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Developing Sustainable Livestock Practices in Botswana

Botswana, a landlocked nation in Southern Africa, is one of the continent's most prosperous nations and has one of the fastest growing economies in the world. After it gained independence from England in 1966, Botswana set up a democratic government that has remained stable to this day. Throughout its 44 year growth and development, Botswana has wisely used its natural mineral resources such as diamonds and copper to stimulate its economy. Regardless of its minerals, Botswana, like a majority of African nations, is still reliant on subsistence farming and livestock for the livelihood of most of its citizens (traditionally called Batswana). With a poverty level of about 30%, the environmental quality of farming and livestock growth in Botswana is low, as many farmers and ranchers cannot afford to preserve the environment as they try to avoid poverty. With a national herd of over 3,000,000 cattle, the government of Botswana is encouraging sustainable livestock grazing by privatizing land to farmers, yet the main issues of water pollution, overgrazing, desertification and the general degradation of grazing lands across the nation are yet to be addressed. With over 50% of the national population involved in subsistence agriculture or livestock farming, the need to address the damage caused by grazing livestock is great indeed. Beef production, a major export of Botswana and a major source of income for its population, threatens the environmental sustainability of vast swathes of Botswana's land. Only with environmental reform focused on educating farmers, diversifying meat products, and enforcing sustainable livestock practices on public rangeland can the large livestock industry of Botswana be improved and preserved for future generations.

Although Botswana is technically a 3rd world country, its quality of life is closer to that of nations such as Mexico or Turkey than typical 3rd world countries. The average Botswana family size ranges from 1-10 people and the per capita GDP is \$13,300. Compared to the United States' GDP per capita, (\$47, 998,) Botswana seems like a more impoverished nation than it truly is, as the government has constructed a large national road system, expanded safe drinking water resources to 97.7% of the population, and recently has begun to distribute free anti-retroviral drugs for those suffering from HIV/AIDs. 1/3 of adults in the 1.9 million citizens of Botswana suffer from HIV/AIDs, and the disease is a major problem in family life and in the continued development of Batswana society. In education, most Batswana attend school for 12 years, and 81.2% of the population is literate by the age of 15. With an average farm size of about 2.3 hectares, most Batswana livestock owners are close to or below the poverty line, and their ability to preserve the environment while simultaneously combating the national AIDs epidemic, educating themselves and their family, and tending to their cattle is minimal.

Botswana, a nation of about 233,000 square miles, includes a variety of climates and landscapes. With 80% of the nation within the boundaries of the Kalahari Desert, the urban centers, including Gaborone, (the capital,) are spread out away from the hot and dry regions of the desert, and closer to South Africa. The Kalahari Desert, while it bears the name, is not truly a desert. The northern areas are composed of mostly close tree and woodland savannahs while the southern and western regions are drier and have low tree and shrub populated savannahs. As the 'desert' is made up of mostly different savannahs, the grazing potential, about 20%, is much greater than the name implies. Although Botswana possesses large swathes of rangeland, the amount of truly arable land is about 0.7%. With such a small amount of farmland to use, most Batswana farmers either raise livestock as well or heavily fertilize and irrigate their soils. Besides the latter being far more expensive, Batswana farmers also cannot afford to sustainably manage the environment if they resort to using extensive fertilization and irrigation. Throughout the nation, the majority of public pastures occur in the East (the Hardveld), while most private ranges are situated in the

Western region of the Kalahari (the Sandveld). Within the western Sandveld, uncontrolled expansion of cattle ranges has continued with cattle-posts and fencing interrupting wildlife migration routes. Although this is technically illegal, the governmentally encouraged privatization of cattle ranges in the Sandveld as spurred such voracious expansion to a higher degree than expected. The National Policy on Agricultural Development, created in 1991, encouraged such privatization by allotting farmers 6x6 km ranches to privately own, maintain, and raise livestock on. The geography and climate of Botswana, while typical of an African nation, is especially suited for livestock due to the abundance of rangeland and savannahs for grazing.

As with many 3rd world, and especially African, nations, Botswana must cope with environmental problems. Botswana's major problems include overuse of water resources, degradation and desertification of national pastures and rangeland, uncontrolled wood harvesting and the general pollution of the air, soil, and water resources of the nation. Within the livestock community, the overuse of water resources and the general damage to national rangeland is especially important, as livestock are reliant on both. Cattle, being large animals, need copious amounts fresh water to live. However, the lack of surface water such as rivers and lakes in Botswana, caused by the large areas of desert and the hot climate of the region, requires the overuse of underground aquifers to provide enough water for the ever-expanding cattle industry of Botswana. Of a more pressing environmental concern, the degradation of rangeland threatens to reduce the ability of Botswana ranchers to earn a living as the price of owning or maintaining pastureland increases with a decrease in useful land. Cattle, as grazing animals, can quickly consume vegetation in a region at an alarming rate. Without time to recover, as in regions such as the Hardveld, the land is overtaken by desert as its ability to resist erosion through deep rooted plants and grasses is removed by the grazing herds. As more and more of Botswana's rangeland and arable land is squandered, the carrying capacity for cattle is declining, even as the industry grows simultaneously. If Botswana loses areas of its valuable rangeland to desertification because of unsustainable management, the accompanying increase in national unemployment and poverty would severely disrupt the Botswana economy, as would the inevitable decrease in national productivity due to less beef production.

Within Botswana's government, various laws and regulatory committees govern the division and maintenance of rangeland in Botswana. The department of animal production, within the ministry of agriculture, is the chief proponent of governmental livestock control and advancement. The department of animal production has its own goals for livestock production in Botswana, including the use of artificial insemination, the advancement of farmer's associations and the education of farmers. Artificial insemination helps to keep the cows healthier and increases the quality of the meat produced, as it reduces the chance of disease transmission and overcrowding due to uncontrolled cattle breeding. By advancing farmer's associations, such as the Botswana Cattle Producer's Association, the department of animal production can encourage education amongst the Botswana ranchers while also generating a self interest within the livestock community to preserve the environment and the rancher's livelihoods. Aside from governmental influence and goals, the Botswana Meat Commission controls a monopoly over Botswana's livestock production, and is the principle exporter of Botswana's meat to nations in Europe and South Africa. The BMC, while only a corporation, can still influence the environmental impacts of the Botswana livestock practices through information or regulation.

Among various environmental laws, the Tribal Grazing Lands Policy, (1975,) attempted to halt the overgrazing on public ranchland by cattle farmers due to the tragedy of the commons. Over time, however, the act as only encouraged the degradation of farmland. Along with the privatization of Sandveld rangeland under NPAD, the TGLP has allowed Botswana cattle farmers to 'double graze' their cattle. By leasing a private area of pasture under NPAD, a farmer can graze his cattle in one area and, within the still unregulated public rangeland of the Hardveld, graze his or her cattle yet again. The attempt to shift grazing to private land away from public land has backfired under the TGLP, as Botswana farmers

are still exploiting public farmland while also exploiting their own private farmland. In another failing of the NPAD, the privatization of land allows farmers to drill boreholes on their land to drain groundwater for cattle drinking. This completely unregulated use of aquifer reserves is a major environmental issue that is unaddressed by Botswana's government. By overgrazing on public pastureland and draining national groundwater reserves, the environmental problems of degradation of rangeland and drought will only become more and more severe.

Along with the failings of the TGLP and NPAD policies of Botswana, the general demands of the Botswana economy and rural population make environmental sustainability difficult. Within the global economy, the Botswana Meat Commission must compete with other world markets including those of European nations and other 3rd world countries. This competition has necessitated the subsidization of the cattle industry in Botswana in order to develop its livestock industry after gaining independence. Today, Botswana still subsidizes its livestock industry in order to remain competitive, yet many rural farmers are still unable to make a large net profit through livestock. Under TGLP and NPAD, some larger farmers have benefited from the privatization of land but most small farmers have been hurt by the growth of larger competitors and the degradation of public grazing land by their large herds. Without the economic capability to sustainably manage the land due to the tragedy of the commons and outside competition, rural farmers are forced to set aside their potential concerns for the environment's preservation in favor of providing for their families.

While new environmental legislation is obviously needed in Botswana, the ability of rural farmers to preserve the environment without government aid is limited. Two basic options exist for rural farmers to sustainably use private rangeland without government aid. The first would be a general increase in private rangeland but no increase in cattle while the second option would involve fewer cattle on the same amount of private rangeland. Most farmers who can afford more rangeland have already purchased it, though with a simultaneous increase in cattle, as rangeland is less profitable if it is being used sustainably. Most farmers also cannot afford to reduce the number of cattle they have, again they must support themselves and their families before preserving the environment. With over 30% of the population impoverished, the government must aid the rural cattle farmers if any true environmental sustainability is to be accomplished.

Aside from the two main laws of TGLP and NPAD, the Botswana government's Department of Animal Production has few other legislative rules on public or private rangeland. In the future, the department hopes to enact several new laws involving artificial insemination for cattle and farmer education. A smaller part of the department's vision is based in alternative livestock, yet the potential for major environmentally sustainable growth in this area is obvious. Many farmers specify in just cattle farming due to their minimal livestock education, and can only monitor one herd or tend to one breed of animal effectively. However, if one considers the implications of mixed livestock breeding, the possibilities for economic growth, rural production, and environmental sustainability increase dramatically. For example, if a farmer owns 200 cattle, those cows require a sizeable amount of rangeland to live on. If the private piece of rangeland the farmer owns is only 40% useful as pastureland for his cows, the farmer could easily utilize the less productive parts in other respects. The farmer could raise goats in place of some of the cows, as goats have more resilient diets than cows and thus can graze on the less productive rangeland. Goats are also excellent sources of milk and dairy products, which are valuable for increasing rural nutrition. Other alternative livestock that doesn't require grazing, such as Guinea Fowl and even Ostriches, can be good sources of meat. The potential of exotic meats such as ostrich to be as valuable as beef on the world market is small, yet the consumption of such meat locally would not only grant self sufficiency to the farmer but a net economic benefit in food security as the farmer could sell more cattle if he or she did not eat them personally. The idea of mixed livestock also applies to farming, as cattle produce nitrogen and phosphate rich fertilizer and, after a pasture field lies fallow, the field can be used

for crops such as corn or sorghum. By generating arable land, the rural farmer can increase the productivity of his or her land and herd without a net increase in spending. By producing small amounts of crops, raising alternative types of livestock, and also raising cattle, a Botswana farmer can easily expect a great increase in food security and net profit while simultaneously reducing pressure on the environment by using less rangeland, and resisting desertification through the enrichment of arable land.

While a Botswana farmer's potential to change his or her farm into a more productive and sustainable one is present, the knowledge of how to do so and the funding to change it is something that the Botswana government must provide. While the department of animal production and the Botswana Meat Commission both have goals to aid the cattle industry, these goals are not necessarily environmentally sustainable. For example, the privatization of farmland under TGLP and NPAD has not reduced pressure on public rangeland as it was supposed to. The government and the BMC should take steps together to encourage the raising of other livestock such as poultry and crops such as sorghum and corn through a free education program to farmers. By showing rural farmers the benefits of a diverse farm, more Botswana would hopefully climb out of poverty and the impoverished level of the nation will also decrease. Along with free livestock education, the government and the BMC should also aid the growth of alternative livestock growth in rural Botswana with a relaxation of tariffs upon alternative meat products and subsidization of the necessary equipment to begin the development of livestock industries with animals such as ostriches, guinea fowl, and goats. The government should especially focus on establishing a BMC equivalent for small-stock (goats, ostriches, guinea fowl, etc.) livestock in order to facilitate the purchase and distribution of meat from rural farmers to markets and thus encourage the growth of small-stock farming. Botswana also can aid rural farmers through tax breaks for environmental sustainability or taxation of large farm groups who over-exploit public rangeland in the Hardveld. One of the main causes of overgrazing in the Hardveld is due to the amount of small farmers who cannot afford to lease land. By subsidizing or even freely distributing parcels of land in the eastern Sandveld to small farmers, rural poverty would greatly decrease, production would increase, and pressure on Hardveld grazing lands would be significantly reduced.

To negate the problem of double grazing on public Hardveld lands, the Botswana government could take several measures including taxation or privatization. By taxing large herds grazing on Hardveld lands, the government could avoid hurting the business of small rural farmers and only tax the large cattle farmers who exploit public rangeland with double grazing. The government could also privatize the land to small farmers for cheap prices, thus removing the ability to double graze altogether, but this would also increase the difficulty for some small farmers to freely graze their herds.

As with any developing nation, the problems for livestock farming and rural food security in Botswana are numerous. Botswana's fast growing economy, along with its major industries including beef livestock and mineral mining, allows Botswana to grow faster than other less prosperous nations in Africa. As Botswana entered the world stage, its beef production increased dramatically, and Botswana now competes with beef-producing nations in Europe and around the world. With the division of rangeland into private and public grounds, the struggle between larger and smaller cattle farmers is exacerbated by scarce water resources and a high poverty level. The sustainability of this ranching system, which is very limited, demands that the Botswana and their government act to preserve the small amount of arable land and rangeland the nation possesses and preserve the rural population's employment in the livestock industry. By supporting the education of rural cattle farmers in the development of agriculture along with a demand for increasing the production of small-stock animals such as goats and guinea fowl, rural farmers can gain greater food security. When this food security is combined with a major reduction in double grazing through the regulation of public rangeland and the subsidization of private rangeland for poor farmers, the potential for environmental sustainability in Botswana's livestock management and rangeland and a general reduction of poverty in rural areas is much greater.

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