

Nuff Nuff Wata: The Land of Wood and Water

by

Daniel Elias, Jadejah Robinson, and Aazah Daniel
North Carolina Wesleyan University, Rocky Mount, NC

Introduction

The first inhabitants of Jamaica appropriately named the island Xaymaca, meaning “land of wood and water” for its rich vegetation and majestic rivers and coastal waters (Broks et al., 2020; Figure 1). Jamaica, like many Caribbean islands, boasts a vast quantity of fresh natural water sources. The country has many rivers, some of which have yet to be explored. Jamaica also receives substantial amounts of rainfall, particularly in areas near the Blue Mountains and John Crow Mountains (Levy & Koenig, 2009). This rainfall, also known as orographic precipitation (Figure 2), is produced when mountains force warm moist air to rise upslope, causing it to cool down and form clouds and precipitation (Gamble, 2014).

Rainfall is typically higher on the northeast of Jamaica because of the northeast trade winds. These trade winds deposit over 130 inches per year on the east. However, the dry savannas of the south and southwest of the country receive lower amounts of rainfall. Regardless, the rainfall the country receives allows for the natural water systems to stay at healthy levels.

Jamaica experiences two seasons annually: a dry season running from early November to April, and a rainy/hurricane season from late April to October. Although it rains throughout the year, Jamaica relies heavily on the rainy season to provide the country with substantial rainfall to recharge the basin and natural sources, nourish the agriculture industry, and provide balance in the country’s annual weather pattern (Crombie, 1999).



Figure 1. Locator map for Jamaica, in green. Credit: Sanjay Rao, PD.

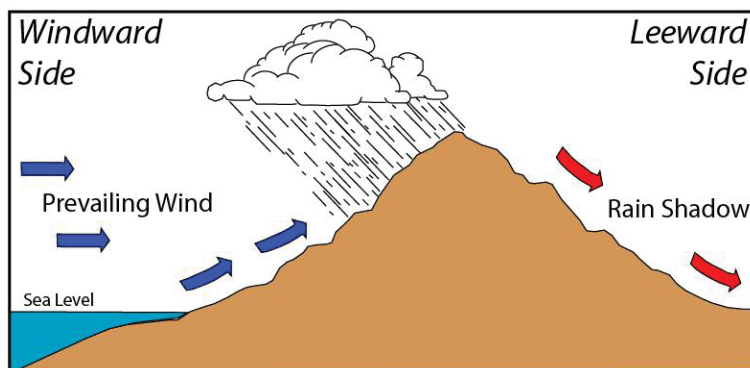


Figure 2. Orographic precipitation. Credit: Meg Stewart, CC BY-SA 2.0.

Part I – NWC Jamaica

Jamaica's primary water company, the National Water Commission (NWC) supplies water to over two million customers. The NWC relies on a network of 160 underground wells, 147 springs, and 116 rivers. The country's vast network of water sources allows the NWC to operate over 1000 water supply facilities (National Water Commission, n.d.). Jamaica also has a reservoir called the Mona reservoir, which was developed as an additional water source. The basin has a capacity of 800 million gallons (FAO, 2015).

Questions

1. In which area of the island is rainfall usually higher? Why?
2. List and explain two ways Jamaica benefits from its rainy season.
3. Jamaica has a population of 2.9 million, and average water consumption per inhabitant is 37.7 gallons/day. Considering the available water in the basin, how many days would people have access to water in Jamaica? Is this basin enough to provide water long term to Jamaica?

Part II – El Niño

El Niño events are an ongoing cause of struggle in Jamaica. El Niño is an infrequent warming of surface waters in the tropical Pacific Ocean. This phenomenon is not a regular cycle that can be accurately predicted like ocean tides. However, an El Niño event usually occurs every two to seven years. During this natural occurrence, there is a reversal movement of the trade winds, which usually flow from east to west. But during El Niño, the trade winds move east, along with warm water, which pushes colder water to lower levels. El Niño affects temperatures, the speed and strength of ocean currents, and local weather from Australia to South America and beyond. Figure 3 compares global temperatures during years with El Niño events (unusual warming of surface waters), La Niña events (unusual cooling of surface waters), and years without either (NOAA, n.d.).

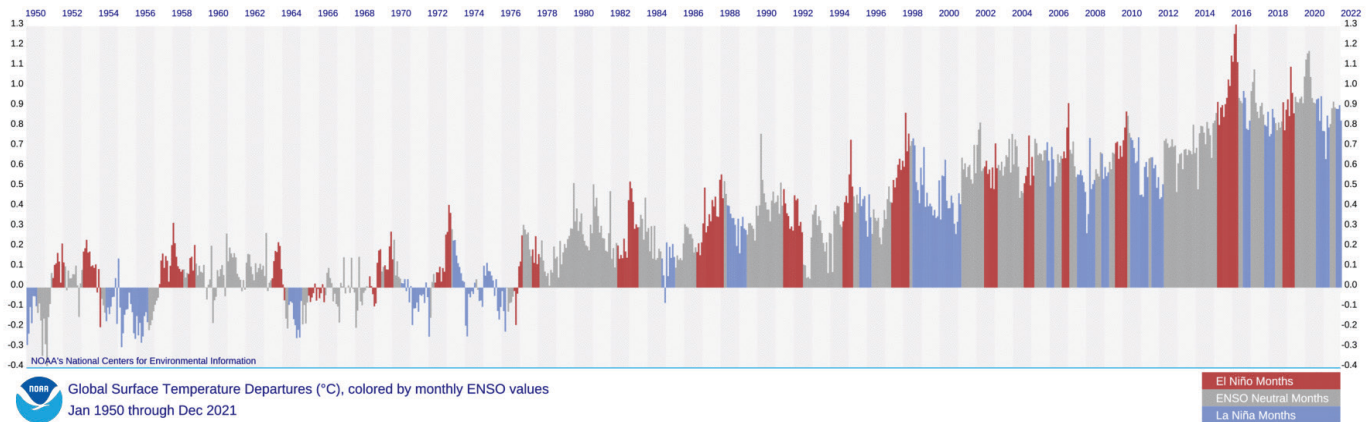


Figure 3. Annual global temperatures anomalies from January 1950 to December 2021 for El Niño and La Niña. ENSO: El Niño Southern Oscillation (NOAA, 2022).

Questions

1. From which ocean does an El Niño event originate?
2. What are weather conditions like in Jamaica during December through February and June through August (Figure 4, next page)? How would an El Niño event during June through August affect rainfall on the island?
3. Two dry seasons, one in July and one from December through March, interrupt the crop growing season. Explain how an El Niño event would likely affect agriculture.

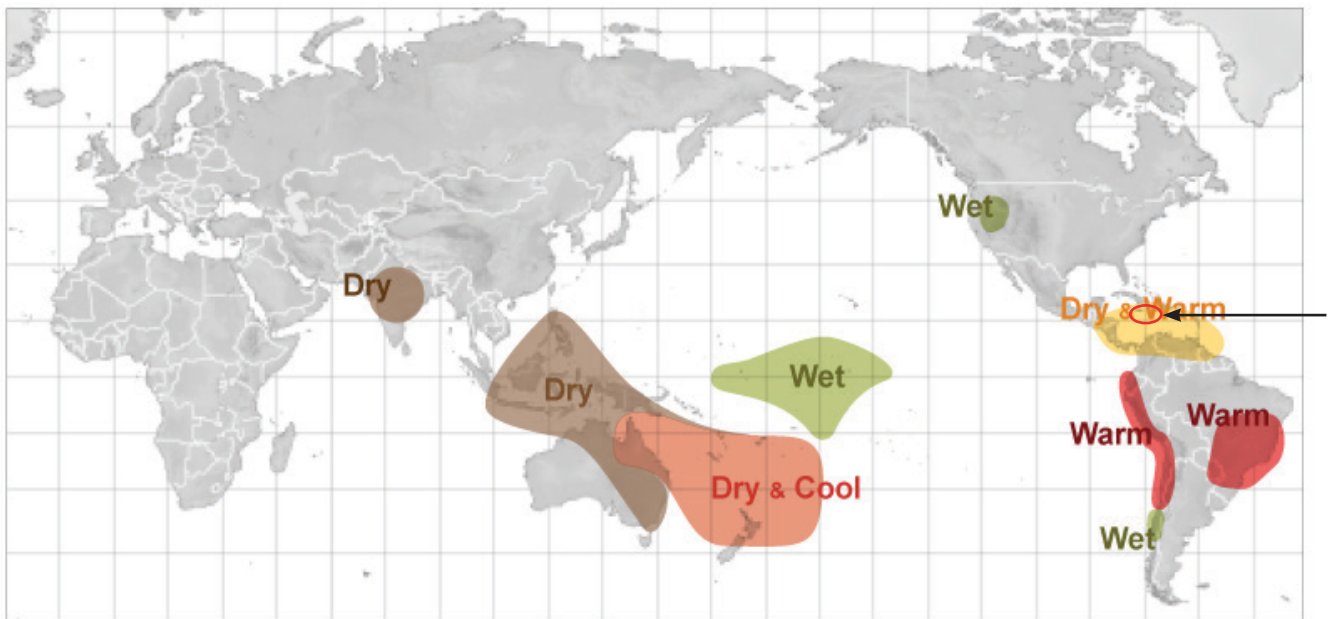
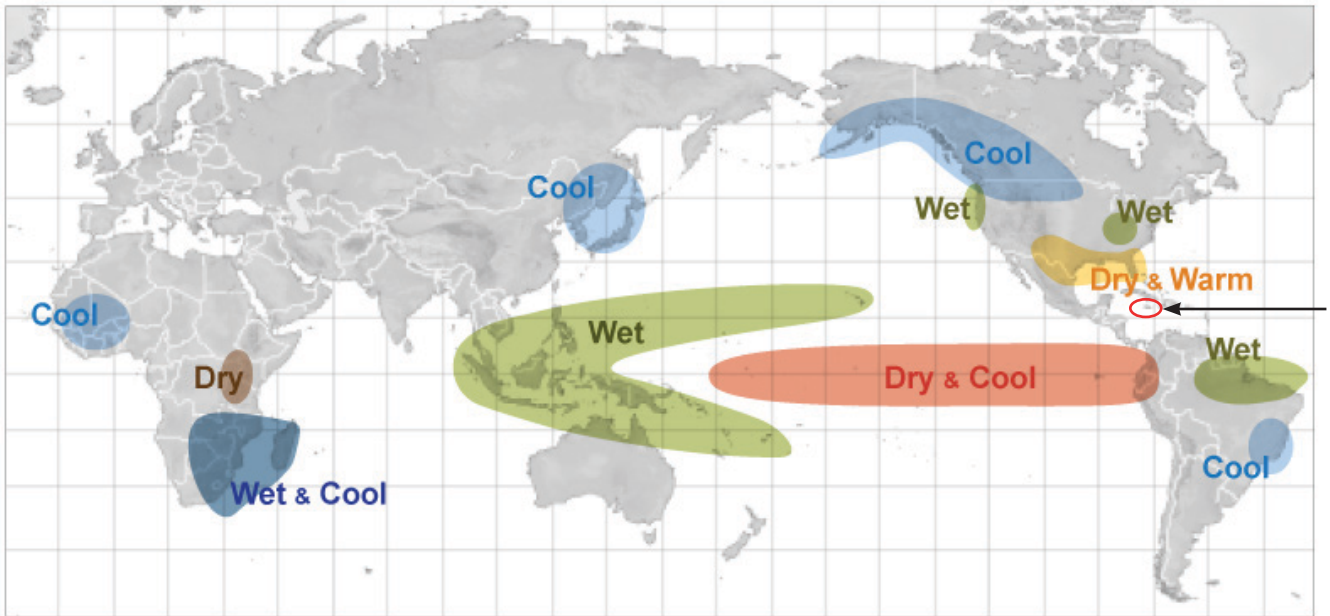


Figure 4. Typical El Niño effects. The top panel shows December through February; the bottom panel shows June Through August. The red circle and arrow (◉←) in each panel indicate the location of Jamaica. (Adapted from National Weather Service, n.d.)

Part III – Lock Offs and Losses

It was a hot Thursday morning in July. Italia and her mother lived in the rural area of Bog Walk, St. Catherine, Jamaica. The country had been struggling with a terrible drought. It was three months into the “rainy season,” and yet there had been little rainfall due to the fact that it was an El Niño year. As usual, Italia got up at 4 a.m. to get ready for school.

“Mommy!”, the 13-year-old yelled. “Yes, Italia?” responded her mother from her bedroom. “There’s no water coming from the pipe!”

“Ah bwoy, here we go again,” sighed her mother, Shanneil.

This was the second time this week that the National Water Commission (NWC) had locked off the water in their neighborhood. Shanneil rose from her bed to get some water from the barrel so that her daughter could take a shower before going to school.

The above vignette is a typical depiction of life in rural Jamaica when water is scarce. During the dry season, the NWC conducts scheduled and unscheduled “lock offs.” The frequency of these lock offs ranges from two days a week to every day. The duration of each lock off varies. The goal of the lock offs is to conserve water so that the water supply can be secured for the following months. However, the country is not very well prepared for drought, which has led to unscheduled lock offs. The NWC reported that in 2016 about 60% of the system’s input volume was accounted for as “non-revenue water.” Non-revenue water includes water lost via physical losses (leaks), and apparent losses such as water stolen or not paid (Figure 5). In contrast, “revenue water” is the volume of water that is billed or charged to the consumer (Frauendorfer & Liemberger, 2010).

System Input Volume 210,458 m ³ /day	Non-Revenue Water 126,551 m ³ /day	Physical Losses 86,189 m ³ /day
	Revenue Water 83,907 m ³ /day	

Figure 5. Water consumption and usage in Jamaica in 2016 (adapted from IDA & GWI, 2019).

In addition to the lowering levels of water in Jamaica’s natural systems, the water company is losing a substantial amount of water. The El Niño event has caused the basin and water systems to stand at lower levels. To compensate for the country’s industrial and agricultural uses of water, along with water lost through non-revenue water, the population is under unscheduled lock offs during drought (International Desalination Association (IDA) & Global Water Intelligence (GWI), 2019). While water for local residents is rationed and locked-off, water for hotels and resorts supporting Jamaica’s tourism is not restricted and is diverted from the residents. Overall, daily water consumption from Jamaicans (300 liters) is almost three times lower than water consumption from tourists (850 liters; Becken, 2014). This disparity in water consumption and availability exacerbates water conflicts in Jamaica.

Questions

1. Can you name any health concerns which arise from using water stored in barrels?
2. List and explain alternatives to scheduled/unscheduled lock offs during the dry season.
3. Jamaica’s economy is highly dependent on tourism. What strategies could hotels and resorts implement to reduce water inequity with local residents?

References

- Becken, S. (2014). Water equity: contrasting tourism water use with that of the local community. *Water Resources and Industry* 7–8: 9–22. <<https://doi.org/10.1016/j.wri.2014.09.002>>
- Broks, P., T. Gascoigne, J. Leach, B.V. Lewenstein, L. Massarani, M. Riedlinger, & B. Schiele. (2020). *Communicating Science: A Global Perspective* (p. 994). ANU Press.
- Crombie, R. I. (1999). Jamaica. In: B. Crother (ed.), *Caribbean Amphibians and Reptiles* (pp. 63–92). Academic Press.
- Erhard, C. (2017, December 1). 450,000 HYDRUS for Jamaica. Diehl Metering. <<https://web.archive.org/web/20211022042014/https://www.diehl.com/metering/en/press-media/press-room/news/450000-hydrus-for-jamaica/>>
- FAO. (2015). AQUASTAT country profile: Jamaica. Food and Agriculture Organization of the United Nations (FAO). Rome, Italy. <<https://www.fao.org/3/ca0415en/CA0415EN.pdf>>
- Frauendorfer, R., & R. Liemberger. (2010). *The Issues and Challenges of Reducing Non-Revenue Water*. Asian Development Bank.
- Gamble, D. (2014). The neglected climatic hazards of the Caribbean: overview and prospects in a warmer climate. *Geography Compass* 8(4): 221–34. <<https://doi.org/10.1111/gec3.12125>>
- International Desalination Association (IDA) & Global Water Intelligence (GWI). 2019. Against the odds: Jamaica’s water security in the face of climate change. In R. Weaver, M. Howells, Y. Yang, S. Lennox & H. Brown (Eds.), *IDA Water Security Handbook 2019 – 2020* (pp. 10–11). IDA and GWI Publications. <<https://globalwatersecurity.org/content-hub/2019-10-22/Against-the-odds-Jamaicas-water-security-in-the-face-of-climate-change>>
- Levy, S., & Koenig, S. (2009). Jamaica. Pp 261 – 268 in C. Devenish, D. F. Díaz Fernández, R. P. Clay, I. Davidson & I. Yépez Zabala, eds. *Important Bird Areas Americas: Priority Sites for Biodiversity Conservation*. Quito, Ecuador: BirdLife International (BirdLife Conservation Series No. 16).
- National Water Commission (NWC) (n.d.). About the NWC [webpage]. NWC Jamaica. <<https://www.nwcjamaica.com/about.php>>
- National Weather Service. (n.d.). Weather impacts of ENSO [webpage]. <https://www.weather.gov/jetstream/enso_impacts>
- NOAA. (2022). National Centers for Environmental Information, monthly global climate report for annual 2021. <<https://www.ncdc.noaa.gov/sotc/global/202113/supplemental/page-2>>
- NOAA. (n.d.). What are El Niño and La Niña [webpage]? National Ocean Service. <<https://oceanservice.noaa.gov/facts/ninonina.html>>
- Serafy, J.E., G.S. Shideler, R.J. Araújo, & I. Nagelkerken. (2015). Mangroves enhance reef fish abundance at the Caribbean regional scale. *PLoS one* 10(11): e0142022. <<https://doi.org/10.1371/journal.pone.0142022>>
- Star Controls. (2021). Jamaica National Water Commission (NWC) project [webpage]. <<https://star-controls.com/2021/03/09/jamaica-national-water-commission-nwc-project/>>

Internet references accessible as of December 12, 2022.

