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### **Ethiopia: Reseeding Agricultural Land for Grazing**

Ethiopia is an agricultural, landlocked country in eastern Africa. Ethiopia's economy is dependent on smallholder farmers who attribute approximately 95% of the country's agricultural production. Ethiopia is filled with high and mountainous areas known as highlands. With the different topographic areas, Ethiopia can be tropical and wet in some areas, but dry in others. There is also little variation in temperature. Ethiopia is governed by a federal parliamentary republic under the leadership of Sable-Work Zewde. The Ethiopian government is stable, but the country faces other issues. Currently, Ethiopia is experiencing a major drought just two years after the last major drought occurred. Throughout the country of Ethiopia, livestock production is decreasing and crops are failing due to the drought. Disease outbreaks are another major barrier Ethiopians face. Citizens have very few health care options, and most Ethiopians cannot pay for health care because it is too expensive. There are only about 0.3 hospital beds for every one thousand Ethiopians (Africa: Ethiopia). With little hospital advancement and medical resources, it is hard to keep diseases from spreading. Ethiopians face many challenges, including problems with their agriculture sector. Animal agriculture is an area that can be improved to help many Ethiopians and their country's economy. There is a need for better management of livestock herds in Ethiopia to improve sustainability and to make sure that the livestock have enough resources to be productive.

The rural population in Ethiopia is 78.3 percent of its total population (Africa: Ethiopia). The north and central areas of Ethiopia have the highest population density. Most of the rural population lives in the highlands. On the other hand, 21.7 percent of the population lives in urban areas (Africa: Ethiopia). Ethiopia has an estimated population of 108,113,150 people (Africa: Ethiopia). Fifty-four percent of the population, about 58 million people, have no electricity in their homes (Africa: Ethiopia). Rural areas struggle the most with obtaining drinking water and having sanitary facilities to use. Most of the time, multiple families have to share toilets that are usually unsanitary. Drinking water is not always abundant or sanitary in rural places. Over the years, drinking water has improved, but it is not where it needs to be. A lot of water sources are not where they need to be, and this impacts the 51.4% of the population in rural areas where the water is unimproved (Africa: Ethiopia).

An average family size is around five people. The houses these families live in are usually in bad shape and cramped. Common foods Ethiopian families eat are millet, sorghum, and plantains. Their diet is usually high in fiber, low in dairy product, and contains low fat content. Ethiopians usually grow their own food, or purchase it at local markets. Around 23.6 percent of children in Ethiopia are underweight (Africa: Ethiopia). Families face a great barrier when it comes to feeding their children. Most families do not make enough money to buy the proper amount of food they need to provide for their family. The average wage in Ethiopia is 8,970 Ethiopian Birrs per month (Average Salary in Ethiopia 2020 ). This

compares to about \$278 a month in the United States of America. Most of the Ethiopian population works in agricultural jobs or other small enterprises. Another factor of Ethiopian's malnutrition is that they do not have access to certain food groups. For example, very low levels of animal proteins are included in the Ethiopian diet. Families can only raise a small amount of livestock each year to produce these animal proteins. The average farm size is 1.4 hectares which is equivalent to 3.46 acres (FAO). This is not enough land to provide enough resources to feed their livestock which is why some farms use public land for their animals to graze on.

Ethiopia is a diversified agricultural country. Currently, around 36.3 percent of Ethiopia's land is used for agriculture (Africa: Ethiopia). A large part of the agricultural industry in Ethiopia is subsistence-based. Twelve million farmers in Ethiopia are smallholder farmers (FAO). Most Ethiopian jobs are related to agriculture. Eighty-five percent of employment is derived from smallholder farming and the agriculture sector (FAO). The common products Ethiopia produces include cereals, coffee, oilseed, cotton, sugarcane, vegetables, khat, cut flowers, hides, cattle, sheep, goats, and fish. Coffee accounts for around 27 percent of Ethiopia's total exports which is higher than any other product (Africa: Ethiopia). Ethiopia's biggest export market is its neighboring country, Sudan. Most farms practice mixed farming which is when the farm produces both livestock and crops. Mixed farming is common worldwide. The main livestock found in Ethiopia are cattle, goats, sheep, and chickens. There is only a small population of pigs since some Ethiopian do not eat pork due to their religious beliefs.

There are difficulties raising cattle in Ethiopia. There are around 57 million cattle in Ethiopia (FAO). These cattle are used for both beef and milk production. Cattle are common on big and small farms. For farmers who use agro-pastoral systems, cattle count for almost 48 percent of their income (FAO). A lot of Ethiopian cattle herds graze on public highlands. These cattle are causing land degradation and using a lot of the water resources. The degradation of the land is leading to soil and water pollution. Between recent droughts and poor grazing practices, these areas are also losing biodiversity. Without the ability to use public land, the Ethiopian farmers have nothing to feed their cattle and other livestock. As Ethiopia's population continues to increase so will their need for beef and milk. Some families rely on their livestock to provide their family with food and income. The Ethiopian highlands, where many cattle are grazed, do not have enough vegetation and resources to maintain all the local farmers' cattle herds.

The United States Department of Agriculture (USDA) has worked with the Ethiopian government to help regenerate the public land cattle graze on. The Feed Enhancement for Ethiopian Development (FEED) Project is a project funded by the USDA. This project focuses on teaching the communities useful management practices and regrowing vegetation on the common livestock grazing lands. The USDA works with the Kebele Office of Agriculture and Rural Development to teach Ethiopian communities near grazing areas about the project and the benefits of rehabilitating the land. This project has been a success, but it has only been introduced into the northernmost part of Ethiopia known as the Tigray area. To start the project off, they planted seeds to secure the major runoff areas. This helped with the land's soil erosion issues as well, because with more vegetation less erosion occurs. Next, these public lands had a lot of gullies which are water-worn canyons. The program scatters seedlings to try to regrow vegetation in these areas. This way the land would grow vegetation again after a rain season. Then, the community cuts the forage each year and shares the profits. The Ethiopian community in Tigray came together to help

protect the land. The FEED project was very successful in helping educate local farmers and it gave them a way to earn more income.

Expanding this rehabilitating land project is a way we can help Ethiopia's animal agriculture challenges. One way to help the land vegetation grow back is by reseeding it. Reseeding is a meticulous process that can be done in different ways. Choosing which seed to use can be a major part of the process. When reseeding, the seeds have to be planted during the right conditions. The land in Ethiopia can be reseeded with crops such as grasses, alfalfa, and hay. When the land is reseeded, local farmers will have good quality feed to give their livestock including the cows so that they do not have to graze as much. When the cattle are not constantly grazing on the land it will have time to regenerate by itself without reseeding the land. So, if the public grazing land is reseeded and different types of new crop are introduced, farmers could grow and feed their cattle then the land will be used in a more efficient way. Also, farmers who grow more hay than they need can sell it. This will allow the farmers to bring in some extra income. To expand the project, agricultural community leaders would have to cooperate with the USDA and the Ethiopian Ministry of Agriculture and Rural Development to help educate the local farmers in their communities. When farmers are informed about the benefit of rehabilitating the land they can select a committee that would be their community leaders to oversee the new project. By using highly respected community members to advocate for the program, the farmers will be more likely to buy-into the program. The current project going on in Ethiopia only focuses on the Tigray area which is in the very northern part of Ethiopia. This idea of rehabilitating land can be spread to agricultural communities in the central and southern regions of Ethiopia. This way more Ethiopian farmers can increase profits and be able to produce more livestock to feed their families. In addition, with an increase in the production of livestock, the whole country will benefit from having more protein items in their diets. Many different Ethiopian communities can benefit from reseeding the land, and becoming more informed about how they can better manage the public grazing land.

The USDA officials can work with Ethiopian community leaders to inform Ethiopian farmers about proper graze management practices. Rotational grazing and restricting access of public land can also help prevent land degradation. In many of the Ethiopian public lands, free grazing is occurring. Free grazing is a technique used by farmers that allows their livestock to graze wherever they want. Free grazing eventually led to the land degradation issues. When livestock like cattle are allowed to graze anywhere they go through the land's resources a lot faster. On the other hand, rotational grazing, when livestock is contained and moved in different grazing patterns, is a good way to use public land. Using this method the animals only eat from one area at a time. When land is not being used for grazing, the forage area has time to grow its root system again. This also makes it so the soil does not get too compacted. Ethiopians can be informed by their own people, who were trained by the USDA, about grazing techniques such as rotational grazing, that will help improve their public lands.

The Amhara region of Ethiopia would really benefit from the rehabilitation of public land. The Amhara region is in the northwest and central part of Ethiopia. It borders the Tigray region where the FEED Project has been successfully implemented. The region has both highlands and lowlands. The Amhara region's economy relies on agriculture. About 85 percent of the population is connected to agriculture in some way (Amhara Regional State). There are a lot of crops produced in this region including oil seeds,

wheat, peas, oats, sorghum, beans, and maize. Amhara's livestock population is 40 percent of Ethiopia's total livestock population. Cattle, sheep, goats, and poultry can be found in Amhara. With the different species of livestock, this region could produce a large amount of meat, eggs, dairy, leather, and wool products. By reseeding and regenerating the land in Amhara, livestock production would increase rapidly. There are several different communities in this region that the USDA and Ethiopian Ministry of Agriculture and Rural Development could educate about grazing practices and growing new crops to properly feed their livestock.

Funding plays a major role in determining which different solutions are sustainable. To fund the expansion of reseeding the land, the USDA will need work with the Ethiopian Ministry of Agriculture and Rural Development. The Ministry of Agriculture is focused on helping the country's economy by increasing agricultural production. The Ministry of Agriculture can help fund the reseeding and rehabilitating the land project because it would help increase the country's livestock production. The Government of the Federal Democratic Republic of Ethiopia also has a percentage of their funding that goes to improving agriculture. After the project gets started, the Ethiopian farmers should be able to afford to reseed the land in the future. By making more quality feed for livestock, Ethiopian farmers can increase production, therefore increasing income. Farmers will be able to support their families so that they can get the proper necessities of life while also having money to help manage public lands. Reseeding and regenerating the land will help provide resources for the livestock to be efficient and productive. Funding this project will not be easy. It is going to take multiple organizations that are willing to work together to help Ethiopian communities.

Ethiopian agriculture can use improved production and management practices to restore the ecosystems that their agricultural sector relies on. By grazing on public land, the cattle are depleting the resources and causing water and soil contamination. Also, the cattle are leaving the land with no vegetation for other livestock. When local farmers are encouraged to grow feed for their livestock, the public land will have time to regenerate and grow vegetation again. Reseeding the public land will help the vegetation grow faster. Programs like the one in the Tigray area need to be expanded and spread to other regions of Ethiopia. These programs will help Ethiopian families increase their quality of life. This is because Ethiopian families rely on their livestock and crop farms to provide them with food and some income. Collaboration between the USDA and the Ethiopian Ministry of Agriculture will make the expansion of the public land rehabilitation programs possible. Community leaders are also important to the buy-in and spread of the public land programs. It is crucial that the public lands are restored for the benefits of Ethiopians and the highland ecosystems.

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