

Kahyun Koh  
Torrey Pines High School  
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Rwanda, Factor 9: Water and Sanitation

## **Rwanda: Rainwater Harvesting and Hygiene Improvements to Solve Water and Sanitation Issues**

Rwanda is a small, landlocked country nestled deep within the valleys of East-central Africa. Since the devastating Rwandan Genocide in 1994, the country has been struggling to recover from its war-ridden and oppressed state. Despite the political measures taken by Rwandan president Paul Kagame to bring economic, political, and social stability, the country still suffers from food security in addition to other issues like Rwanda's political conflict with Burundi. Among the range of elements that contribute to food insecurity in rural Rwanda, an important factor is the lack of quality water and sanitation, which is caused by unsafe water sources, droughts, floods, and water-borne diseases. Therefore, as the population continues to skyrocket at an annual growth rate of 2.4%, water and sanitation issues and their pernicious effects to the people in terms of food insecurity and health must be first considered, then analyzed, and ultimately solved ("Population Growth (Annual %)").

Of Rwanda's total population, 70% is largely rural and located by the countryside ("Population Growth (Annual %)"). These rural areas are home to many of Rwanda's poorest families, who have an average size of 4.3 people, which is .3 people smaller the average size of wealthier urban families ("Population Growth (Annual %)"). Contrary to pre-colonial times, tribe identification among the Hutus, Tutsis, and the Twa no longer limits marriages between people of different tribes, as evinced by the rise of Hutu-Tutsi marriages starting from the early 21<sup>st</sup> century ("Rwanda"). Nevertheless, marriage remains an integral part of Rwandan culture, and there is a great societal pressure to bear children, a symbol of wealth. Family duties continue to be largely influenced by societal gender divisions and expectations, which have so far demonstrated little improvement in elevating women's status. As in most rural African countries, men, being the head of the family, carry out the heavy work like construction and overseeing livestock, while women, who also assist their husbands in agricultural work like planting, weeding, and harvesting, are mainly responsible for the household chores ("Rwanda").

While the quality of and access to education and healthcare has increased compared to previous times with the implementation of policies that require mandatory education for primary school and lower secondary schooling in state schools, there is definitely room for further growth ("Rwanda Education System"). As of late, only 70% of Rwandans over the age of 15 can read or write, and an even fewer amount of women than men are literate ("Statistics"). In addition to her aforementioned responsibilities, the mother, usually assisted by her eldest brother, is the parent who rears and educates the children.

Agriculture is essential to Rwandan economy. Diet in the average Rwandan family is quite simple; beans, bananas, sweet potatoes, potatoes, and sorghum are some of the most commonly-eaten foods. Dairy products, especially in the form of a traditional curdled milk, are also regularly consumed. Contrarily, meat, primarily beef, goat, and chicken, is considered to be a luxury in rural Rwanda that is almost rarely consumed. The average size of a family farm is 0.4 hectares, which is equivalent to the size of a junior football pitch ("Land Use and Agriculture").

Rwanda is not called “Land of a Thousand Hills” for no reason. Environmental factors like land degradation and soil erosion greatly circumscribe not only the types of crops that can be planted, but also the agricultural yield of crops that have already been planted, posing a threat to food security. Extreme poverty in Rwanda is only exacerbated by farmers’ inability to afford methods like terracing to overcome such environmental challenges. With the lack of advanced technology and money, farmers have little choice but to plant their crops on the slopes and select hardy crops that can withstand the harsh conditions. Despite these natural limitations, however, the jagged slopes and acidic soils of Rwanda’s highland regions are surprisingly an ideal place to grow two items that comprise of nearly four-fifths of the country’s agricultural exports: tea and coffee (“Climate & Agriculture”).

As mentioned earlier, environmental challenges limit agricultural productivity, which correlates to a dip in employment and access to food markets. The continuous trend of short, yet heavy, rainy seasons, in Rwanda’s Eastern Province, has resulted in a diminished crop yield and droughts. This is exacerbated by the alarming fact that Rwanda, along with several other neighboring regions in the East African province, recently faced the worst drought in 60 years. As a result, over 23,448 hectares of crops were destroyed and lives of cattle were taken by the severe drought and lack of rainfall (“East Africa: Rwanda Facing Worst Drought in 60 Years - Minagri”). Not to mention, 47,306 families have been affected by famine by this drought alone.

Because of the devastating effect that droughts have on livestock and crops, the income and employment of a Rwandan farmer living in the Eastern Province is in constant danger. Also, the fact that Rwandan farmers, due to the little stretch of land they are given, do not reap much harvest to begin with, underscores the value of even just one crop that has been lost to water shortage. Ultimately, lower agricultural yield, caused by droughts, directly takes a toll on local food markets, for food scarcity leads to higher food prices when supply fails to meet the demand of countless, hungry Rwandans. With the said employment instability and low income, many people are unable to invest in new, technological ways to enhance their farms, let alone afford healthy food from the markets during the “lean seasons,” a term used to describe the period right before harvest when people begin to run out of food crops from the previous harvest (“Climate & Agriculture”).

Compared to the Eastern Province, the Western and Northern Provinces of Rwanda are markedly higher in altitude (<http://www.rema.gov.rw/soe/chap9.php>) by several hundreds of miles. An in-depth study by Ntwali, Ogwang, and Ongoma strongly suggests that the increase in elevation and the waning presence of the El Niño account for the heavy rainfalls in the Western and Northern regions. Unfortunately, this heavy rainfall and the topography of the area can cause natural disasters such as floods, landslides, and rock falls that kill humans, crops, and livestock and demolish roads, bridges, and schools. Therefore, the potential of flash flooding in many parts of Rwanda is not something to be lightly dismissed when it is so clear that the effects are often fatal and long-lasting. In 2015, the severity of this problem was emphasized by a report released by The International Disaster Database (EM-DAT) that claims that floods are the most frequently-occurring and death-causing natural disaster in Rwanda (“Rwanda Disaster & Risk Profile”). In fact, at least 50 people, most of them farmers, in April of that year were killed after heavy rain brought on a deadly flood that swept over the Western Province. Buildings were damaged. 206 hectares of crops were inundated. 500 homes, along with farms, were demolished, leaving thousands homeless. Sanitation infrastructures and water supply were flooded, elevating the danger of contamination. And 3,435 people were affected because of a single flood (“Deadly Rwanda Floods Leave Thousands Homeless”).

Associated with cases of landslides and floods, outbreaks of water-borne and water-related illnesses like malaria, diarrhea, cholera, and viral infections, sourcing from polluted wells and groundwater, have spread throughout and contaminated the country. Although many people who have access to clean water take it for granted, water is actually a very precious and valuable resource among rural Rwandans—57% of whom live in poverty and 37% of whom live in extreme poverty (“Poverty in Rwanda Surprising Facts”). Water’s importance is only highlighted by the startling statistic that three million, a little more than 1 fourth of the entire population of Rwandans, do not have access to safe water. Speaking in broader terms, an additional 1.5 million people on top of the already-established three million do not have access to adequate sanitation in Rwanda (“WaterAid - Where We Work - Rwanda”). In the end, what these figures indicate are that, despite Rwanda’s economic boost since the genocide, millions still lack basic sanitation requirements like clean water and toilets.

Water and sanitation, in terms of their slightly indirect effects on household income, may not be the most pressing issue in Rwanda, but they are key topics that need to be carefully analyzed and considered. Primarily, the point is that water contamination and sanitation problems are particularly dangerous to rural Rwandans because they generally cannot afford the medical treatment needed to cure water-borne illnesses. For example, cholera, a common water-borne disease in Rwanda, triggers severe vomiting, dehydration, nausea, and sudden onsets of diarrhea; if left untreated, which is often the case with indigent Rwandans living on farms, the bacterial disease can kill children and adults in a matter of days, or even hours. This means that the number of family members who can work to generate family income, whether it be through helping on the farm or other money-generating activities, decreases due to the victim’s diminished productivity.

However, people are not the only victims of the lack of quality water and sanitation in Rwanda. The environment suffers too because organisms in the surrounding area are also exposed to the contamination. Additionally, livestock raised on the farms have a large chance of contracting diseases like cholera or e coli and eventually dying from dehydration—another illustration of how this issue can lead to lower income and agricultural yield (The Center for Food Security & Public Health). Even worse, the people’s susceptibility to water contamination is heightened by the physical proximity of farms and houses in a village, as many water-borne illnesses are highly contagious.

Considering all of the aforementioned, improving water and sanitation standards in rural Rwanda is necessary for the well-being of the country’s people and their produce, for the potential of developing health hazards from contamination would be significantly reduced. Crops and animals would be able to grow to their maximum potential after being watered with a consistent supply of clean water, increasing the agricultural yield and thus increasing the family’s income. Family members would not have to pour what little money or time they have into seeking unaffordable medical treatment for detrimental water-related diseases like cholera. Moreover, women and girls specifically would not have to travel long, painstaking distances across difficult, mountainous terrain to fetch water from unsafe sources, which would profit their economic productivity (“Social Protection, Water Sanitation and Hygiene | ONE UN Rwanda”). More importantly, the lives of over 900 innocent children under five who die yearly from diarrheal diseases associated with poor water and sanitation problems would be rescued (WaterAid).

Thankfully, the issue of water and sanitation is steadily being improved as it is gradually being brought into public awareness. Among the pool of organizations working to improve water and sanitation quality in Rwanda, WaterAid is an international non-profit organization that has been working closely with the government since 2009 to “ensure water and sanitation stay on the agenda and plans are carried

out in an effective, integrated way,” according to their website. WaterAid has had a wide positive impact on the lives of many impoverished Rwandans. The organization’s success is evinced by the 4,000 people they were able to supply with safe water and 7,000 people who were supplied with improved sanitation (WaterAid).

As aforementioned, Rwanda’s heavy rains and floods can lead to water and sanitation problems. To be more specific, oceans, lakes, and rivers are not completely clean masses of water, for they are teeming with strange and naturally occurring bacteria and organisms. This means that there are very high chances that the water is polluted by outside sources. Furthermore, risk of contamination is heightened during and after heavy rainfalls because pollutants, including toxic pesticides like malathion, and wastes from the farms and lawns are carried along with the rainwater. In fact, such contamination can be found in Lake Kivu, a water source that thousands of Rwandan farmers and fishermen depend on daily, as evinced by a study conducted by Michael Houbraken which indicates that the lake’s surface water is tainted with “malathion, metalaxyl and carbendazim . . . the most used pesticides by the farmers in the environment” (“Multi-Residue Determination and Ecological Risk Assessment of Pesticides in the Lakes of Rwanda”). Therefore, water contamination caused by heavy rains is pernicious to not only the environment, but also to rural Rwandans who unknowingly drink from flood-damaged water supplies.

Although the situation may seem bleak, there is still hope. First, to address the problem on a local scale, a recommendation to combat water and sanitation problems is to encourage unity within each village. Until a more suitable solution can be found, rainwater harvesting, a technique used for collecting and using rainwater for irrigation and other uses, can be utilized by setting up several large water tanks throughout the provinces. This method is beneficial because it will help reduce surface runoff overflow and soil erosion that interferes with crop growth. In addition, the collected rainwater can be filtered into sanitary drinking water. Undeniably, cost will be an obstacle when it comes to installing or even building water tanks, especially for rural farmers who do not even have the money to feed themselves and their families. Despite this, community leaders can collect a small portion of money over gradual periods of time from each family to save enough money to buy at least a few water tanks from an East and Central-Africa based corporation called Roto. From being hygienic to well-insulated, Roto tanks offer a variety of benefits; they are relatively low-cost and are completely accessible to even an isolated country like Rwanda. Not to mention, the tanks are weatherproof and long-lasting.

Over the past three years, the national government has been working under the Rainwater Harvesting Project, a project administered by Rwanda Natural Resources Authority, to develop the water and sanitation conditions in the country, but so far the project has only covered only six of the 30 known Rwandan districts (“Rwanda: 4,000 Water Tanks Installed in Rainwater Harvest Drive.”). In order to increase the efficacy, influence, and speed of the project, the government may need to seek further assistance and funding from large international organizations like World Food Bank and United Nations, as well as from foreign countries like the United States and Britain—two of Rwanda’s most generous foreign supporters. Additionally, the government should request for regional leaders to collect data that provides information of which families within the area suffer the most from water and sanitation problems. With this data, the government can then give priority to the mentioned families when installing the tanks.

While rainwater harvesting is an effective method to put rainwater to good use, it is neither the most lasting nor the most impactful method to approach the current issue. The national government, aided by foreign countries, should set plans to develop a curriculum in schools that teaches rural Rwandans about the basic sanitation guidelines, such as washing hands or food storage, and the causes and effects of

water contamination. Additionally, the government should send an inspector every four to five years to check that schools fulfill the government standards and guidelines on hygiene and sanitation; schools that do not meet the requirements should then be given some money to install clean toilets, distribute healthy food, or make any other necessary adjustment if the school cannot, for whatever reason, raise the money to do so. Children and adults alike who do not have access to clean toilets should be allowed to use the school bathrooms and washrooms but strictly during school hours.

Lastly, small medical treatment centers can be established throughout the 30 provinces. Rwandan doctors or doctors from other countries and organizations like the United Nations should be divided into equal numbers and then assigned to different centers to provide free medical attention. This would greatly decrease the potential for the spreading and worsening of contagious water-borne diseases. Thus, sanitation levels in rural Rwanda would be dramatically improved.

To conclude, Rwanda is an impoverished Third World Nation that suffers from a wide range of issues like malnutrition and climate volatility. Throughout the essay, however, the focus has been on water and sanitation problems in Rwanda, which are caused and worsened by unsafe water sources, droughts, floods, and water-borne diseases. Just by taking a glance at the millions of lives being jeopardized by water contamination and sanitation problems, it is apparent how necessary and urgent it is to address the problem at hand. Fortunately, the Rwandan government and help from outside countries can save future lives by implementing measures like investing in more Roto tanks, improving school hygiene standards, and establishing local medical centers in rural Rwanda. Slowly but surely, with continuous local, national, and international effort, the Land of a Thousand Hills can offer a brighter future that guarantees food security and cleanliness to all.

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