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Jamaica, Factor 5: Climate Volatility

Jamaica: Vulnerability to Climate Change

Jamaica, as a small island is particularly vulnerable to the impacts of climate change. Jamaica's weakness against natural disasters has been a major threat to the stability of the country's settlements and infrastructure. The volatility in climate will continue to have an impact on the agricultural-dependent livelihoods of Jamaicans. The intensity and frequency of climate-related hazards, variability in rainfall, droughts and floods, combined with fragile ecosystems and coastal exposure all contribute to Jamaica's vulnerability. The agriculture sector is at any time likely to lose crops and/or suffer damage to livestock, fishery and irrigation structures. High-value crops such as coffee, citrus fruits, sugar cane and bananas are highly vulnerable to climate hazards. Climate change also reduces the availability of water for agricultural systems. Small-scale farmers are the most vulnerable.

Can Jamaica develop sustainable solutions for both current needs and predicted challenges? I believe they can by integrating climate change impact into the country's development and investment plans.

Between 2001 and 2012 Jamaica experienced 11 storms, including five major hurricanes, and several floods. These storms and floods resulted in loss and damage amounting to approximately $128 billion. In wake of Hurricane Ivan (2004), the loss was equivalent to 8 percent of Gross Domestic Product. Hurricane Sandy (2012) accounted for $9.7 billion in direct and indirect damage and all social sectors were affected, including agriculture, health, housing and education. One death and 291 injuries resulted from Hurricane Sandy (Chen).

Jamaica is an island in the Caribbean Sea. It has a total area of 10,990 square kilometers and extends 235 kilometers north-to-south and 82 kilometers east-to-west. The greater part of Jamaica is a limestone plateau, with an average elevation of about 460 meters. The interior of the island is largely mountainous, with peaks over 2,100 meters. The Blue Mountains are 2,256 meters above sea level. The average annual temperature on the coast of Jamaica is 81 degrees Fahrenheit; inland it is 55 degrees Fahrenheit. The island has a mean annual rainfall of 78 inches. (Jamaica).

Jamaica, the third largest of the Caribbean islands, is a lower-middle income country of 2.6 million people. Three million tourists visit Jamaica annually. Almost half of all Jamaicans live in the island‘s rural areas and depend on the land and the island‘s increasingly depleted natural resources. Nineteen percent of the population lives below the national poverty line. Two-thirds of Jamaica‘s poor households are headed by women (Selvaraju). A small number of farmers control a disproportionate amount of farmland, monopolizing high-quality arable land and leaving small farms with marginal hillside land. The state owns and controls approximately 22 percent of Jamaica‘s land, with the balance held in freehold, either individually or by families. This tenure system provides access to land based on kinship ties, but plots are small and characterized by low productivity. Even though women in Jamaica have the legal right to own land and may be included on documents as joint or individual landowners, they are seldom landowners; in fact, they are among the poorest members of Jamaican society (Selvaraju).

The diet of the majority of Jamaicans consists more of processed foods, with more added salt, sugars and fat, than it ever did before. Jamaicans have shifted toward nutritionally poor diets that have led to increasing obesity, diabetes, hypertension, stroke, heart disease and some forms of cancer. These diseases have become national health problems, which are costly to individuals and the nation (Tabling).

As of 2006, 93 percent of the total population of Jamaica had access to treated water. Ninety-seven percent of the urban population and 88 percent of the rural population had access to treated water. Ninety percent of urban households and 47 percent of rural households had water piped to their home, yard or plot. One-third of the poorest households relied on standpipes for their water, and 30 percent obtained their water from untreated sources, such as rivers (Selvaraju). Increasing population growth, food consumption, and water use for domestic purposes have strained water resources in Jamaica. Declining water resources most dramatically impact impoverished communities which are more likely to be located in forested areas, further straining water resources.

In Jamaica, the average household is three to four members. The country has a large proportion of female-headed households at 47 percent (Bernard). Jamaica has free public healthcare that was established in 2008. However, approximately one quarter of Jamaicans (25.8 percent) reported having at least one of the following chronic illnesses: hypertension, diabetes, arthritis, asthma or mental illness. Hypertension was the most prevalent condition, followed by diabetes, asthma and arthritis. A larger proportion of women than men reported chronic illness (Bernard). Significant increases in school enrollment suggest that people are staying in school longer, leading to an increase in the average years of schooling. The country continued to enjoy rates of enrollment in excess of 90 percent at the early childhood, primary and up to the first stage at the secondary level (Bernard).

More than 90 percent of households in Jamaica have electric lighting and use of kitchen facilities. Concrete-block-and-steel outer walls are used in more than 70 percent of housing. Only 54 percent of Jamaica's homes have indoor plumbing. Less than two-thirds of households have access to private or public garbage collection, with burning the second most common method of garbage disposal (Bernard).

Climate change poses unprecedented challenges to all countries. "Climate change" refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide emissions due to human activities have grown since pre-industrial times, with an increase of 70 percent between 1970 and 2004. The estimated 0.74 Centigrade rise in temperatures over the past ten decades and the predicted increases over the next two decades will have significant impacts.

Expected climate change impacts:

- Sea level rise is expected to increase storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, human settlements and facilities that support the livelihood of island communities
- Increased air temperatures
- Ocean warming and thermal expansion
- Increased acidification of oceans
- Increased threats to human health, such as the spread of tropical diseases
- Increased variability in rainfall patterns adversely impacting water resources
- Increased frequency of extreme weather events such as storms, droughts and hurricanes
- Reduced quality and quantity of water resources due to the impacts of climate change on the water cycle (Eitzinger)

The hazards of climate change are further compounded by issues such as poverty, the location of human settlements in high risk areas, environmental degradation and instances of poorly constructed infrastructure and housing. Natural hazards include hurricanes, storms, and floods. The dependence on natural resources by key economic and climate-sensitive sectors such as tourism, agriculture, fisheries, forestry and water, means that climate change is a major threat to the island's overall development.

Based on recent climatic trends observed over the past 100 years, climate change is likely to alter and disturb the quality and available quantity of food (Pickersgill).

The mean temperature of Jamaica has increased by around 0.6 °C since 1960, an average rate of 0.14 °C per decade. The mean precipitation over Jamaica has decreased approximately 5.0 mm per month per decade respectively. Tropical storms in the region show an increase since 1995, especially Category 4 and 5 hurricanes. The mean annual temperature is projected to increase by 0.47 °C to 1.17 °C by 2030, and 0.6 °C to 2.3 °C by the 2060s. Projections of mean annual rainfall from different models indicate decreasing rainfall for Jamaica (Fisheries).

Jamaica is already experiencing the impact of climate change most significantly in terms of the frequent occurrence of drought, the frequency and magnitude of hurricanes, and associated secondary events such as floods, landslides and seawater intrusion. The agriculture sector is also prone to crop yield loss and damage to livestock, fishery and aquaculture, and irrigation structures. An in-depth analysis of the agriculture sector in Jamaica identifies two critical impacts of climate change – reduced water availability for agriculture systems, especially for small-scale agriculture; and increased extreme climate-related events such as hurricanes, floods, landslides, water stagnation and saltwater intrusion. In all cases, these impacts significantly affect not only agriculture but also rural livelihoods (Selvaraju).

A study on the impact of climate change on the Jamaican hotel industry supply chains and on farmers' livelihoods predicted that the suitability of crops such as cabbage, carrot, ginger, sweet potato and tomatoes is expected to decline by 2050. The Water Resources Authority of Jamaica reported that water demand for agriculture will increase by 18 percent in 2030. The sustainable water yield may decline by 20 percent during the same period. As the agriculture sector is the major user of freshwater resources (75 percent), it is expected to be affected severely. High-value crops such as coffee, citrus, sugar cane and banana are highly vulnerable to extreme climate events. The financial impact of extreme climate events on the agriculture sector from 1994 to 2010 amounted to $14.5 million. Climate change impacts will add additional costs (Fisheries).

Agricultural practices and management have contributed to climate vulnerability in Jamaica. Loss of habitat for fish due to coastal degradation and pollution are also a concern. Overfishing has nearly eliminated large predatory fish species, such as groupers and snappers. The fishing-dependent communities are more vulnerable to impacts of climate due to poorly planned coastal development and sedimentation resulting from land-based sources of pollution (De Giorgi). Crop cultivation on steep slopes and unsustainable farming practices have led to soil erosion, flooding and degradation of watersheds. Insecure land tenure, unequal distribution of agricultural land among rural people and farming in marginal hillside land contributes to vulnerability.

The agriculture sector is mainly small-sized and medium-sized farmers with five hectares or less, who account for 85 percent of total agricultural holdings. In general, agriculture-dependent parishes have the highest incidence of poverty in Jamaica (Eitzinger). The proportion of irrigated agriculture is less than 30 percent in agriculturally important parishes such as St. Thomas, St. Elizabeth, Trelawney and Westmoreland. Poor irrigation water supply systems, inefficient water management and runoff losses lead to low irrigation efficiency (Eitzinger).

To assist with the management of water supply for agricultural purposes, small-scale water harvesting ponds are the most suitable means of water supply to small farmers during water scarcity and dry spells. Conservation practices, such as hedge rows and mulching, will improve soil moisture conditions as well as the crop yield during dry spells and should be implemented throughout the country. Development of small scale reservoirs to replenish ground water is one important strategy to enhance efficient water resource management. This infrastructure would help to ensure that water resources are managed in a

long-term sustainable manner. Local communities have developed their own coping strategies to reduce the impacts of climate variability. Many growers have switched to dwarf varieties of fruit trees, planting hedgerows around and between high risk vulnerable crops to reduce wind impact and growing root tuber crops during hurricane season are some of the practices (Eitzinger). Jamaican farmers have begun cultivating crop varieties that are able to withstand increasing temperatures, drought and pests. Many growers have switched to short-term crops which take a shorter time to recover from severe weather events. Recently there has been some development of improved water-saving irrigation systems and farm water storage such as ponds and tanks (Pickersgill). The Ministry of Water, Land, Environment and Climate Change has begun to develop capacity for development of research, technology, training and management toward a coordinated integrated policy approach toward climate change (Chen).

Ongoing projects and initiatives show promise to alleviate climate impacts. In 2007 United States Agency for International Development trained students in development of high tunnel houses to increase productivity and mitigate impacts of national disasters. In 2010 the Jamaican Ministry of Agriculture developed and funded training initiatives to educate farmers in contour farming, reforestation and drought mitigation. Between 2010 and 2013 the Forestry Ministry funded and supported numerous projects related to protecting and restoring forest reserves and watersheds. In 2010 the Ministry of Agriculture instituted programs that introduced farmers to improved water harvesting and small scale irrigation technology. One ongoing project is the development of nurseries that grow seedlings for use in coastal area sand dune protection (Selvaraju).

A number of key recommendations to address issues of climate vulnerability and adaptation projects, programs and policies were developed as part of the Government of Jamaica's Second National Communication to the United Nations Framework Convention on Climate Change (Government of Jamaica, 2011). The list of recommendations includes these priorities:

- Leverage and coordinate international funding to maximize benefits within the agricultural sector
- Improve access to loan/grant funding to domestic crop producers
- Raise awareness of the potential impacts of climate change on the agricultural sector, food security and cultural practices
- Review approaches to integrated cropping and management systems under climate change
- Develop regional links to fund and promote plant breeding programs for common crops and livestock
- Support and fund increased water use efficiency across irrigated agriculture
- Support and expand funding of the Integrated Water and Coastal Areas Management program, as well as internationally hosted coastal zone management and other related initiatives
- Initiate a Climate Change Working Group for Agriculture
- Develop modelling approaches and tools to allow assessment of impacts of climate change on export and domestic crops and meat production
- Review role of financial instruments to provide insurance (Selvaraju)

Currently, knowledge, management and communication on climate change is weak within the agriculture sector, so reinforcement of information exchange is vital (Chen). Reports, data and information need to be spread among all organizations. Retention of highly trained technical staff is important if Jamaica is to develop the necessary skills to design adaptation interventions, programs and policies to support the programs related to climate change adaptation in agriculture. Aligning agriculture sector priorities to Jamaica's climate change strategy, a part of the Vision 2030: National Development Plan can leverage additional resources for implementing climate risk reduction measures to protect livelihood assets (Chen).

I believe it necessary that local agencies host information sessions throughout the country to educate small farmers on the issue of climate change. I would suggest Extension services be available to make suggestions on best practices and adaptive measures. In regards to adaptive practices, there could be available loans that could be used to purchase and to provide immediate improvements. The loans could have target incentives to provide adoption and follow through.

The agriculture sector in Jamaica is already experiencing the impact of increased climate variability. The future projections for climate change introduce further challenges. From my research, the current response level is inadequate. There are many policies, plans and programs that address the issues of agriculture and climate change. I believe a focused effort should be given to the farmers' vulnerability, exposure and ability to adapt and cope with climate change. I believe Jamaica can achieve its goals of growth and prosperity for its people while meeting the challenges of climate change. Jamaica can build resilience and capacity to adapt to the impacts in an effective and sustainable manner.

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