

RUNNING WITH WATER – DOMINICA

WATER AWARENESS RESEARCH & EDUCATION REPORT



PREPARED BY

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For

Mr. John Roach
Chief Youth Development Officer (Ag)
Youth Development Division
Ministry of Culture, Youth & Sports

August 6th- 9th, 2013

Locations

Fond Cole Community Center*
Convent Preparatory School
Delices Youth Center*
Grand Bay Youth Center*
Castle Bruce Youth Center
Marigot Youth Center
Isaiah Thomas Secondary School*
Water Area 9 Intake*

* primary school students present

Water Features

Fond Cole Beach/drains
Bath Estate River
White River
Stewart River/Geneva River
Castle Bruce River & Beach
Cabana River & Beach
ITSS Cistern
Picard River

This report summarizes eight ~ 3 hour water awareness workshops led by Dr. Trotz in 8 different youth development districts in Dominica. These workshops were a part of a new UNDP funded youth volunteerism initiative, Running with Water, where secondary school & college students lead water themed summer camps for primary school students at the country's various youth centers. Each workshop was tailored for the audience given the mix of ages, interests present, and whether or not they resided in the local community where the workshop was being held.

Each workshop also included a site survey around a local water feature/resource and participants worked in small groups to address a selected category of things to observe, assess, and provide recommendations for improvement. The main categories identified as important by participants were flora, fauna, water, human activity, structures, and garbage. During their surveys they took pictures with their phones or cameras, wrote down findings, and recorded video using phones etc.. The teams then shared their findings with the entire group.

A LaMotte World Water Monitoring kit was used to test water quality. These

kits cost as low as ~\$14 US and students volunteered to be water chemists to determine the temperature, turbidity (cloudiness), pH, and dissolved oxygen content of the water. More advanced kits provide other tests for things like nitrate and phosphate that are usually linked to fertilizers and total coliform which informs on contamination from human/animal waste.

For workshops with only secondary school students the students shared their career goals and Dr. Trotz commented on how each depended on or linked to water issues. The local center was also used as a study site to identify how water was being used and introduce students to the idea that their immediate surroundings can be used for learning multiple things about science and engineering.

Water is a tremendous asset for Dominica and more can be done to protect it, manage it better, and emphasize its importance. Although participants believe that their water is very clean and in abundance, there was a keen interest in learning more about water quality. Some general recommendations based on the 8 workshops are provided next.

RUNNING WITH WATER – DOMINICA

WATER AWARENESS RESEARCH & EDUCATION REPORT

The top 4 recommendations are:

1. Develop a short educational video based on the DOWASCO presentation given at WA-9 which describes where potable water comes from, how it is treated, how it is transported, and how it is used. Mr. Cooleridge Bell has some of the raw footage. This can serve as a template for youth groups to develop similar material for the other 42 water areas. This would also allow students to meet a professional engineer and visit their water source. The media should be linked on the DOWASCO website which already has some text for each water area.



Intake across river

Chamber facilitates settling

Chlorine disinfection

Supply lines take water to storage tank

Distribution lines take water to houses etc.

Best practices for water use

2. Water quality awareness should be enhanced throughout the program. Many of the rural communities seem to use springs for potable water when DOWASCO's supply is limited. They also question the safety of disinfected (by chlorine) water from DOWASCO and are unfamiliar with the potential contamination of their local spring from septic/latrine leaching since these springs are below the houses. Monitoring kits should be provided for youth to use and to participate in World Water Monitoring Day. Basic LaMotte water quality monitoring kits provide information on pH, turbidity, temperature, and dissolved oxygen. More advanced kits (Green Low Cost monitoring kit) include tests for nitrate, phosphate, and total coliform and some teachers on the island received these Green Low Cost monitoring kits from DOWASCO at some point in time, however, their use in the classroom may have been limited. The LaMotte website for ordering is <http://www.lamotte.com/en/education/water-monitoring>.
3. Secure support/funding for youth driven projects at the Isaiah Thomas Secondary School (refurbishment of two cisterns on the school's property) and Fond Cole Community Center (this includes garbage clean up and unclogging of storm drains). An important part of the Water Awareness Research and Education (WARE) program in Tampa is the action taken by the students/communities/teachers to improve something that makes the management of water more sustainable and create learning around the improvement. The two projects are suggested for immediate follow up as they can serve as pilots/examples for the other youth groups. The school project is driven by the environmental club and the social studies teacher and it provides a good opportunity to link with USF students and a high school teacher in Tampa who participates in the WARE program there. The Tampa program is directed by Dr. Trotz and this should be possible to arrange.
4. Provide hands on activities for the primary school students to understand hydrologic cycle concepts and show how they apply to the local environment (e.g. infiltration using soils from area or evaporation/runoff using paved areas). Many students know the hydrologic cycle (evaporation, condensation, precipitation, runoff, infiltration/percolation, groundwater, aquifers, surface water, oceans/seas) and can sketch its main components. They should be tasked with building a physical model of it that mimics their local environment (e.g. youth center compound) and include the way in which they affect the cycle (how do we consume water, how do we produce water, how do our structures change the natural cycle).

The following eight pages highlight the main activities and results for each workshop and provide more specific recommendations for each site/group. Ideally the youth participants should produce this type of material to share with their families using the computers available at the youth centers. A communication component to their camp activities would provide other lifelong skills.

involved Mr. John Roach - Chief Youth Development Officer
Mr. Ridge Bell - Videographer & Photographer
Mr. Julian Pacquette - Youth Development Officer - District-Roseau North
Ms. Valencia Webb - Youth Development Officer - District- Roseau South
Ms. Marcia Baron- Youth Development Officer - District-South East
Ms. Merkwana Pacquette - Youth Development Officer - District- South
Ms. Lilia Durand- Youth Centre Facilitator - District-East
Ms. Rosalyn Theodore - Youth Development Officer - District-North East
Ms. Kerry-Ann Remie - Youth Development Officer - District-West
Mr. Wallace Williams - Youth Centre Manager - District- North
Mr. Gomez Drigo - Water Engineer, DOWASCO

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RUNNING WITH WATER – DISTRICT ROSEAU NORTH, DOMINICA



Photo by Maya Trotz

Located in Roseau, the community center sits close to homes, bars, businesses, and the highway. Its drains go to the Fond Cole Beach; a five minute walk away. A concrete court with few lights, little shade & one bench provides space for sporting activities. Participants identified an outdoor activities area for little kids as something they would like to develop for the center.

August 7th, 2013

RIVER

Location

Fond Cole Community Center

Water Feature/s

Fond Cole beach & area drains

Administrator

Mr. Julian Pacquette
Youth Development Officer

Participants

Mix of primary, secondary & beyond

Using the community center as a field site youth volunteers led teams of students to 1) document what was there, 2) the condition, and 3) any improvements needed. Each team selected two categories to work on from a list generated by everyone that included plants, animals, structures, water features, garbage, weather, and human activity. After 15 minutes of surveying each team shared their results with everyone. Where water was concerned, the drains around the property were clogged with garbage, dried leaves, and vegetation. This was linked to flooding during rain events. The clogged drains were also seen as breeding grounds for mosquitoes that affect human health (dengue recently became a major concern in Dominica). The groups then walked five minutes to Fond Cole beach where they repeated the exercise. The outfall from the drains emptied there and garbage was prevalent in its stagnant pool as well as everywhere along the beach. Climate change was discussed in terms of

existing weather conditions - what happens during intense storms and what needs to be done to better manage the impact. Their suggestions were:

- Host a lively community event with music, food & activities that kicks off a garbage management campaign, cleans up, and improves the community center (e.g. shaded areas for sitting, designated areas for parking, clearing of drains, creation of an activity space for little children).
- Reduce stagnant water in abandoned boats by either removing them from area or turning upside down (one was at the community center).
- Create better signage and handouts about garbage disposal for families.

Recommendation: Support the young people in developing and leading the community event and campaign to address the growing problem of garbage that inevitably ends up in the waterways. Ensure that they create their own materials that can be used to motivate their peers and families to participate.

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RUNNING WITH WATER – DISTRICT ROSEAU SOUTH, DOMINICA



A river running through a city environment can provide multiple features that can make the community more sustainable. Safely accessing these kinds of outdoor spaces as well as reinventing them to serve multiple purposes (e.g. spaces to exercise) is an exciting challenge for any city dweller who usually associates “nature and the environment” with something “out of town” and something that excludes humans.

August 7th, 2013

RIVER

Location

Convent Preparatory School

Water Feature/s

Bath Estate river

Administrator

Ms. Valencia Webb
Youth Development Officer

Participants

Secondary school & College

Working in groups of four, participants fanned out around the site on the Bath Estate river to characterize the area by its plants, animals, structures, human activity, water, and garbage and recommend improvements. Some participants quickly worked with their feet in the river, commenting that they had never been there before and have very limited opportunities for learning outside of the classroom during their formal educational training. During the twenty minutes spent by the river we observed boys swimming upstream, someone dumping cut branches on the banks of the river (it is possible that these are later burned), and a homeless person who seemed to live on the riverbank. Once back at the primary school each team shared their observations with everyone. These included:

- Flora – castor, banana, palm tree, flamboyant, orange, and elephant grass. The grass on the riverbank was used to discuss the role of

plants in reducing erosion.

- Fauna – fishes and crabs.
- Structures – apartment buildings, bridge, retaining walls, restaurant with outdoor seating at the Alliance Francaise.
- Human activity – swimming, dumping, relaxing, and conducting research.
- Water – a participant collected water in a beverage container and said that she felt it was safe to drink. There was garbage on the riverbank & evidence that someone lived there. Dr. Trotz discussed water quality & its importance to human health.
- Garbage – plastics, discarded metal & tree cuttings seen on riverbank.

Recommendation: Provide students with hands on opportunities to conduct water quality analyses using a test kit (e.g. LaMotte Green test kit) and/or a tour of a water testing lab in Roseau. If possible, let them work on a project that improves a water feature in Roseau that they usually access. Given the common issue with garbage in Roseau, explore having them work with Fond Cole project.

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Photo by Maya Trotz

RUNNING WITH WATER – DISTRICT SOUTH EAST, DOMINICA



Photo by Maya Trotz

During periods of low water pressure in the Delices area many residents use the local unprotected springs for potable water use. Many of these are at lower elevations than the houses. The houses use either septic systems or pit latrines. Water quality of the spring water is a concern and disinfection methods encouraged on the DOWASCO website include bleach addition and boiling – both of which add to the cost of water treatment either for chemicals or for electricity.

August 8th, 2013

RIVER

Location

Delices Youth Center

Water Feature/s

White river close to mouth

Administrator

Ms. Marcia Baron
Youth Development Officer

Participants

Secondary school & College + 1 primary school student

Given the heavy rainfall at the beginning of the session, time was initially spent discussing careers and water. Except for one student interested in science, the majority of students planned to pursue careers in business and/or marketing. Participants were asked to identify the various ways in which water is used in Dominica – drinking, cooking, bathing, washing, cleaning, hydroelectricity, fishing, recreation, agriculture, ecosystem upkeep, and various industries.

For each use, Dr. Trotz encouraged discussion on business opportunities. For example, on the topic of recreation, students identified kayaking and snorkeling and focused mainly on the beaches. Few knew how to swim and there were no ideas of recreational activities for the rivers, much less any that did not require importation of equipment. They did say that older generations swung on ropes into the river. Can developers and providers of such an activity grow into a business?

On the topic of drinking, the issue of beverage containers was used. Using the center’s cooler and disposable plastic cups business opportunities in reducing the disposables were discussed.

At the White River (10 minute drive from youth center) the group documented various categories and took water quality samples close to the bridge of the main highway. The information was shared back at the center. The water quality results were:

Temperature (°C):	24
Turbidity (JTU):	100
DO (mg/L):	4
pH:	7

Recommendations:

Focus on springs in local community as they seem to be used often by residents. Ask youth to identify where they are, their condition, how they are used, and build water awareness program around them as residents will want to ensure their water source is clean and protected.

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RUNNING WITH WATER – DISTRICT SOUTH, DOMINICA



Water is critical for life; body functions begin to shut down after seven days without it. Twenty gallons per day is the minimum volume required for human use and many places in the world lack access to that amount, much less in a form that is safe. The abundance of water for communities with heavy rainfall and easy access to rivers brings obvious challenges like landslides. Less obvious challenges relate to climate change impacts, safety, and the cost associated with materials and energy needed to deliver water.

August 8th, 2013

RIVER

Location

Grand Bay Youth Center

Water Feature/s

Stewart/Geneva river

Administrator

Ms. Merkwana Pacquette
Youth Development Officer

Participants

Second form and up,
college & beyond

We first surveyed the youth center to see how water was being used, the condition around it, and ways in which that use could be improved. The students worked in groups on different areas of the center (bathroom, kitchen, grounds, computer building). As they shared their results with everyone Dr. Trotz integrated current research applications into the discussion and pointed out other ways in which water was used in the buildings (e.g. Some places where the gutters from the roof drained were pooling on the ground. Eliminating potential stagnant water pools could be accomplished through rainwater harvesting and use in building, a rain garden, or connection to drainage system). The students identified improvements needed for the toilets – building water awareness means that the best conditions should exist around places where the resource is used. The question of water quality and water use was addressed.

The team then drove 5 minutes to the

mouth of the Stewart/Geneva river where they worked in groups documenting the animals, plants, human activity, garbage, water, structures, and soils. Dr. Trotz discussed water quality & guided a team in testing using the LaMotte World Water Monitoring kit. The presentations were done at the beach and included the need for amenities and garbage collection/management. The Water quality results at the river were:

Temperature (°C): 26
Turbidity (JTU): 40
pH: 7

Recommendations:

- Use local community center as site for water awareness. Let the youth prioritize areas to improve (e.g. toilets) and provide support for them to help implement. Work with DOWASCO to show the source of potable water to Grand Bay. Given that they all use the river/beach facility, push them to do a project there that enhances the space.

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RUNNING WITH WATER – DISTRICT EAST, DOMINICA



Rough waters describe the Atlantic ocean around the mouth of the Castle Bruce river. Apart from the Seabreeze hotel, no other major structure was visible. Students identified coconut trees, almond trees, crabs, birds, and a few cows as a part of the landscape. Turbidity was linked to land use and we used the cleared plots on the hills in the distance to discuss better agricultural practices at the household level.

August 8th, 2013

RIVER

Location

Castle Bruce Youth Center

Water Feature/s

Castle Bruce river/beach

Administrator

Ms. Lilia Durand,
Youth Centre
Facilitator

Participants

Secondary school & beyond

As students identified their career interests, Dr. Trotz linked each to the science and engineering fields. The few students interested in those careers identified the fields of forensic science, architecture, mechanical engineering & scientist. The group, none of whom were from the immediate area, then walked down to the Castle Bruce river where they worked in small groups to document: plant life, animal life, human activity, water condition, and potential for use of space. Dr. Trotz discussed water quality with a group & guided them in testing for the two different river branches using the LaMotte World Water Monitoring kit. Student volunteers collected samples, prepared samples, and assessed the readings.

Each group then shared information at the youth center. Some key points:

- DOWASCO supplies water to the area, but there are shortages. Issue of costs to pump water raised and the energy-water dependence was

discussed. Ms. Durand was particularly interested in water quality issues and the safety of chlorine applied for disinfection.

- Terracing and planting of different types of crops were identified as local practices to reduce soil erosion on the slopes. It was evident that this was not being practiced everywhere.
- Hydrologic cycle mural was being painted on wall.
- Water quality results for river:

	A	B
Temperature (°C):	28	28
Turbidity (JTU):	0-40	40-10
pH:	6-7	7-8

Recommendations:

- Use local community center as site for water awareness, beginning with the removal of leaks from gutters & possibly a rainwater harvesting system. Mural can be used to challenge students to create one that is more representative of the local context.

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RUNNING WITH WATER – DISTRICT NORTH EAST, DOMINICA



Signs with warnings against dumping of rubbish are obviously ignored along the drive into the mouth of the Cabana river. Closer to the river, someone was burning piles of it. Crossing the river exposed a much more pleasant view and appreciation for the black sand beach, tree lined riverbanks and cool & clear river water. This more pristine view aligned with the youth center’s operations where no disposable containers were used to serve food.

August 8th, 2013

RIVER

Location

Marigot Youth Center

Water Feature/s

Cabana River/beach

Administrator

Ms. Rosalyn Theodore
Youth Development
Officer

Participants

Secondary school &
college

Our activities began at the mouth of the Cabana river which few participants use. After an ice breaker to introduce everyone, groups formed to assess the area for various things ranging from the flora and fauna to the water quality and flowrate. In addition to our own use for research, the river was used for swimming and crossing at the time of our visit. Fish, birds, and a jelly fish were identified and water quality was tested for samples taken from both the river and the ocean. Working with Dr. Trotz volunteers sampled the water, prepped the samples, and assessed the results. The results were:

	River	Ocean
Temperature (°C):	28	30
Turbidity (JTU):	0	0
pH:	8-9	7-8

A student who just graduated from the Dominica State College pushed the exercises to a higher level. He wanted to describe the flow of the river so we used available tools (small piece of wood that floats, stopwatch on phone)

to estimate flowrate (time it takes for float to travel a certain distance marked out using his foot) and discuss the engineering approach to assumptions, setting up of experiments, and replicates. For the short time back at the youth center we cut the bottom off of a drinking water bottle, drilled two holes in the cap, added a small piece of foam to the cap, and then packed it rocks, pebbles and then washed sand collected on the beach. Water mixed with soil and pieces of leaves from the yard was then poured into the open end of the bottle to see if the turbidity was reduced through the filter.

Recommendations:

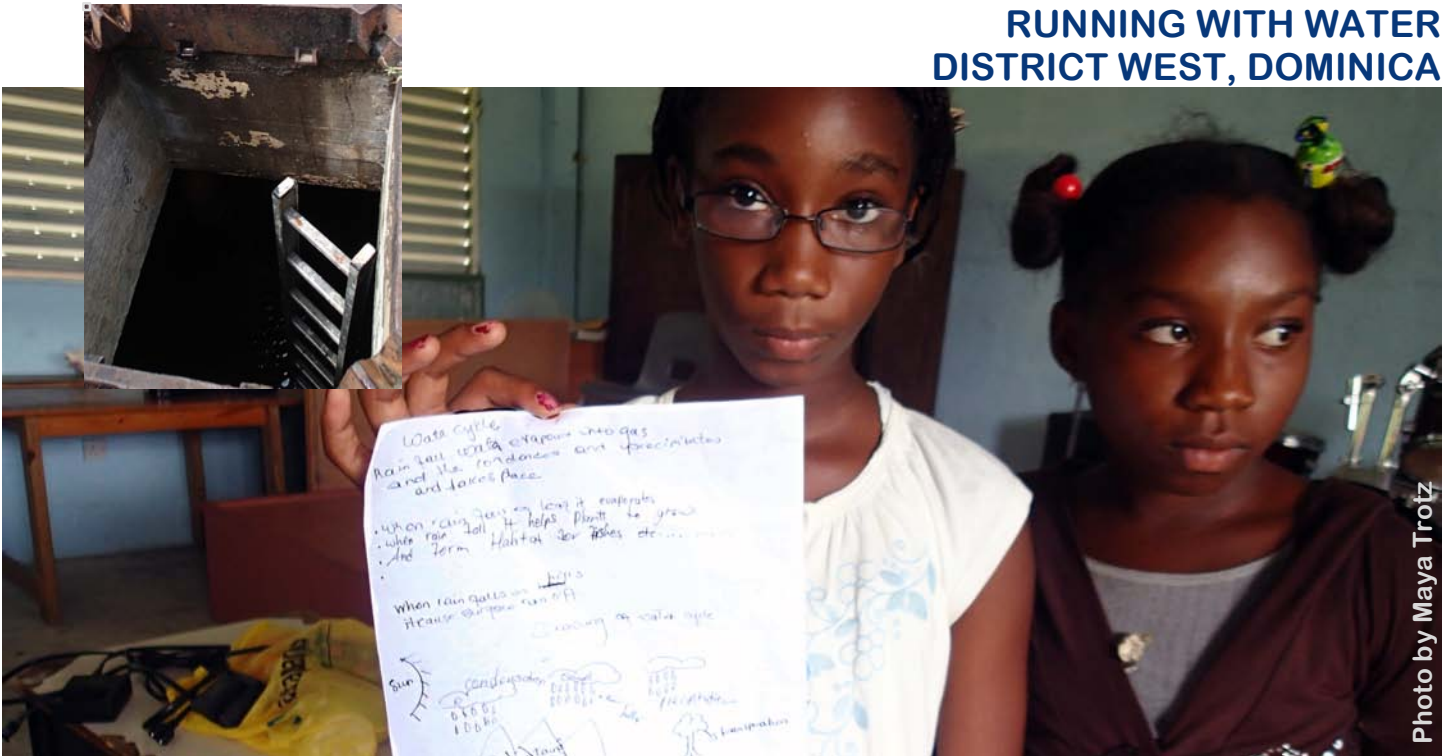
- Develop more measurement oriented activities that encourage students to test their own questions and provide better descriptions for the resource they are trying to describe. Repeat the river survey at a more popular river in the area like the one next to the airport where improvements would have a bigger impact on the local population.

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RUNNING WITH WATER DISTRICT WEST, DOMINICA



Located in the village of St. Joseph on the west coast of Dominica, Isaiah Thomas Secondary is one of the largest in Dominica. Built over 60 years ago, the school features lots of natural ventilation and light in each classroom. The rainwater from the flat roofs is piped to two underground concrete cisterns on the playing field. The students in the school's environmental club recently discovered these cisterns.

August 9th, 2013

CISTERN

Location

Isaiah Thomas
Secondary School

Water Feature/s

Cisterns at the school,
Drains, Gutters

Administrator

Miss Kerry-Ann Remie
Youth Development
Officer

Participants

5 years old to
teachers. The group
included students in
the school's
Environmental Club.

Groups of 4 primary school students were led by a volunteer to describe the hydrologic cycle as it relates to what happens on the school compound. The teams fanned out around the school and then presented their findings to everyone. Each group also took a water sample from various leaks in the guttering & tested the pH of the water - between 7 and 8. The groups also looked in on the two cisterns on the school compound.

The environmental club was trying to clean the cisterns & have them disinfected by DOWASCO. First task for them was to figure out the size of the cisterns using available materials. Depth was ~ 10 ft (other measurements would be done when empty). The teacher had a Lamotte GREEN low cost water quality monitoring kit with tests for pH, DO, temperature, turbidity, nitrate, phosphate, & total coliform. Dr. Trotz showed them how to use the kit using water from the cistern as a sample.

Recommendations:

- Support the environmental club in their project. They should be linked with an engineer who can serve as a mentor and guide them through the entire process of revamping the cisterns. This would include:
 - Capacity of cisterns & potential to supply toilets (is piping separate from regular supply line) as a function of time of year (rainfall).
 - Pump needed – solar powered, needs to be sourced, priced and fund raised to purchase & install.
 - Water quality testing should be done professional service in addition to LaMotte test kit.
 - Elimination of first flush from roof.
- Make students, teachers & club champions for their visionary project in Dominica & regionally.
- Link with USF researchers & Tampa school on rainwater harvesting.
- Mr. Penal from the Youth Division is interested in supporting this project & should be encouraged to do so.

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RUNNING WITH WATER – DISTRICT NORTH, DOMINICA



The Water Area 9 (WA-9) system has an intake across the Picard river at 380 ft above sea level. The first volume of water passes through a chamber where large particles settle. Chlorine is added and then water supply lines gravity feed the water to a tank above the Portsmouth hospital where it is stored until distribution to homes & businesses via distribution lines.

August 9th, 2013

INTAKE

Location

Portsmouth

Water Feature/s

Water intake at WA-9

Administrator

Mr. Wallace Williams
Youth Centre Manager

Participants

4 years old to mid twenties. The director of Dominica's Peace Corps program and a volunteer were also present.

Mr. Gomez Drigo, an engineer at the Dominica Water & Sewerage Company (DOWASCO - www.dowasco.dm), met the group of over 50 at the intake structure for water supplying the Portsmouth area. Standing on the bridge across the Picard river he told us to look at the intake structure and the water's color. Using that image, he proceeded to explain what is done to supply the area with water and ways in which water can be conserved in Dominica. Ridge Belle recorded the 50 minute presentation. Some key points:

- River dammed & up to 40% of flow taken in for potable water use.
- Chamber – 1st treatment system – settling of larger particles to reduce turbidity.
- Disinfection by chlorine occurs.
- Supply lines gravity feed water to storage tank.
- Distribution lines take water to various users.
- Hydrometric station collects water level & water flowrate.

Dr. Troitz discussed water quality with small groups & guided each group in testing for **temperature (28 °c)**, **turbidity (40 JTU)** and **pH (7-8)** using the Lamotte World Water Monitoring kit. Student volunteers collected samples, prepared the samples, and assessed the readings. Sediment was added to the sample to describe the terms turbidity and settling.

Recommendations:

- Work with DOWASCO to develop 2 minute video on WA-9 with images of Portsmouth storage tank, distribution & supply lines, & include data on water flowrate, head, water use, and water quality.
- Expand concept to all 43 Water Areas as a youth development activity & link to www.dowasco.dm.
- Create hands on activities that DOWASCO employees can use to teach at various sites: 1) turbidity & settling using various particle sizes in water bottles; 2) gravity fed water.
- Develop educational signage for site.

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