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Empty Plates or Full Tanks

Our planet has always been a balancing act between the countries that have an excess of resources and those who struggle make ends meet the needs of the population. We have all observed the drastic inequality between countries with petroleum reserves and the countries that must import fossil fuels.

The explosion of biofuel production has been an attempt for countries that do not have vast oil reserves to at least decrease the amount that they must import. With the rapid growth rate of the biofuel industry, another problem has become apparent. The argument that biofuel production has and will continue to take way food is a very interesting and complex subject, as well as an emotional issue of modern day society.

As fossil fuel prices continue to rise and environmental concerns mount, the international debate has centered on the implications of more and more resources going into biofuel production. Biofuels are plant based liquid fuels touted as beneficial to the environment since there are a renewable product which reduce pollution from the oil and petroleum industry, and potentially reduce the overall quantities of greenhouse gases which drive global warming. The corn used to make ethanol is field corn, which is primarily fed to livestock, not humans. But since biofuel crops reduce the area of land used for food production, there is also a concern in many parts of the world, such as South Africa, that the new industry will threaten food security if crops are grown to feed cars instead of people.

South Africa has a dual agricultural economy, with both well-developed commercial farming and more subsistence-based production in the deep rural areas. Covering 1.2 million square kilometers of land, South Africa is one-eighth the size of the United States and has seven climatic regions, from Mediterranean to subtropical to semi-desert. While only 13% of South Africa's land can be used for crop production, only 22% of this is high potential arable land. Maize or also known as corn is the most widely grown crop, followed by wheat, oats, sugarcane, and sunflowers. With the limited amount of arable land that can be used for crop production, South Africa still manages to be the second largest exporter of grapefruit, third largest exporter of plums and pears, and the fourth largest exporter of table grapes.

Although South Africa has a dual agricultural economy, it is mainly comprised of subsistence agriculture. Subsistence agriculture (also known as self sufficiency in terms of agriculture) is a method of farming in which farmers plan to grow only enough food to feed the family, pay taxes or federal dues, perhaps even provide a small marketable surplus. Subsistence agriculture usually refers to a farm that produces enough to feed the family but will not be enough for the family to participate extensively in the cash market. The typical subsistence farm has the range of crops and animals needed by the family to eat during the year. Planting decisions are made with an eye to what the family will need during the coming year, rather than market prices.

In South Africa it is not uncommon to hear of rural citizens surviving off of what are small personal farms adjacent to their homes. In fact sometimes they are so prevalent that they demonstrate most of a countries economic activity, as Lesotho, which on a scale 0 to 1 had the highest rating of (93%) of farming activity in South Africa according to the Afrobarometer study.

Surpluses on these types of farms are a rarity as production is limited to providing a marginal livelihood for the household. The temperature, arid environment, and high cost of inputs discourage a

farmer from growing any more than what is needed. Thus risk is typical mindset and disincentive for a subsistence farmer in the area to produce enough to participate in the market economy, leaving no opportunity for cash activity. Relying on these farms can then be unstable and insecure during events of drought when no other alternative ways of purchasing or obtaining food are available.

Rural households in Southern Africa are often overcrowded as many encompass several distant family members. Traditionally fathers are the head of the household and “decision makers at all societal levels” however there is a frequency of scenarios of father deprived families due to the pandemic of aids and HIV. Women are the typical caregivers and tend to have lower education rates. Subsistence families do not have many children because of high infant and mortality rates.

When it comes to the environment, most of Southern Africa is considered arid or semi arid because of very low levels of rainfall. South Africa and Zimbabwe have levels of rainfall around 451 mm and 652 mm per year respectively. Small farmers are thus mandated by the lack of rainfall to employ techniques appropriate for their conditions. Irrigation is a technique subsistence farmers have used profusely in areas where rain-fed agriculture is not possible.

Staple crops by necessity are the only produce grown on the small plots of land. They usually consist of maize sorghum, or wheat and are also very water intensive. With the current sizes of subsistence farms their harvests are insufficient in comparison to larger commercial farms. And in the specific nation of Zimbabwe it’s “land redistribution policies had reduced the amount of commercial farm land growing maize, compounding the excavating food security problem”. The reasoning behind this is that the economies of scale in large commercial farms are not present in small subsistence farms and so the bonus supply that could be harvested if that small farmland was added to a larger one would be much greater than if that subsistence farm persisted independently.

Another barrier to the improvement of South Africa’s insufficient food producing capability cannot be bridged until these farmers find reasonable methods to market their crops and when they have finally reached the level of production in which they can meet their own needs and still have a surplus to sell. When farmers reach this level often isolation is the first obstacle they face.

Isolation from the market is actually a very critical issue to deal with in respect to sustainable growth for an individual farm. Many farmers are completely isolated from their markets as a result of poor infrastructure development in rail transport, road, postal and telecommunications. As a result many farmers end up either selling their crops at unprofitably low prices or keep the surplus until it rots.

The highest infrastructure developed nation in southern Africa has 44% developed roads, 24% live enumerator to a postal office, and 15% have access to rail transport. Lesotho the worst infrastructural developed nation has 4% pavements, and 1% transports. Improvement is constantly happening in South Africa, as it already has the lead in all sectors. Yet still needs to accelerate much quicker, therefore wireless communications might be the answer. They are much cheaper to construct and more reliable, enabling the average farmers to access the market and knowledge of market prices, trends and potential customers.

At present time the weather, water supply, farm size, capital, and government practices dictate the type and size of farm in South Africa. Probably the most dictating factor that causes a family in South Africa to not produce enough food or sufficient income is weather. As mentioned earlier in this paper, South Africa has a vast array of climatic regions, and is unreliable in terms of rainfall. Rainfall is distributed unevenly across the country, with almost 50% water being used for agricultural purposes.

Another limiting factor is the average farm size. An urgent challenge that goes beyond agriculture in South Africa is the access to land demanded by thousands of rural black Africans. Historically, the most productive cropland and pasture have been settled by white farmers and apartheid, African American people were relegated to “homelands”. There often intrinsically poor soils were further depleted and ravaged by over exploitation caused by over crowding and lack of education, training, and resources to farm sustainability. The post '94 government started the process of acquiring land from white farmers and distributing it back to the black African owners. But this process of re-distribution is neither going far or fast enough for most of the rural black African owners. However, land re-distribution alone will not be enough: new owners must be offered training and resources to farm productively. Otherwise, South Africa's overall agricultural productivity will decline and good crop and pasture lands will be rapidly degraded leaving the black African owners with no more of an economic future than they had when they were landless.

Along with profit come agricultural practices. Since South Africa is mainly comprised of subsistence farmers there is no extra money to spend on hybrids or fertilizers that may yield or may help yield more for the farmer. With this said, you can also imagine that they do not have tractors either. For most of their farm work they use the animals they own which then in return are fed by the crops they helped the farmer produce.

In order for biofuels to be competitive they need a large readily available supply of raw materials. These materials may vary from corn, sorghum, sugar cane, or other carbonatious concentrates or they may be fueled by the use of cellulite fibers that will break down into biofuels.

A typical bushel of corn weighs 56 pounds and contains about 72,800 kernels. Most of the weight is starch, oil, protein, and fiber, with some natural moisture. Using the Wet Mill process, one bushel of corn produces 4 pounds corn germ, 11 pounds corn gluten feed, 2.5 pounds corn gluten meal, 2.5 pounds CCDS, 16.5 pounds carbon dioxide, and 16.5 pounds (2.5 gallons) ethanol. By using the dry mill process, one bushel of corn produces 18 pounds distiller's dried grain and 18.4 pounds (2.8 gallons) ethanol.

In order for South Africa to be successful in producing biofuels, South Africa's farming community first needs to be educated about the process and the benefits of being a biofuel producing region. They could benefit from extension programs that would teach them the value of hybridization, proper weed and insect control as well as the proper use of fertilizer. Through these means they could greatly increase the amount of crops raised for both food production and the biofuel industry.

From there, South Africans would need to obtain arable land on which they can produce enough corn, wheat, or sorghum to satisfy their family and the biofuel market. The current status for this factor isn't very good. Because South Africa has only 13% arable land it is often sought after by the larger cooperate farmers rather than the small subsistence farmer. The land that is obtained by the subsistence farmer is usually of very low quality. Along with the small amount of land the subsistence farmer has they also have to worry about natural resources. Since rainfall is erratic in South Africa this factor poses as a potential threat to the average subsistence farmer who already is struggling to make ends meet.

Developing countries thus stand to benefit significantly from biofuels. Given their enormous potential for creating jobs and generating income, they offer a real option of sustainable development, especially in countries that depend on the export of scarce natural resources. At the same time, ethanol and biofuel open up new paths of development, especially in the bio-chemical industries, in the form of social, economic, and technological alternatives for countries that are economically poor but have sun and some arable land such as South Africa.

If South Africa were to begin producing biofuel they would also find themselves with some valuable by products, which would include corn germ, carbon dioxide, corn gluten feed, corn sweeteners, plastics made out of corn, and of course ethanol. The building of the biofuel plant would create many jobs in the construction phase and some long-term jobs at the plant. Employees would also be needed in the acquisition of raw materials. Jobs would be created in the marketing of the fuel plus all of the by products.

Corn gluten is a by-product of wet milling process to make cornstarch. It is an animal feed for cattle, poultry, and other livestock. It also contains naturally occurring substances, which inhibit the growth of seed's tiny feeder roots by causing a break down in the cell wall. The seedlings struggle to get enough moisture, which causes them to die before they ever have a chance to take hold. When used as directed corn gluten acts as a natural herbicide that will not harm beneficial insects, soil organisms, and pond or stream life.

In conclusion, South Africa could greatly benefit from biofuel production, but they must proceed with caution. The developers must take into account the domestic needs of the people of South Africa. The nutrition of the people should be a priority. Second there should be research and development on a small scale to measure the country's ability to supply the raw materials needed to produce biofuels. They must also be open to new ideas in cropping and cropping methods. One other point would be the government must create the infrastructure to handle the exports and research and development of this industry. Development of this venture must also be accompanied by the long- term views of energy to become more self- sufficient. The bio-energy industry is very dynamic with many changes taking place and there will surely be more changes to come.

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