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Rwanda, Climate Volatility

Rwanda: A Double-Sided Crisis

Climate change affects the entire world. It's an unavoidable event, but this effect is not the same for everyone. Less industrialized countries are disproportionately hurt by this global event. The climate is in crisis, becoming more volatile, unpredictable, and extreme with each passing day. This crisis threatens the lives of billions of people and their access to food and any form of a stable income. Rwanda is an example of this. This democratic Republic is facing a food insecurity crisis because of climate change. Rwanda's food insecurity crisis has been caused by a volatile climate that threatens the agricultural industry. This threat leaves the millions of small-scale farmers in the country with a limited income and a food deficit, making feeding a family an almost insurmountable task in some rural areas. It is only through the adoption of advanced irrigation techniques, an influx of a younger workforce in the agricultural sector, and an increase in productivity on small-scale farms, that this crisis can be resolved.

As of August of 2022, Rwanda has a total of 13, 246, 394 people living in the country (National Institute of Statistics of Rwanda, 2023). The climate is tropical and quite hilly, but its four regions have stark differences in geography. The regions are as follows: the eastern plains, highlands, the area around Lake Kivu, and the central plateau (Climate Change Knowledge Portal, n.d.). Across the entire country, 70% of the land is arable with the potential to be used for farming. Rwanda's primary exports are tea and coffee, grown as a method of income, but maize and beans are commonly grown as a food source (Rwanda Environment Management Authority, 2009). Rwandans typically have families of four people, and the majority of the population in rural areas reside in edifices (homes made of mud bricks with thatched roofs) on family farms (Nations Encyclopedia, 2011). The majority of families rely on produce grown on their family farms as a food source. The average farming family makes around 221,932 Rwandan francs ($194.93) a month by participating in small-scale agriculture (ALIGN, 2023). These small farms have an average size of 1.78 acres (0.72 hectares), minuscule compared to the United States' average farm size of 446 acres (United States Department of Agriculture, 2022). Most produce from these farms is beans, maize, bananas, potatoes, or tea/coffee; however, the efficiency of the farms is limited by the climate crisis and limited access to advanced farming equipment.

The volatile climate in Rwanda has affected the agricultural sector immensely. There are large regional differences in the effects of the climate; however, the ultimate effect is a lack of food production and small-scale farmers being predominantly impoverished. Across the entire sector, 62% of the jobs in the country (ALIGN, 2023), there is a heavy reliance on rain for agricultural yields. Droughts in the eastern regions of the country have resulted in a low crop yield and difficulty for farmers to travel to markets to sell their produce. The northern and western regions of the country have experienced shorter, heavier rainy seasons that have made floods and landslides much more likely, which once again contributes to low agricultural productivity (Lydie, 2022). The climate has led to increased soil degradation because of higher global atmospheric concentrations of CO_2, on average 1.4 million tons of fertile soil have been lost per year in the last decade in Rwanda. These trends further contribute to food insecurity in the country, especially in rural areas.

The focus of concern regarding food insecurity in Rwanda must be centered on the rural, farming population. 82% of the Rwandan population lives in rural areas, with 52% of the country living below the international poverty line (ALIGN, 2023). Citizens who work on their farms or those owned by others have a 76.6 % poverty rate, and chronic malnutrition affects 43% of children under 5 years old. Most working families struggle to provide crops for income generation, without the consideration of the food needed for consumption. The food deficit can be easily realized in the fact that only 34% of the food produced by farmers is sold (Habte-Selassie & Ntukanyagwe, 2022). Farmers in Rwanda have not yet

adapted their agricultural practices in response to the increasingly disastrous weather conditions. Few farms have adopted fertilizers, rural infrastructure is far outdated compared to neighboring countries, and an underdeveloped water irrigation system that only worsens the effects of the volatile climate (Food and Agriculture Organization of the United Nations, 2023).

Malnutrition created by the food crisis affects Rwanda's children and their future. 4 in every 5 households (1,963,975) in Rwanda are marginally food secure, and 473,847 households are identified as food insecure. The consequences of childhood malnutrition are irreversible. Over 800,000 children in Rwanda under the age of 5 years old are stunted, and the majority of these children live in poor, rural households. These children are more susceptible to disease, more likely to not perform well in school, and ultimately have a decreased work capacity. The future of Rwanda's working class has been jeopardized by the climate's impact on agriculture. Stunted children grow into adults who struggle more to move out of poverty than their counterparts, and will contribute less to the development of Rwanda (United Nations International Children's Emergency Fund, 2023).

The fight with the climate may seem to have insurmountable odds, but innovation and modernization will combat the volatile climate. As previously mentioned, Rwanda's agricultural sector has been slow to adopt more modern practices, and there is a lack of education/funding to modernize farms in the country. There are 3 ways to address this country's crisis. First, the younger generation must be encouraged to join the agricultural sector. Second, irrigation methods must be updated in drought-prone areas. Finally, agricultural productivity needs to be increased with more advanced farming methods. Education will reform Rwanda's agricultural battle with the changing climate.

The agricultural sector in Rwanda constitutes the majority of the working class, and the younger generation will be the innovators of the future to change the industry. These individuals simply need support, and the country must entice more of its youth to join the industry. 1 in 5 of the country's youth is currently unemployed, and the majority of the population is under the age of 20. Rwanda has the perfect conditions to create a new, educated working class to develop the country. The Rwandan Ministry of Agriculture and Animal Resources realized this opportunity and started the Rwanda Youth in Agribusiness Forum (RYAF). This year-long paid internship has encouraged 328 graduates with degrees in agri-business areas and work in over 12 different businesses. The businesses they work for receive investments from the Rwanda Private Sector Driven Agricultural Growth (PSDAG) program. These graduates have a supported, bright future in agriculture. Many young people in the program like Antoinette Umurerwa (finance management and accounting major) intend on starting their farming businesses using savings from the program and internship stipends that they have received. The goal of this program is to not only create jobs for the youth of Rwanda but also increase the income of small-scale farms by transforming the market through education and financial support (McGill, 2018).

Irrigation techniques in Rwanda are in desperate need of an update. Droughts in the eastern and southern regions of the country have created a demand for new irrigation systems to encourage agricultural development, especially in rural areas. In the district Nyagatare, in the northeastern region of Rwanda, dams have been constructed to control the amount of water available to the region. The dams allow farmers to harness water for irrigation and build resistance against the variability of the climate. Muhire Ganza, a farmer in the region says that "before dams were introduced, the lack of water severely affected most of the farmers because they depend on small-scale agriculture for their livelihoods". The dam project is expected to irrigate 7,380 hectares (18,236.38 acres) of farmland and will also function as a power plant (Mugisha, 2022).

Rwanda's coffee industry (one of its main exports) is a paramount example of the need for adaptation in the face of the climate crisis to increase agricultural productivity. Outdated farming practices only hinder the yields of small-scale farmers and disable them from participating in markets and maximizing their yields. The Rwanda Trading Company has sponsored a project that will modernize Rwanda's coffee industry. The Company has invested in training in both business and sustainable farming for the industry's

small-scale farmers. Over 31,000 coffee farmers in Rwanda receive such training from the organization. Completion of this specialized training has allowed farmers to increase their yields by up to 149%. The income increase has allowed families to send their children to school, explore new business opportunities, and invest money into a better quality of life (U.S. International Development Finance Corporation, 2023).

The most important solution focuses on education. Education on sustainable agriculture in the face of a climate crisis directly benefits Rwanda's citizens. Opportunity International has an Agriculture Finance program in Rwanda that promotes the education of farming families on cultivation methods, as well as provides resources for small-scale farmers. This program primarily focuses on rice farmers and encourages them to grow a second or third type of crop between harvests to create alternate sources of income. The farmers are trained in financial literacy and modern agricultural practices to increase their crop yields and financial earnings. The program employs a network of trusted farmers with cell phones to work in different communities in Rwanda as a local support system for farmers. These smaller communities can then connect to increase financial opportunities. Finally, this program brings digital resources to farmers by supplying loans for technology and training on how to navigate mobile banking. Rural areas are often disconnected from city centers, so digital technology gives farmers a larger market to sell products to (Kooser, 2022). The success of this program is due to making communities a part of the solution. It is only through collaboration with local producers and consumers that change can be made in a country that relies so heavily on small-scale agriculture.

Building on the importance of agricultural education, emphasizing farmer-to-farmer learning is vital in empowering local producers. The Twigire Muhinzi program (self-reliance farming) is Rwanda's agricultural extension program. This organization trains farmers and uses local farmers to demonstrate sustainable and high-yield farming practices. This education system prioritizes small-scale farmers and community engagement using experimentation and analysis. This is comparable to Florida's agricultural extension programs which research and educate the public and local farmers on sustainable agricultural and environmental conservation practices. The promotion of local agricultural education makes an investment in farmers that directly addresses challenges in the country regarding agriculture. A global study conducted in 2022 in Rwanda, Cameroon, Chile, India, Indonesia, Peru, the United States of America, West and Central Africa, and Kenya displays that when a country invests in small-scale producers, they expand their technical capacity, increase farmers' incomes, yields, and inclusion of minority groups, as well as increasing individual productivity. (*Rwanda study shows the success of farmer-to-farmer learning system*, 2022)

Through a multifaceted approach to bringing Rwanda's agricultural industry into the modern world, the climate crisis can be combated. It's a leveling of the playing field. Education, domestic and international programs, and individual changes can lessen the impact of Rwanda's volatile climate. It may seem difficult to invest in a country with limited resources to expend, but aid from larger more developed countries is a protection of the human right to food security. The climate crisis affects the globe, and it is only a united effort that will ensure the safety and security of people across the world in the face of a volatile climate. More money, time, and resources must be invested into making Rwanda's agricultural industry resistant to climate change for the population to move towards an oasis from food insecurity.

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