

Zika in Paradise: Climate Change, Migration, and Disease.

A case Study of San Andres Island, Colombia.

Who Offers the Case

The case is offered by Dr. Tatiana Acevedo Guerrero a lecturer and researcher in the Politics of Sanitation and Wastewater Governance at the IHE Delft Institute for Water Education, and Leslie Ford an MSc candidate in Water Services Management. Dr. Acevedo Guerrero is a geographer with a background in political studies. Her current research focuses on rapid urbanization and uneven development in the global south. Leslie Ford has a background in Public Health: Environmental Health and has conducted research on socioeconomic factors and their impacts on health in India and possible sources of contamination in the informal water distribution systems of Dar es Salaam, Tanzania.

The Case

Colombia has reported more than 65,000 cases of Zika virus as of April 2016. One of the highest attack rates in the country was on the island of San Andres. Between September 2015 and January 2016, 12.13 confirmed cases of Zika virus per 1,000 individuals were reported. Zika virus is transmitted by the *Ae. aegypti* mosquito which requires warm temperatures and clean water to breed. One of the main breeding sites on San Andres are water containers within households. While historical data is not available for Zika virus, the island has seen an increase in other mosquito borne diseases, such as dengue and chikungunya virus, since 1995 (Rojas et al, 2016, p.1: 3). Could climate change and migration explain this increase in mosquito borne disease and the onset of Zika virus?

Rapid Urbanization

Since San Andres Island was declared a free port, where there are no customs duties on goods in transit, in 1953 there has been a rapid increase in the population of the island (Ross, 2007). In the 2005 national census the population of San Andres was reported as 59,573 inhabitants, a number that was projected to continue growing (DANE, 2005). This is a large increase over the population of 1,150 inhabitants reported in the 1806 census (Ross, 2007, p. 11-12). Because of the islands relatively small size, 27 square kilometers (Rojas et al., 2016, p. 2), the growing population has given it one of the highest population densities in the world (Ross, 2007, p.5). Many of the migrants who first moved to the island after the declaration were Afro-Colombians who came to work in the construction industry that resulted from expanded trade and tourism on the island. Most of these migrants came from the largely populated cities along the Caribbean coast of mainland Colombia. The building of an airport on the island further increased the number of mainland Colombians who migrated to the island; however, it was a new law in 1959, which allowed investors to create businesses on the island without paying taxes, that opened the way for predominantly Middle Eastern merchants to immigrate to the island and further expand trade and tourism (Ross, 2007, 9: 22-27).

Insufficient Water Distribution

The population density, changing climate conditions, and limited natural resources have become a major concern for the island. Traditionally an agricultural and small trade island, relying largely on coconut production in the late 1800's and early 1900's, the major economic activity on the island has since switched to tourism (Ross, 2007, p. 13-17). The Department of Tourism for San Andres reported

more than 700,000 tourists in 2014. Tourism requires a large portion of the water resources on the island which has resulted in water shortages for the islander population. Currently only 80% of the island's drinking water is supplied from wells, the remaining 20% is supplied through traditional methods such as rainwater harvesting (Torrejano, 2015, p.3:5)

Water Storing

According to the National Government rainwater is used in 52% of the homes on San Andres (DANE, 2005). This rainwater harvesting is able to cover approximately 20% of the water demand for the island (Torrejano, 2015, p. 5), however, rainwater harvesting reduces the amount of recharge for the aquifers that supply the majority of the freshwater on the island. Additionally, changing climate conditions will affect the availability of rainwater, sea level, and the temperature on the island. It is still unclear how these changes will affect the water supply of the island.

Increased Mosquito Breeding

The increasing rate of rainwater storage on the island has created ideal breeding grounds for the *Aedes aegypti* mosquito which transmits Zika. Additionally, a recent study from a team of Stanford researchers found that the ideal temperature for the transmission of Zika virus is between 26-29 degrees Celsius (Mordecai et al., 2017, p. 1). According to the Instituto de Hidrologia Meteorologia y Estudios Ambientales (2012) the average temperature range on San Andres is 24 – 30 degrees Celsius. Could changing temperatures and rainfall patterns contribute to increased mosquito breeding on the island?

Zika Outbreak

The first case of Zika virus was reported in Colombia in mid-September of 2015. As of April 2016 over 65,000 cases of Zika virus were reported. This gave Colombia the second highest rate of Zika virus, surpassed only by Brazil. Of those cases, 928 were on the small island of San Andres.

There are many possible health complications from Zika virus. These include Guillain-Barre syndrome and microcephaly in newborns. Because of this the World Health Organization declared the Zika virus outbreak a Public Health Emergency on the first of February 2016 (Rojas et al., 2016, p.1-2).

Important Questions to Consider

Did climate change play a role in the Zika outbreak on San Andres Island, Colombia? Will future climate change contribute to another outbreak? Could tourism on the island and the migration of workers in Colombia play a role in spreading the Zika virus to previously unaffected areas?

Results of the Case

While perceived by many as a new virus Zika virus was first detected in 1947 in Uganda. Since its detection cases have been reported in Africa and Asia but little is understood about the disease. It was only after the virus spread to new locations with devastating impact, that more emphasis was placed on understanding the transmission of the virus (Rojas et al., 2016). One reason for this newfound urgency is the burden of the disease. Zika virus has been linked to conditions such as Guillain-Barre syndrome and microcephaly in newborns. There is also a high potential to spread the disease to new areas (Mordecai et al., 2017 p. 2). The possibility of spreading the disease and the health implications make Zika virus a threat to the national security of many countries. As climate change occurs globally new areas may

become ideal breeding ground for the mosquitos that carry this disease. Through understanding the possible links between climate change, migration, and episodes of disease we can better equip ourselves to educate the public, control the spread of disease, and protect communities.

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