance of water and the need to partner with the CWSA in conserving water and augmenting their own domestic storage capability in the event of water supply loss. The awareness drive will also include a continuing plea to the public to report leaks that are not easily visible to the CWSA's emergency hotline for immediate follow up.

At the same time, in order to strengthen the partnership between the CWSA and its customer base, the CWSA, in encouraging customers to increase their own domestic storage capacity, will also highlight the tremendous efforts made by the CWSA over the years in consistently increasing its island wide water storage capacity from just under one day in 2004 to 1.5 days in 2017. This will be done by highlighting in chronological order the implementation of water reservoir projects over the years using pictures and narrative.

The CWSA will also be providing advice to the population on domestic water storage including sizing of water tanks, plumbing and leakage controls and treatment.

It is anticipated that with increased domestic storage, there will be mutual benefits to both the customer and the CWSA, in that in the event of a loss of supply, complaints will be minimized and the CWSA would be in a better position to supply the more vulnerable sections of the population in an emergency.

The CWSA will also be continuing to ensure that all emergency shelters and critical public institutions are outfitted with adequate storage. This will be done through direct contributions and in conjunction with the private sector.

Newest Associate Member of CAWASA



*David Boyce, Managing Director
DLB Group Ltd Consultancy
Services*

DLB Engineering was established in 1999 and provides services in a range of engineering disciplines primarily focusing on project management, municipal engineering, infrastructure designs and sourcing of financing for major investments. The company was reconstituted in 2016 as a Corporate Body registered as DLB Group Ltd., Trading in Designs Lands and Business.

The Company has been associated with a number of specialists within various sectors of water and infrastructure and has developed capabilities to meet the needs of several clients in water, commercial operations, schools, transportation and environmental types programmes.

For additional information visit their website: <http://dlbgrouppltd.com/>

BWA Personal Water Tank Programme

In 2017 the Barbados Water Authority (BWA) launched the Personal Water Tank Programme (PTP), a drought relief measure to benefit the most vulnerable communities affected by drought. The programme is a public/private partnership between the Barbados Water Authority and the City of Bridgetown (COB) Credit Union.

The PTP offer residents in St. John, St. Peter, St. Joseph, St. Andrew and St. Thomas the opportunity to have a 400-gallon tank, pump, fittings and installation on a full-tank solution under a five-year interest-free hire purchase agreement from the BWA. The BWA also offers free installation of the PTP system and the tank is filled by the BWA tankers under the Rapid Response Unit during outages.

CWSA declares 2018 the Year of Storage

Meanwhile, the Central Water and Sewerage Authority of St. Vincent and the Grenadines has declared 2018 the year of storage.

WATER STORAGE SOLUTIONS

2018 Is The Year of Storage!

DON'T BE CAUGHT OFF GUARD, BE STORAGE SMART...

INVEST IN A WATER TANK TO ALLEVIATE THE IMPACT OF WATER DISRUPTIONS CAUSED BY WEATHER RELATED AND EMERGENCY SITUATIONS.

FOR INFORMATION ABOUT INSTALLATION OF WATER TANKS, PLEASE CONTACT YOUR PLUMBER.

US\$3.5 Million UAE Grant for BWA Solar Project



The Barbados Water Authority (BWA) recently signed a US\$3.5 million grant agreement with the United Arab Emirates (UAE) that will fund two new solar projects in Barbados.

The first project is a 500 kilowatt (kW) ground-mounted solar photovoltaic (PV) project at the Bowmanston pumping station in St. John. The project will reduce the Barbados Water Authority (BWA) energy consumption by 20% and reduce yearly cost by \$500,000. The BWA will also have the capacity to continue pumping water in the event of a power outage.

The second project would be the building of a 350 kW solar car port at the old Cave Shepherd warehouse, opposite the Bridgetown Sewerage Treatment Plant.

WATER AUTHORITY – CAYMAN ISLANDS LABORATORY ACCREDITATION RENEWED



“The renewal of the accreditation for another two years provides me with a sense of external validation for the hard work that the Lab staff put in every single day,”

Following another successful audit by the American Association for Laboratory Accreditation, Water Authority – Cayman Laboratory’s ISO/IEC 17025 Accreditation was recently renewed.

The Laboratory has maintained its accreditation since 2002, when it became the first laboratory in the Caribbean specialising in water and wastewater analysis to be internationally accredited by the A2LA. The Laboratory carries out quality control testing of the Authority’s potable water supplies and the treated effluent of the wastewater treatment plant. It also provides testing services to Government agencies, the private sector, and the general public.

The A2LA accreditation was approved until November 2019, following which the Authority will undergo another external audit to continue the accreditation.

Laboratory Manager Marcela Martinez-Ebanks explained that the Laboratory undergoes internal audits each year and external audits every two years to maintain its international accreditation.

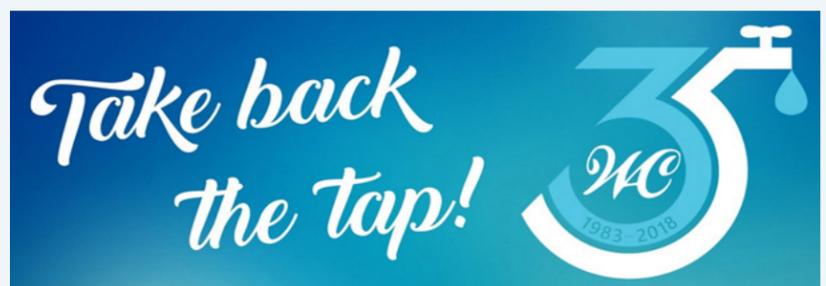
“The renewal of the accreditation for another two years provides me with a sense of external validation for the hard work that the Lab staff put in every single day,” Ms. Martinez-Ebanks said. “It indicates that the quality of our work can stand up to peer review.”

The Laboratory team works diligently to ensure that the tap water produced by the Authority is safe to drink.

The Laboratory’s accreditation was expanded in 2014 to ensure reliable testing of nutrients in wastewater samples. As of November 2014, the Laboratory’s accreditation includes nutrient-related parameters (nitrogen and phosphorous) such as TON (Total Oxidized Nitrogen), Nitrate, Nitrite, Ammonia, TN (Total Nitrogen), SRP (Soluble Reactive Phosphorous) and TP (Total Phosphorous) and Silica. The Authority is in the early stages of exploring the possibility of expanding the accreditation further.

“It is anticipated that, if added, these parameters would become part of our scope in 2021,” Ms. Martinez-Ebanks explained.

Water Authority of Cayman Celebrates 35th Anniversary



This year will mark the 35th Anniversary of the Water Authority of the Cayman Islands. The Water Authority was established in 1983 with the passage of Water Authority Law. In those early days, the Authority had a staff of five and its offices were located in a three-bedroom house on Maple Street in George Town, the capital of The Cayman Islands. The Authority now boasts a complement of over 130 staff members and its customer base has more than tripled in the past 20 years, expanding from 5,000 service connections in 1996 to approximately 19,800 in 2017.

Water Authority Director Gelia Frederick-van Genderen said that the 35th Anniversary marks a very important occasion for the Authority. “This milestone serves as a chance for us to reflect on what we have accomplished over the past 35 years and express our gratitude to the loyal patrons and dedicated staff members who have contributed to our successes as an organization,” Dr. Frederick-van Genderen said. The year-long series of events will include a variety of celebratory occasions and projects to engage with the Authority’s customers and the general public.

The 35th Anniversary will focus on three core themes: tap water, education, and employee engagement. “The purpose of focusing the Authority’s celebration around these three values is to ensure that this milestone has a meaningful impact on the wider community,” Dr. Frederick-van Genderen said. “The Water Authority would not be where it is today without the support of the local community and our staff. So it is important that our celebrations reflect that fact.” The public is encouraged to stay tuned to the Authority’s social media pages and website for more details!

(Extracted from the November, 2017 Newsletter – Water Authority – Cayman)

NAWASA Launches School Community Water Storage Project



The National Water and Sewerage Authority (NAWASA) is seeking to alleviate some of the challenges experienced by some schools when water has to be turned off.

In collaboration with the Caribbean Disaster Management Agency (CDEMA), National Disaster Management Agency (NADMA) and the Ministry of Education and Human Resource Development, NAWASA officially launched its School Community Water Storage project that will see twenty-five (25) schools benefiting on January 22nd, 2018.

Board Director Mr. Christopher De Allie, speaking at the launch, noted the importance of the program that will bring relief to some of the country's schools during periods of drought and excessive rainfall.

This project, was developed in 2015, with the intent of providing water storage tanks to government schools on the island that have no form of storage and experience challenges when there are periods of water interruptions.

Funding was sought from the Caribbean Disaster Management Agency (CDEMA), which was approved under the Caribbean Disaster fund by the European Union Country Directed Fund (CDF) in the value of over EC \$200,000.00

The decision to develop this project stemmed from difficulties experienced by NAWASA during periods of excessive rainfall or drought, in providing a continuous supply of water, resulting in stoppages throughout the state for varying periods and on occasion resulting in instances of school closure for periods ranging from 2-4 days.

Given that these schools have limited or no storage capacity, NAWASA was unable to provide them with truck borne water, leading to school closures and lost tutoring time for students. In light of this, NAWASA designed the Tap Close School's Open community project to ensure that there is basic water storage facility in all schools.

NAWASA collaborated with the Ministry of Education (MoE), for guidance in the development of the project and an assessment was done of the storage capacity of the schools' island wide.

Eight (8) or 38% of the schools requiring intervention, are also designated Hurricane Shelters in Emergency situations and we are very happy to highlight NADMA as a major and important partner for the project.

Project Objectives:

- To install emergency water storage to Schools in Grenada
- To increase water storage capacity to schools in Grenada

OUTCOMES:

- Increased capacity to reduce risks to all hazards

OUTPUTS:

- Water availability and its sustainable use improved
- Over three thousand (3000) students from twenty-five (25) schools will benefit from this initiative as we aim to increase capacity to reduce risks to all hazards Given that 8% of the receiving schools are emergency shelters, this project will enhance the capacity to serve the expected number of shelters should the need arise.

At the project's completion, 25 schools on the tri island (some of which are national emergency shelters) will have functioning water storage systems to mitigate against the effects of climate change. They will have functional water storage systems that will mitigate against shortfalls during the dry and rainy seasons.

This programme will contribute directly with NADMA's Country Work Programme (CWP) 2015- 2019, Outcome 1: Improved capacity to reduce risks to all hazards - Output 1.8 Water availability and its sustainable use improved by improving water storage at schools used as emergency shelters.

This project will be implemented according to contract and within standards. NAWASA will be responsible for seeking cooperation from the receiving

schools through community will work closely with contractors, ensuring that the implementation schedule is maintained.

Following completion, a schedule for maintenance will be provided to the schools and NAWASA will ensure that this is achieved through periodic checks. This will be compounded with further consultation with receiving principals on proper water circulation of the stored supply within the tanks. The Authority will also work closely with the Financial Complex Limited the body responsible for the utility maintenance throughout the education systems Engineers.

A team of Engineers from NAWASA will be responsible for the management of this project. The team will work closely with contractors and suppliers to ensure that project meets all budgetary and scheduled targets.

New Water Supply System for Dennery North in Saint Lucia



In early January, 2018, The United Nations Office for Project Services (UNOPS) announced the completion of the construction works of Phase 1 of the Dennery North Water Supply Redevelopment Project.

The project was made possible through a grant of US\$5 million from the Government of Mexico with additional funds from the Government of Saint Lucia and the mobilization of WASCO and UNOPS Teams.

The project comprised water intake construction and raw water transmission, water treatment plant construction and commissioning, the installation of storage tanks for treated water, the installation of pumping facilities and network distribution upgrades.

The community of Dennery North (population of 8,000) will now enjoy a safe and reliable and climate resilient water supply.

NURC Launches Website



The National Utility Regulatory Commission (NURC) of Saint Lucia launched its website on February 9, 2018 at the conference room of the Ministry of Infrastructure, Port Services and Energy at Union, Castries.

The launch included remarks by Mr. Victor Poyotte, Chairman of the NURC and Mr. Jerome Jules, CEO of the NURC. In his remarks, the CEO outlined the responsibilities of the NURC and said that the website was critical to fulfilling the mandate of the Commission. He cited a quotation from a commercial advertisement: "A business without a sign, is a sign of no business", which implied that the launch of the website was a sign that the NURC was now open and ready for business.

The launch of this new online platform, which offers quick and easy access to essential information about the services offered by the NURC, is part of the organization's ongoing efforts to enhance the quality and availability of information to the public. It also serves as a channel to encourage and facilitate public participation in the regulatory decision-making process. The site has been optimized to ensure that visitors are provided with a "user-friendly" experience

across all digital devices, including desktop and mobile.

The NURC was established by an Act of Parliament (No. 3 of 2016) to regulate water and sewerage services, and electricity supply in Saint Lucia. The responsibilities of the Commission include:

- Ensuring the economic regulation of utility supply services;
- Establishing, approving, monitoring and reviewing tariff schemes and tariffs;
- Monitoring and ensuring compliance with standards;
- promoting the economic regulation of utility supply services;
- Ensuring the protection of the interest of consumers in relation to the provisions of the utility supply service;
- Promoting competition and monitoring anti-competitive practices in the utility supply service, and
- Reporting to and advising the minister with responsibility for public utilities on the economic, financial, legal, technical, environmental and social aspects of the utility supply services sector.

NATIONAL UTILITIES REGULATORY COMMISSION PRESS LAUNCH OF THE WEB SITE Friday February 9, 2018, Remarks by the Chief Executive Officer

Victor Poyotte - Chairman of the Commission, NURC Commissioners, Permanent Secretary - Department of Infrastructure, ports, energy, Permanent Secretary - Department of Sustainable Development, Staff of the NURC, invited Guests, Ladies and Gentlemen, as I gave thought to what I would say in my brief remarks at this, the Press Launch of the NURC's website, I recalled a jingle I heard on the radio a few years ago.

It said "A BUSINESS WITHOUT A SIGN IS A SIGN OF NO BUSINESS"

The person who coined that phrase, which I believed was used to advertise a sign making company, was very cognizant of the value of a sign to the success of most if not all businesses, whether they are for profit or non-profit.

They recognized that unless prospective customers can find your business's physical address, there is very little likelihood that they could access the goods or services your business organization provides.

Today, it may be argued, that a sign that identifies a physical street location may not be as relevant as it was a few years ago.

Since the arrival of the internet, it is now thought that an address that allows people to reach your business on the information superhighway, is now equally, if not more important, than the traditional signage that identifies a business's location.

In fact, given the reach of the internet, one may argue that a website is infinitely more useful than any stationary sign or advertisement in the traditional media; radio, television and newspapers.

Without a web address, there is very little chance you can effectively provide information about the goods or services that you provide to people all around the world, at very little cost.

Consequently, an email address and a web site are now integral elements of an organization's communication strategy.

Some of the benefits of a website to an organization are:

- It can be used to show off its work to its clients and prospective clients
- It can be used Influence people's decisions and educate them on issues that are considered pertinent to them
- It can be used as a medium to obtain feedback from the public
- It can provide information even when the organization's offices are closed



Jerome Jules, CEO, NURC

- Used instead of hard copy brochures and pamphlets to sell goods and services.

An important part of the NURC's mandate is to provide information to and receive information from the community that it serves, as well as to obtain feedback on decisions it makes.

The NURC, as a regulator, is required to follow good regulatory practice and this demands that the regulator obtains the views of persons and organizations who may be impacted by the Commission's practices, procedures and decisions.

We are mandated by various pieces of legislation to engage in public consultation before making a decision.

The Water and Sewerage (General Provisions) Regulation 7(1), mandates the Commission to engage in public consultation before making a decision.

Regulation 10 states in part, that... 'the Commission's decisions shall be in writing and publicly available'.

Provisions are also made in the Draft Electricity Supply Services Bill for the Commission to "conduct public education programmes and consultation meetings to educate the public and develop public awareness on matters related to electricity supply services generally and in the promotion and use of renewable energy.

While both the Water and Sewerage Act and the Draft Electricity Supply Services Bill, prescribe that publication of notices, tariff applications and tariff decisions should be done in the Government of Saint Lucia Gazette and two newspapers with wide circulation, the NURC recognizes the limited reach of these media and also intends to utilize its web site for this purpose.

The value of maintaining a web site was also not lost on the framers of the Water and Sewerage (General Provisions) Regulations, as a provision was made in Regulation 9 (2) which mandates that "The Commission, licensees and permit holders shall maintain a web site designed to keep the public apprised on questions of substantial public significance"

Our website will play a critical role in our public sensitization, information sharing and public consultation strategy. It will serve as a channel to encourage and facilitate public participation in the regulatory decision-making process.

The site has been optimized to ensure that visitors are provided with a "user-friendly" experience across all digital devices, including desktop and mobile.

The website's design places key emphasis on its layout, content, ease of navigation and presentation. The site provides users with access to Policy documents, Legislation, Consultation documents, Licensing Guidelines as well as the ability to lodge and track complaints online.

We want to thank the IT services company CONVERGE for designing this site for us. We thank them for their patience as we went through many design options over the design period.

Caribbean Partners to Participate in the 8th World Water Forum



The World Water Forum is the world's biggest water-related event and is organized by the World Water Council (WWC), an international organization that brings together all those interested in the theme of water. Its mission is "to promote awareness, build political commitment and trigger action on critical water issues at all levels, to facilitate the efficient conservation, protection, development, planning, management and use of water in all its dimensions on an environmentally sustainable basis for the benefit of all life on Earth".

This year the 8th edition of the World Water Forum (WWF8) will be hosted by the City of Brasilia, Brazil from March 18 to 23, 2018. It will

be the first time the event is held in the Southern Hemisphere.

The Caribbean intends to have strong and meaningful participation at the WWF8. One of the key objectives of strong Caribbean participation in the WWF8 is to present a Strategic Action Plan (SAP) as an instrument to donors

and development partners and to use it as a negotiating tool for support for the region.

The primary instrument is a White Paper on Governance and Climate Resilience in the Water Sector which will form the basis of a Strategic Action Plan (SAP) for the Caribbean.

The preparatory process began in September, 2017 when the organisers of the Americas process for the WWF8 convened a meeting in the Bahamas for the purpose of receiving input from the Caribbean and Latin America.

The process continued at 13th High Level Forum (HLF) of Caribbean Ministers for Water at the Caribbean Water and Wastewater Association's (CWWA) 26th Annual Conference in Guyana, October 17th to 18th, 2017. At this forum a Draft White Paper on Governance and Climate Resilience in the Water Sector prepared by Dr. James Fletcher (Consultant), was presented and participants made comments and suggestions for its improvement.

The partners will convene a coordination meeting from February 20th to 21st, 2018 in Barbados to finalize the White Paper and delegation for the WWF8. The White Paper is the key instrument for the Caribbean input to the SAP since it identifies those issues in the water sector that need to be addressed.

Profiles of new appointments at Utilities - WASCO

Corporate Secretary/Legal Officer, **NICHOLA GEORGE-BENJAMIN** has responsibility for the management of WASCO's Legal Unit and also serves as the organization's Corporate Secretary.

Mrs. George-Benjamin brings fourteen (14) years of regional experience, a deep understanding of the regulatory sector and excellent legal insights to the WASCO Team. She has been called as a member to the Trinidad and Tobago Bar, the Bermuda Bar, the Saint Lucia Bar and the Barbados Bar.

Apart from holding a Bachelors of Law (Hons) from the University of the West Indies and being a graduate of the Hugh Wooding Law School, she holds a Masters' Degree in Corporate and Commercial Law. With the wealth of knowledge and experience gained from practicing in several jurisdictions in her various specialties she brings with her an expertise in corporate and commercial law, corporate governance, utilities regulation, consumer protection and competition law.



Strategic Planning Manager **PETER NORVILLE**, Water and Sewerage Company Inc. (WASCO), Saint Lucia.

Peter Norville is a Professional Engineer and Project Manager. He holds Bachelors Degree and Masters Degrees in Agricultural Engineering from the University of the West Indies and Mc. Gill University respectively. He served in Professional Engineering positions in the Ministry of Agriculture and the Ministry of Planning within the Government of Saint Lucia for over 12 years. He is also a certified Project Management Professional (PMP) with over 15 years of Project Management experience, including over 10 years of Senior Project Management experience at the OECS level, and he has worked on several projects funded by international donor agencies including the World Bank and the European Development Fund. He has provided consultancy services to a range of organisations in Saint Lucia and the wider Caribbean region, particularly in the fields of Engineering, Environmental Management and Project Management. He has also served as a member of the Engineers Registration Board of Saint Lucia, and as Chairman of the Environmental Management Technical Committee of the Saint Lucia Bureau of Standards.



DORCIA JAMES-CALLENDAR joined the Water and Sewerage Company Inc (WASCO) in September, 2017 as the Human Resource Manager with over 10 years of Human Resource Management experience.

The key initiatives under her purview include Recruitment and Selection, Performance and Compensation Management, Labor Relations as well as Organisation design and development.

She holds a Bachelor's Degree in Business Administration with second class honors from Monroe College, New Rochelle in New York and a Masters Degree in Business Administration with specialization in Human Resource Management with merit from the Australian Institute of Business, Adelaide, South Australia.



Congratulations to Bernard Maloney Recipient of the CWWA Best Paper Award 2017

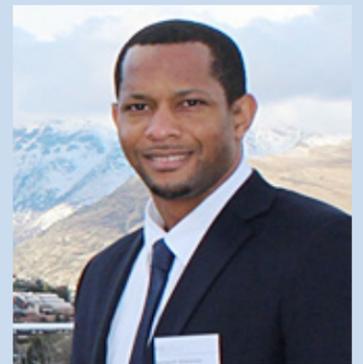
CAWASA takes the opportunity to congratulate Mr. Bernard Maloney recipient of the Caribbean Water and Wastewater Association's (CWWA) Best Paper Award 2017. Mr. Maloney was awarded for his technical paper at the CWWA's Annual Conference held in Guyana in October, 2017.

Mr. Bernard Maloney is a Senior Engineer: Design, Planning, and Hydrology at the Central Water and Sewerage Authority in St. Vincent and the Grenadines. He is a national of the small multi-island State of St. Vincent and the Grenadines where he has worked as a civil engineer since 2010. He holds a Master's degree in Water Resources Management from the University of South Australia (UniSA) with High Distinction.

In 2010, he graduated from the Meritorious Autonomous University of Puebla, in the State of Puebla, Mexico, with the honour of the highest grade point average with a Bachelors of Civil Engineering degree. He attended said institution after being awarded a scholarship from the Mexican Government, through the Organization of American States, to pursue studies in Spanish Language and Culture, as well as his professional training. It was during his undergraduate training that Bernard became interested in the field of water resources management; while working on a research project about the vulnerability of aquifers in the Valley of Puebla. Subsequently, in 2013 he was awarded an Australia Awards Scholarship as well as an invitation to participate in the prestigious Australia Awards Leadership program which is extended to the top 5% of Australia Awards Recipients with the attributes and potential to lead developmental reform. In 2015, he was inducted into the Golden Key International Honour Society, by invitation, based on exemplary academic results at the UniSA.

The following is an abstract of Mr. Maloney's award winning Technical Paper:

"The issues surrounding water supply infrastructure are numerous as the human systems they service are in a constant state of flux. Due to population growth and improved standards of living, rural communities in St Vincent have expanded from the coastal areas towards its mountainous interior. As a result, the gravity fed water supply systems that were designed for lower elevations are becoming obsolete and access to water is being reduced. At present, the Central Water and Sewerage Authority (CWSA) is undertaking a series of projects to improve the supply capabilities of its aging water supply infrastructure. A vital part of these projects is the selection of sites for the construction of storage tanks. Site selection is a complex process that involves various types of issues, objectives, and precision. This paper synthesizes the application of GIS to the process of locating the most suitable sites for a new water distribution tank in the parish of St. Patrick that is currently being served by the Hermitage water supply system. A multi-criteria approach, executed by a weighted linear combination, was integrated into the ArcMap 10.4 software which was able to expedite the site selection process that would previously have incurred notable human resource and time expenditure. Based on the analysis, 1.8%, 27.3%, 47.2%, 22.5% and 1.2% of the possible sites were determined as 'most suitable', 'more suitable', 'suitable', 'less suitable' and 'least suitable' for the construction of a storage tank. It is an added expectation that this methodology be adapted to other parishes and supply systems in St. Vincent as the CWSA strives to integrate GIS into its operations."





HOW CAN WE REDUCE FLOODS, DROUGHTS AND WATER POLLUTION? BY USING THE SOLUTIONS WE ALREADY FIND IN NATURE. DIVE IN AT **WORLDWATERDAY.ORG**

World Water Day is held annually on 22 March, a day designated by the United Nations to celebrate the importance of water sustainability. The 2018 theme is Nature for Water.

According to UN-Water, the United Nations' inter-agency collaboration mechanism for all freshwater issues, this year's theme explores how we can use nature to overcome the water challenges of the 21st century.

Environmental damage, together with climate change, is driving the water-related crises we see around the world. Floods, drought and water pollution are all made worse by degraded vegetation, soil, rivers and lakes.

When we neglect our ecosystems, we make it harder to provide everyone with the water we need to survive and thrive.

Nature-based solutions have the potential to solve many of our water challenges. We need to do so much more with 'green' infrastructure and harmonize it with 'grey' infrastructure wherever possible. Planting new forests, reconnecting rivers to floodplains, and restoring wetlands will rebalance the water cycle and improve human health and livelihoods.

Sustainable Development Goal 6 - ensuring availability and sustainable management of water and sanitation for all by 2030 - includes a target to halve the proportion of untreated wastewater and increase water recycling and safe reuse.

— Source: www.worldwaterday.org —