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Lesotho, 5: Climate Volatility

Addressing Climate Volatility in Lesotho

Droughts, heat waves, floods, frost, and other extreme weather events plague Lesotho's residents and land each year, and the situation will likely worsen. Entirely landlocked by South Africa, Lesotho is a small, mountainous country of approximately 30,000 square kilometers (Central Intelligence Agency, 2021). It has a temperate climate with cool, dry winters and hot, wet summers, but factors such as precipitation and temperature widely vary based on latitudinal location and topography (Food and Agriculture Organization, n.d.), endangering the country to the severe effects of climate change. According to the CIA's World Factbook (2021), the population of Lesotho is approximately 2.2 million with a higher population density in the western part of the country where the capital, Maseru, is located, but Lesotho has a mostly agrarian population. Although only about 10% of Lesotho's land is arable, agriculture comprises 86% of the labor force as of 2002 since a large portion of the population relies on subsistence agriculture (Central Intelligence Agency, 2021). Because most households grow their own food, they are constantly affected by climate volatility and its impact on agriculture. Lesotho also faces many socio-economic obstacles including high levels of poverty, the second highest levels of HIV/AIDS in the world, and major food insecurity, which are additionally negatively affected by extreme weather events. In order to begin tackling Lesotho's toughest issues, the country must develop more sustainable agricultural practices that can lessen the effects of climate volatility.

The majority of Lesotho's inhabitants, known as the Basotho people, live in rural villages largely focused on agricultural practices, but more people have been migrating to cities where there is a mix of traditional and modern lifestyles (Legum et al., 2020). Families have an average of 2.95 children, but Lesotho does have a relatively high infant mortality rate. Access to health care is very limited, as the ratio of doctors to the general population is only 0.9 to 10000 (World Bank, 2018), and health care distribution is uneven due to geographic obstacles (Legum et al., 2020). The high prevalence of HIV/AIDS overwhelms the health care system, which already lacks medical supplies and personnel (Legum et al., 2020). However, education in Lesotho is better than many other African countries. Children in Lesotho have an average of twelve years of schooling (Central Intelligence Agency, 2021), and seven years of primary education is mandatory and free for all children (Legum et al., 2020). A typical Basotho family's diet heavily depends upon maize, as well as wheat and sorghum to a lesser extent (Food and Agriculture Organization, 2010). These staples are usually eaten with fruits and vegetables, especially starchy roots like potatoes. Lipid and protein intake is considerably low (Food and Agriculture Organization, 2010), and 32.6% of the population was undernourished as of 2018 ("Lesotho," n.d.). Even though most Basothos' livelihoods depend on agriculture, Lesotho produces less than 20% of its food supply, importing most of its agricultural goods from South Africa (Central Intelligence Agency, 2021). The high climate volatility in Lesotho drastically impacts rural Basotho families since it decreases crop production and therefore makes families more vulnerable to food insecurity. Because nearly half of the country's population lives below the poverty line, around 49.2%, many families do not have the money or resources to protect themselves from crop failure or any other negative effects on their food supply (United Nations Development Programme, n.d.). Climate change and the increasing frequency and magnitude of extreme weather events are not only causing more stress upon Basotho families, but also reducing the amount of time for them to recover from the effects of the events.

The small amount of arable land in Lesotho makes farming challenging, especially because over 70% of the rural population is engaged in subsistence agriculture (World Food Programme, 2016). Most

farms are family-owned and practice traditional farming methods, so the average farm size is only 1.3 hectares (Food and Agriculture Organization, n.d.). The primary crops grown in Lesotho are maize, sorghum, wheat, peas, and beans (Food and Agriculture Organization, n.d.), and farms usually grow a three-month monoculture of maize, wheat, or potatoes (Alliance for Food Sovereignty in Africa, 2019). Even though maize is a staple crop in Lesotho, its domestic cost of production is actually greater than the cost of importing maize from South Africa (International Center for Tropical Agriculture, 2018). The low crop productivity is a significant issue that will continue to worsen due to climate volatility if Lesotho does not adopt more efficient farming practices. The vast majority of farms rely on rainfall, as less than 1% of arable land in Lesotho is irrigated, making Basotho farms extremely susceptible to changes in temperature and precipitation, which are only becoming more unpredictable (Food and Agriculture Organization, n.d.). Cultivation of livestock such as sheep, goats, and cattle comprise a large part of the agricultural sector, as wool and mohair production support half of rural households (International Center for Tropical Agriculture, 2018). Unfortunately, overgrazing has degraded pastures and reduced soil fertility (Food and Agriculture Organization, n.d.).

Overgrazing and monocropping have degraded much of the limited arable land, forcing farmers to cultivate marginal lands (Alliance for Food Sovereignty in Africa, 2019). These practices will not be able to support the country in the long term, especially because Lesotho relies almost entirely on rainfall, which has been inconsistent in recent years. The high rate of HIV/AIDS limits much of the population from being able to work and consequently lowers household income, making it difficult for families to pay for food in addition to possible health care bills (New Agriculturalist, 2011). Those with diseases are also less likely to do labor-intensive agricultural jobs (International Center for Tropical Agriculture, 2018). Moreover, the failing agriculture sector is unfavorable to Basotho youths who tend to look for better opportunities in other sectors (Food and Agriculture Organization, n.d.). Households throughout Lesotho also rely on remittances, typically from men working in South African mines, which contribute to nearly half of household income (International Center for Tropical Agriculture, 2018). However, a decrease in mining employment and economic downturn in South Africa has caused more Basotho families to fall into poverty and depend on agriculture even more for both food and money (New Agriculturalist, 2011). Basotho families' reliance on outside sources of income and the vulnerable agricultural sector makes their economic situations extremely fragile.

A major factor restricting food production is climate volatility, as extreme weather events such as droughts, storms, and floods worsen agricultural issues already present in Lesotho. In recent years, droughts have become more frequent, greatly reducing crop production. Major droughts, which have occurred in 2007, 2011, and 2016 (World Bank, n.d.), greatly impacted production of staple cereals and livestock since Lesotho depends on rainfall. The recent drought in 2015 and 2016 put 534,000 people in the country at risk of food insecurity because droughts and other weather hazards reduce seed germination, cause crop failures and price rises, and lead to livestock emaciation (International Center for Tropical Agriculture, 2018). Meanwhile, heavy rainfall in 2010 and a subsequent flood in 2011 washed away topsoil and important nutrients along with crops, resulting in even greater damaged land than was already present (New Agriculturalist, 2011). Short-term weather hazards such as hailstorms, tornadoes, snowstorms, and frosts also occur throughout Lesotho (World Bank, n.d.). This extreme variability in precipitation means that Basotho farms and farmers are constantly in danger because Lesotho does not have the resources to immediately address climate change.

In addition, the temperature in Southern Africa has been increasing in recent decades. As a result of a warmer and drier climate, floods and droughts are likely to become more frequent and intense, making climate volatility an even greater issue (World Food Programme, 2016). Climate change severely

impacts Lesotho's agriculture and directly damages the food security of Basotho families by worsening climate volatility. A study done by Jasper Verschuur and his colleagues at the University of Oxford found that climate change significantly exacerbated the drought that occurred in 2007, leading to a severe food crisis (Verschuur et al., 2021). Furthermore, the study found that climate directly reduced agricultural self-sufficiency by 50% and decreased household purchasing power by 37%, making the fragile situations of many Basotho households even worse, especially those who rely on subsistence farming. Because of the climate change-intensified drought, maize production decreased by 40% and approximately 20% of Lesotho's population required emergency assistance (Verschuur et al., 2021). These findings show that Lesotho's already vulnerable food system will likely experience more bouts of severe food insecurity if climate change continues to occur, which is almost certain.

Lesotho's vulnerability to erratic weather and climate change requires immediate attention, but the country lacks the resources to fix all these issues. Currently, the most beneficial solution to climate volatility is to adopt more sustainable farming practices. Rather than continuing practices such as monocropping and uncontrolled grazing that induce soil erosion and make farms more susceptible to extreme weather events, Basotho farmers must implement new systems in order to conserve the available farmland in Lesotho. Even though arable land is limited, much of it is still underutilized or lying fallow because of inefficient farming methods and farmers' inability to afford enough seeds or fertilizers (New Agriculturalist, 2011). However, this could be fixed through the usage of more efficient and sustainable farming practices. The monoculture of maize, although productive when there is sufficient rainfall, is extremely vulnerable to periods of inconsistent rainfall (Food and Agriculture Organization, 2011). Greater crop diversity can significantly reduce Lesotho's agricultural vulnerability because farms with different crop types have greater nutritional diversity and are less likely to suffer from complete crop losses (Food and Agriculture Organization, 2011). This exemplifies why Lesotho must adopt intercropping and different methods of farming.

For example, the Alliance for Food Sovereignty in Africa (AFSA) has helped thousands of Basotho farmers adopt the Machobane Farming System, which utilizes intercropping and organic manure from livestock which most farmers already own. In this system, farmers plant winter-resistant crops like potatoes in the spring for a late winter harvest and other crops like maize in the summer for a late fall harvest, which provides year-round production (Alliance for Food Sovereignty in Africa, 2019). The crop diversity increases productivity by three-fold in comparison to the traditional monoculture and increases the protein content in the crops by as much as 60% (2019). Even poor farmers can adopt this technique because it only requires hand tools, making it an approachable way for Basotho farmers to combat climate volatility. By reintroducing a variety of nutrients, especially potassium from ash and manure, into the soil, this method can help reduce the effects of soil degradation and increase drought resistance (Alliance for Food Sovereignty in Africa, 2019). During the severe droughts between 2001 and 2005, regions in which farmers utilized the Machobane Farming System had significantly higher yields than the rest of the country, which suffered drastically (Alliance for Food Sovereignty in Africa, 2019).

Keyhole gardens are another sustainable farming method that conserves water, making them more resistant to drought. They are raised beds with layers of soil, manure, and other organic material, which allows for increased moisture retention (International Center for Tropical Agriculture, 2018). This design is more efficient than conventional gardens because it is resistant to drought and low temperatures, which increases yield. Keyhole gardens also do not require extensive labor, so those who are sick with HIV/AIDS or other diseases can work on them (International Center for Tropical Agriculture, 2018), providing work opportunities for the 21.1% of adults in Lesotho suffering from HIV/AIDS (Central Intelligence Agency, 2021). According to a case study in eight Lesotho districts, keyhole gardens

improved year-round food security for families because they were resistant to drought, frost, and other weather conditions (Billingsley et al., 2013). The gardens also promoted the farming of more types of vegetables, which additionally increased nutrition and health in the families involved (Billingsley et al., 2013). Economically, keyhole gardens overall benefited households because they could sell excess produce from consistent harvests (Billingsley et al., 2013).

Farmers could also utilize drought, flood, or disease tolerant crops and livestock in order to protect their farms from any extreme weather. Appropriate health care and hygiene for livestock can increase resilience to disease or extreme weather while boosting production (International Center for Tropical Agriculture, 2018). Also, even growing the same type of crop with different drought or pest resistant traits can improve the resilience of a farm (Food and Agriculture Organization, 2011). Similarly to Lesotho, Zimbabwe suffers from crop failure due to droughts, so a study in southeast Zimbabwe assessed the effects of drought-tolerant maize on total maize production. In a random selection of 200 household farms, the ones growing the drought-tolerant maize produced 617 more kilograms per hectare than other households, which translates to over nine months of additional food for most families (Lunduka et al., 2019). Not only do these solutions protect farms from climate volatility, but many of them also increase yield and therefore increase profit for farmers after possible initial investments. In order to induce more Basotho farmers to follow these techniques, there should be funding for education on sustainable farming practices. These practices will be desirable to farmers because they will increase income over time and protect farmers from devastating climate events that significantly reduce profit.

Being one of the world's least developed countries according to the United Nations, Lesotho cannot realistically fund all of these measures alone. But despite political instability, Lesotho's government has designed programs to improve the country's economic and social infrastructure, including the National Strategic Development Plan and the National Vision 2020 (Bertelsmann Stiftung, 2020), which included the objective of "protection of the environment and promotion of climate-friendly technologies and practices" (Commonwealth Governance, n.d.). However, these strategies have resulted in little to no success. Because Lesotho's government clearly expresses interest in promoting sustainable practices, organizations such as the World Food Programme (WFP) and the Food and Agriculture Organization (FAO) should assist the government in improving the agricultural sector. Both of these are global humanitarian organizations associated with the United Nations and have collaborated in the past in order to solve hunger-related issues. As wide-reaching organizations with resources and volunteers from around the globe, the WFP and FAO could aid Lesotho by educating farmers, sending volunteers, and providing farmers with the proper resources. Additionally, they could work with regional organizations, such as the AFSA, to help implement existing sustainable farming projects on a national level. The Machobane Farming System has assisted thousands of Basotho farmers, but its five-year training curriculum would make it difficult for farmers to adopt nationwide (Alliance for Food Sovereignty in Africa, 2019). Although volunteers can train many farmers throughout the country, sending volunteers to every village in Lesotho is not feasible. With the help of humanitarian organizations, the government should also promote sustainable farming systems by mailing informational pamphlets and including climate education in school curriculums to increase awareness of unsustainable farming issues. Once Lesotho can establish widespread sustainable farming practices, the effects of extreme weather events on the agricultural industry will lessen, preventing the country from facing extreme food insecurity during times of drought, heat waves, or other unusual severe conditions. Eventually, if Lesotho's economic conditions improve enough, larger projects like a nation-wide irrigation system can be feasible, but currently, educating farmers on more modern and sustainable farming practices is a realistic solution.

Due to its unique topography and climate, Lesotho experiences extreme effects from climate change, which especially damage its agriculture sector. Inefficient use of the limited arable land, soil degradation, and especially climate change have increased the impacts of climate volatility, causing difficulty for farmers and families to grow and buy food. Droughts, floods, and other smaller weather events that have become more frequent in recent years destroy crops and decrease soil quality. As a solution to such issues, international organizations should help fund the education and adoption of sustainable farming practices, such as the Machobane Farming System and keyhole gardens. By improving production, crop diversity, soil quality, and more, these changes will protect Lesotho from the extreme weather that plagues the country.

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