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Tanzania: The Search for Clean Energy

The daily struggle of Tanzanians to obtain clean water and energy sources for their families is difficult. Each person should have the ability to implement the use of biogas biofuels into their daily living. Biofuels are cost-effective and would help decrease the use of fossil fuels which strain families financially. Families are forced to choose between having heat to cook or whether their children go to school. Decreasing the financial burden and using a renewable resource will benefit families and the environment around them by decreasing the use of fossil fuels. Improving resources for families and providing a renewable energy source will improve their health and lifespan for years to come.

Tanzania is an Eastern African country. It is situated just south of the Equator. Since Tanzania has so many lakes, an estimated 22,800 square miles of Tanzania's territory consists of inland water. Kenneth Ingham is a professor Emeritus History at University of Bristol explains that Tanzania is home to some of the most breathtaking natural sites in Africa (Ingham, Chiteji, Bryceson, & Mascarenhas, 2019). It houses the continent’s highest mountains and the world's second largest lake. Though Tanzania is a very beautiful country it is still very poor.

Tanzania is one of the most poverty-stricken countries in the world. Tanzania has many environmental problems as well. They have problems on land and on sea (Project, 2018). They rely on wood for a majority of their energy. Since they use so much wood for energy they have developed multiple environmental problems (Project, 2018). They now have the problems of deforestation and degradation. The deforested areas are no longer able to provide shelter for the wildlife in that region (Environmental problems in Tanzania, 2020). Vegetation disappearing causes soil erosion in a variety of areas. The erosion of soil reduces the ability for new plants to grow and thrive (Environmental problems in Tanzania, 2020). The soil that runs off from erosion goes into rivers and the sea which will smother the sensitive coral reef..

Illegal timber crime has caused millions of dollars of timber revenue lost a year. Cattle, goats, and other wildlife have started to overgraze. When there is no vegetation left they go to another region. Moving to another region results in grazing on underdeveloped plants (Environmental problems in Tanzania, 2020). When animals graze on underdeveloped plants they don’t have a chance to fully mature. If resources are being used faster than they are being replenished, then that specie or species has exceeded its carrying capacity. If this happens then those species will decrease in size (Environmental problems in Tanzania, 2020). Carrying capacity can be decreased by disease, increase in predators, hunting or harvesting by humans, a decrease in habitat availability such as destruction from humans, parasites, competition with

another species for that resource, or changes in the environment that makes that species less suited for that region.

Tanzania has struggled with pollution for years. Solid and liquid waste is currently being left untreated resulting in more air and water pollution. The few sewage systems that Tanzania has are currently being emptied into the ocean. Air pollution is a combination of several harmful particles and gases (Samsung Engineering, & Unep, 2020). It varies from cement and steel industries, vehicles, burning forests, high use of charcoal, agricultural activities, poor waste disposal, and mining activities. People are fighting for clean air, but they aren't able to afford environmentally friendly cookers (Samsung Engineering, & Unep, 2020). For over a century their main source of energy has been from burning fossil fuels. Fossil fuel energy powers the majority of cars, power businesses, and electricity in homes. Even today, coal, gas, and oil produce eighty percent of the energy source which causes problems for humanity. Using fossil fuels for energy takes an enormous toll on humanity and the environment. There are hidden costs in using fossil fuels that many people are unaware of. Land degradation causes the unearthing of forests and mountaintops to expose underground coal and oil resulting in the destruction of wildlife habitats.

Another effect of using fossil fuels is the amount of pollution it causes. Coal, oil, and gas usage has posed a great threat to our waterways and groundwater (Pollution in Tanzania, 2020). Coal mining causes acid runoff to descend into rivers, streams, and lakes. Large amounts of unwanted rock and soil are getting dumped into streams. Oil spills and leaks caused during extraction or transportation can pollute water sources and endanger freshwater or ocean ecosystems. Global warming pollution is problematic for the climate system. Burning oil, coal, and gas increases problems associated with the global warming issue (Pollution in Tanzania, 2020). When fossil fuels are burned large amounts of carbon dioxide are released. Carbon discharge traps heat in the atmosphere and then creates climate change.

Tanzania has a great problem with pollution. Getting clean cooking and drinking water is almost unheard of. Nearly half Tanzanians don't have access to clean water (Tanzania's Water Crisis - Tanzania's Water In 2019, 2020). Only fifty-seven percent of Tanzania's fifty-seven million population has access to an improved source of clean water. Only thirty percent of Tanzania's population have access to clean and safe sanitation. Since these are the current conditions people, mainly women and girls spend a very long time traveling a long distance just to get water. This problem has just been getting worse and worse through the years. In Tanzania the need and demand for clean water and sanitation is very high. People are fighting for clean water, but they make so little that they don't have a great opportunity for change. Only one fourth of Tanzanians have indoor watering because of how little they earned (Tanzania's Water Crisis - Tanzania's Water In 2019, 2020). No matter where you are in Tanzania you always have to be careful about where the water comes from. In fact, it is advised that you only use tap water for showering and washing your hands. To avoid health problems you should only use bottled or filtered water for drinking. With the amount of pollution there already is, we have to do something before it's too late and can't be fixed.

Biodigestion is a biological process that occurs when an organic matter is decomposed by bacteria in the absence of oxygen. As the bacteria is decomposed the organic matter, biogas is released and captured.

Biogas consists of about sixty percent methane and forty percent carbon dioxide (Biodigestion2020). Biogas can be combusted to provide heat, electricity, or both. Afica produces about sixty-two million tons of waste a year. Organic waste is numerous and extends to non-edible sources. When organic wastes are improperly disposed they pose a significant risk to the environment and public health. Pathogens, chemicals, and nutrients present in waste contaminate surface and groundwaters through runoff or seeping in through soils (Piccirilli Dorsey, Inc. 2020). Organic wastes also produce large amounts of methane as they decompose. Biofuels offer new opportunities for African countries. They can contribute to economic growth, employment, and rural incomes. They can become an important export for some countries and can provide low-cost fuel for others. By using biofuel it could help clear away a majority of Africa's waste (Biofuels in Africa 2020). Biofuel does not produce a lot of waste. Biofuels are best stored in aluminum or steel. They should never be stored in bronze or copper because it causes degradation (Farm-Energy, 2019). Biofuel can be kept in a steel storage container right outside.

Facing the reality of human-caused global warming we are in desperate need to reduce the problem so that future generations won't be thrown into a disaster. John Abraham is a professor of thermal sciences at the University of St. Thomas School of Engineering explains that the easiest answer is to use our energy wisely and sparingly and to quit wasting our necessarie natural resources (Abraham, 2018). Fossil fuel power plants burn coal and or oil. It is burned to create heat which is then used to generate steam to operate turbines that will then generate electricity. However, when burning carbon-based fuels it will create large amounts of carbon dioxide (Abraham, 2018). Large amounts of carbon dioxide can create climate change. Besides the obvious ways to help solve pollution like driving less and reducing wood usage is biofuel. Biofuel is a type of fuel that is produced in a contemporary process from biomass. Much different than a fuel produced in a very slow process with fossil fuels such as oil. Biofuel is much safer and just as effective as other oils. Biofuel can be used for many different things. It can be used for transportation, energy generation, heat production, cooking, and helping reduce the need for imported oils. It is an efficient and renewable energy source.

The cost of biofuel depends on the labor and land costs. Roselyn Alphonce is a lecturer in the Department of Agricultural Economics and Agribusiness at University of Agriculture in Tanzania states that, agriculture is constantly being challenged by the increasing demand of food, and the changes to the climate (Alphonce, 2017). A majority of plans to battle climate change mainly relies on the agricultural section to increase carbon storage soils, and also to produce raw materials for the large-scale production of biofuels and power. Studies have been done and results suggest that biofuels could help our environment and decrease pollution. Biofuels can have a wide range of environmental outcomes depending on exactly where and how the crops are grown (Alphonce, 2017). Climate benefits can be increased at a relatively low cost.

If Tanzania implemented a more affordable energy source, their resources could expand. Families in Tanzania have nearly achieved universal health care. Kim Thelwell is The Borgen Project's Political Director states that, the Borgen Project is an innovative national campaign to raise awareness about poverty in other countries (Thelwell, 2019). Since 2007, school attendance has been dropping. An estimated two million kids ages seven to thirteen are currently not attending school (Thelwell, 2019). A

little over seventy percent of fourteen to seventeen year olds aren't going to secondary school. Only three percent of adults are attending two years of college. Children in the poorest families are three times less likely to go to school than children in the wealthiest families. Females, disabled, and the poorest children, are the most vulnerable to drop out of school (Education, 2016). The average family in Tanzania makes fifty dollars a month. The average national salary is about twenty-two thousand dollars. The average family size for poorer people in Tanzania is about five people (Education, 2016). For the wealthier side the average is about eight people. Tanzania is in a housing shortage so a majority of the homes are made from mud, poles, mud bricks, and blocks. Tanzanians also suffer from lack of public transportation.

Low income households struggle with a terrifying energy burden. For Tanzania to afford biofuel energy they need to have a partnership with their local government. If Tanzanians advocated the government to redirect money used for fossil fuels to biofuels, they could have access to a renewable resource and improve their living conditions. The government would save more money than they currently do on energy (Working in Tanzania, 2020). Out of Tanzania's fifty-two million people only twelve percent of urban communities have electricity. Only two percent of rural communities have electricity. Which means that less than ten percent have access to grid-based electricity (Working in Tanzania, 2020). Of course these statistics are when Tanzania uses fossil fuels. If Tanzania were to switch to biofuels energy more people in urban and rural areas would be able to have access to energy. With more people having access to energy it could change many households in Tanzania. With a more affordable energy source, families wouldn't have to spend the majority of their income on electricity. By saving money, more families would be able to send their kids to school.

Tanzania is one of the most polluted parts of Africa. Tanzanians spend more money on energy than necessary. By switching energy sources to biofuel they will save money, improve the environment, decrease pollution, and improve their water quality. The impact with reducing costs will have an impact on school attendance as more families will be able to afford education. Using a renewable resource will help save nonrenewable resources and decrease negative environmental impacts related to mining and deforestation. Educating and providing opportunities for Tanzanians to use biofuels in their everyday lives will improve their quality of life and health. The benefits of biogas to society and the environment show promise for improving Tanzanians way of life and the lives of future generations.

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