BUILDING WATER-STRESS RESILIENCE IN PANAMA

How researchers are finding better ways to manage the precious resource in a changing climate

POSTED BY NIKI WILSON ON JUNE 18, 2019

As a child growing up in the parched interior of Panama's La Villa River basin, there were years when Diana Gutiérrez watched her family's crops and livestock perish due to water shortages. The area, also known as the Dry Arch, is part of the Central American Dry Corridor, which also blankets parts of Costa Rica, El Salvador, Honduras, Guatemala and Mexico.

In this irrigated agricultural heartland of Panama, water shortages not only mean a reduction in crop and livestock production, but also an increase in pollution and water contamination as chemicals and microbes accumulate in stagnant or slower-moving streams. Bacterial diseases increase, too, as water to wash both equipment and people becomes scarce. These are the reasons why Gutiérrez, now 24, decided to study biology at university. "I wanted to have the knowledge that would help improve the situation," she says.

Through a youth leadership program run by El Centro del Agua del Trópico Húmedo para América Latina y el Caribe, or CATHALAC, a Panama City-based organization that promotes sustainable development of water resources and the environment, Gutiérrez travels to communities in the basin to raise awareness about water issues and how to mitigate them. It's crucial work. In the Dry Arch, rainfall is irregular at best, and in El Niño years it can drop by 30 to 40 per cent. These dry periods are often accompanied by lengthy heat waves that decimate subsistence crops such as corn and rice. The 2015 drought was so severe that the Panamanian government declared a state of emergency. Subsequent crop losses between 2015 and 2016 hit the economy hard, at an estimated cost of US$72 million.

In addition, the area is proving to be particularly vulnerable to climate change. Heat waves are now longer and harder to predict, while tropical storms in the rainy season are ramping up in intensity and frequency, with equally devastating effects.

Yet despite all this, Tania Campos, CATHALAC's chemistry and environment specialist, says the main problem is not the amount of water available in the La Villa River basin, but how it's managed. Campos is working on a project funded by IDRC and Panama's Ministry of Environment that aims to improve the use and distribution of water as the climate changes. She says inefficient management has facilitated extreme scarcity in some areas and pollution and poor water quality in others. "These problems are exacerbated by a lack of institutional coordination, where action plans tend to be redundant and they lack monitoring and evaluation," she adds.

To tackle these issues, CATHALAC is helping develop municipal action plans that guide the cities of Chitre and La Villa de los Santos and other communities in the river basin toward doing a better job of managing water resources. Part of that process has been to collect data that will help create evidenced-based plans. For example, Campos and her colleagues conducted research to estimate the basin's water balance (the amount of water flowing in and out), identified new underground reservoirs and studied reforestation plans to mitigate water scarcity.

Diana Gutiérrez (far right) takes measurements of a river during a community water monitoring day in El Guayabal, Panama. (Photo: CATHALAC)

The sustainability of these action plans depends on people such as Gutiérrez, who Campos says consolidate the work of CATHALAC, whether by teaching people about microbial contamination or helping conduct CATHALAC's water-quality monitoring projects. During such work, Gutiérrez and others have acquired valuable skills for future research, including learning how to use drones to map resources in the basin. "These young leaders can now integrate themselves into the main institutions and community-based organizations that conserve and manage water resources in the La Villa River basin," says Campos

And Gutiérrez is just getting started. While new environmental policies and programs to improve community-government dialogue on water issues are emerging, she notes there's still a long way to go. "We ought to build efficient water storage systems," she says. "And make state policies about water conservation that reach the communities." She also wants to see Panama adopt a culture of water conservation, and believes this will require an investment in education. "We have to introduce environmental education at an early age," she says. "As a society, we have to teach children how to take care of our resources."

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READING AS THINKING

1. What other name is used to describe Panama's La Villa River basin? Why was this name given to this particular region?

2. List three negative impacts associated with water shortages in Panama:

a. _____

b. _____

c. _____

3. What do you think the term "subsistence crop" means?

4. Tania Campos says, "The main problem in Panama is not the amount of water available in the La Villa River basin, but how it's managed." Explain what you think she means by this.

5. Climate change is mentioned as a potential cause of devastating effects on the crops and land in the La Villa River basin. Describe the connection between water scarcity and climate change.

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6. Are you familiar with any other regions in the world that also suffer from occasional water scarcity or drought? If so, which regions? What do these regions have in common with Panama's La Villa River basin (e.g., population size, agricultural demand, land cover, latitude, irrigation or agricultural practices)?

Think-Pair-Share

Think

7. Provide the students with a brief overview of the water cycle and remind them that water can be found on land, underground, in the cryosphere and in the atmosphere. Use photos or videos to illustrate your point if necessary. Discuss the connection between geography and water availability on a local scale. Build on this discussion by considering the potential impacts of water scarcity on the environment and economy in your community.

   Reiterate that the work being done by the researchers mentioned in the article is directly related to what the students just discussed, and is contributing to:
   1) the collection and dissemination of drought-related data;
   2) the construction of sustainable water storage systems;
   3) better conservation and management practices at the municipal level;
   4) an increase in public awareness about the causes and effects of water scarcity.

   Next, have each student independently compile a list that includes two examples of each of the following:

   a. Water-related data they could collect in their community
   b. Technologies or products that can assist with water storage
   c. Ways to conserve water
   d. Methods or educational programs that could be used to inform the public about water issues and encourage them to conserve water

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Pair

8. Divide the class into four groups and inform them that each group will be presenting a short report:

a. **Hydrologists** These students are responsible for collecting and sharing information about water in Canada. Using the Natural Resources Canada website about water, have this group research the major patterns and trends related to water resources and movement in Canada. Use the following questions as prompts: Where are the major bodies of water in Canada? Where are the wetlands and areas with poor drainage? Which areas receive the most precipitation? Which areas are more susceptible to drought?

b. **Engineer**s These students are responsible for designing a storage facility for water that uses cutting-edge technologies and manufacturing practices. Using websites such as the Ontario Treated Water Storage website for inspiration, have this group draw up plans for a water storage facility specific to their region. Use the following questions as prompts: What considerations are necessary when storing water for long periods of time? Is there a backup plan if the storage facility runs out of water? Where should this facility be built? How would this facility differ if it was built in another region of Canada?

c. **Conservationists** These students are responsible for reporting on best practices in water conservation in Canada. Using websites such as the Government of Canada Water and the Environment website, have this group report on the most efficient and inefficient water conservation practices in Canada and how they are linked to Canada's water resources. Use the following questions as prompts: What can an individual versus an organization do to conserve water? What sources of water are protected in Canada? How can farmers conserve water? Should people strive to conserve water every day, regardless of the availability of water in their region?

d. **Educators** These students are responsible for reporting on incentives and programs that encourage Canadians to conserve water. Using websites such as the Environmental Defence website, have this group report on the types of education programs or resources that are available to Canadians that focus on water conservation. Use the following questions as prompts: What programs exist? How do these programs encourage the public to care about the protection of freshwater systems? Are there any programs that are highly successful? Are there any incentives you would like to see implemented? How would incentives differ across Canada?

Share

9. Have students present their reports to the class. Build on this exercise by performing a similar activity focusing on the Central American Dry Corridor, or by making a pledge as a class to conserve water at school and at home.

Online

- Protect your watershed
- Watershed awareness
- World Rivers Day
- FAO: Chronology of the Dry Corridor
- Drought Watch

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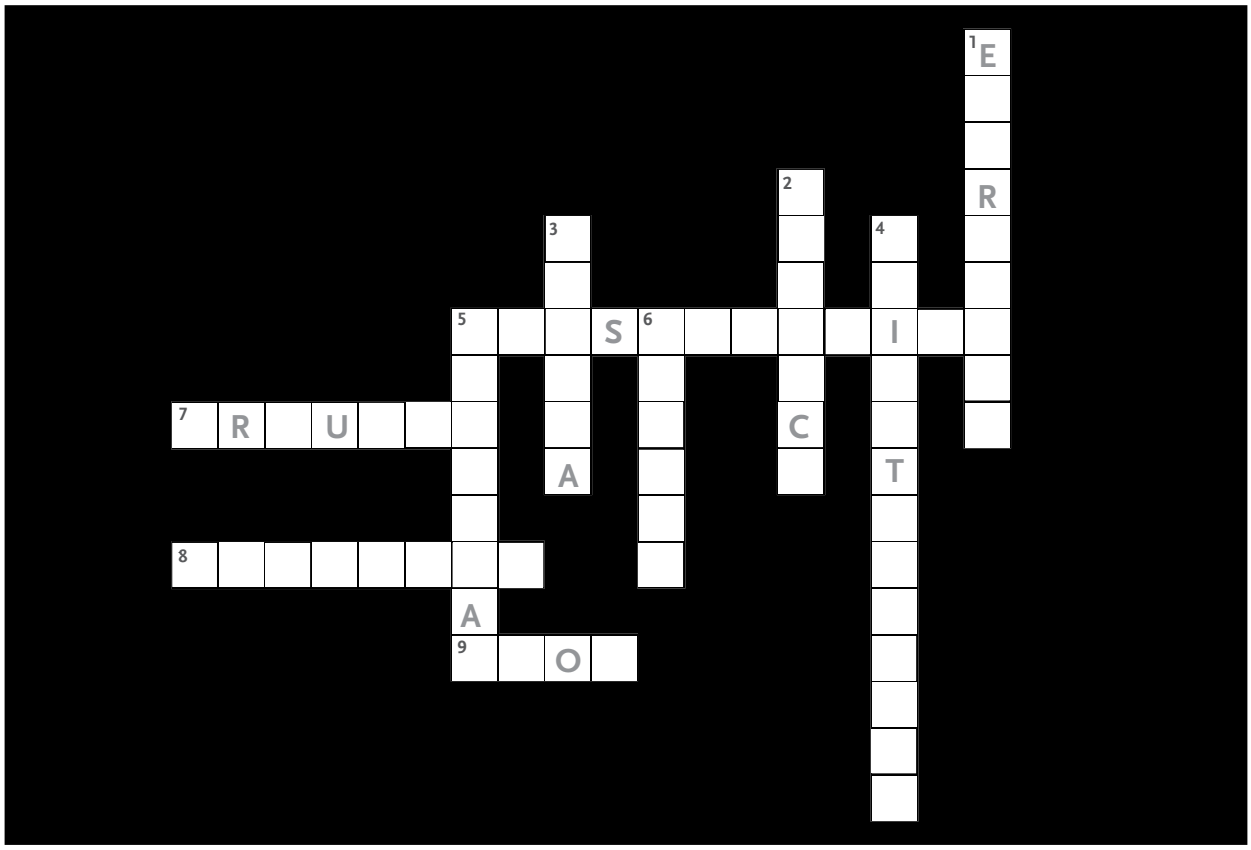

CROSSWORD:

Across

5. Prevention of wasteful use of a resource
7. A prolonged period of abnormally low rainfall
8. Another term for precipitation
9. A cultivated plant that is grown by people and harvested as food

Down

1. A serious, unexpected and often dangerous situation requiring immediate action
2. Another name for the La Villa River basin (two words)
3. The country where the La Villa River basin is found
4. A measurable shift in global or regional weather patterns over a long period of time (two words)
5. The acronym for a Panama City-based organization that promotes sustainable development of water resources and the environment
6. Changes in temperature between the ocean and atmosphere in the Equatorial Pacific region of the world (two words)