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Economic Advantages and Disadvantages of Biofuels: A Pathway to Success in Poverty-Stricken Pakistan and Afghanistan

Introduction

In September of 2000, one hundred and forty seven world leaders attended the Millenium Assembly in New York to develop a set of goals in which to accomplish within the inchoate years of the twenty-first century. The result was an establishment of what became known as the Eight Millenium Development Goals, all in which to be carried out by the year 2015. With emphasis on decreasing the amount of extreme poverty, disease, and environmental degradation worldwide, the Millenium Development Goals were expected to bolster economic success in poverty-stricken nations such as those in Africa, Asia, and Latin America. More specifically, the major intent of the Goals was to halve the amount of people living on less than a dollar a day, the income of an extremely impoverished person. To accomplish this, the developing nations need a helping hand from developed countries, as well as Non-Governmental Organizations (NGOs) and other institutions including the United Nations, the World Bank, and the International Monetary Fund. This will require a global effort. Developing nations can only succeed with the collective help of others; but this will require major leadership by world leaders such as the United States and the European Union.

Consider the fact that about 2.7 billion people live in poverty and make less than two dollars a day, while 1.2 billion people fall under the category of extreme poverty, making less than a dollar a day (*Rural Poverty Portal*). Estimating the global population at roughly 6.7 billion, this equates to forty percent of the world's population living in poverty, and about one in six of the population living in extreme poverty (Sachs). To achieve the Millenium Development Goals, by 2015 there should be only five hundred to six hundred million people living in extreme poverty. As unrealistic as this may seem, achieving this goal is possible if the correct planning and leadership is carried out. However, there is no one magic panacea to solve the world's dilemma; a solution lay in improvements in many different areas including agriculture, infrastructure, access to education and healthcare, as well as alleviating large financial debts that exacerbate a country into economic decline. Aldo Leopold, the famous conservationist and writer, once said, "That the situation appears hopeless should not prevent us from doing our very best." One thing to keep in mind is that once we look at the bigger picture, the situation is far from hopeless. The world today has the knowledge and the technology to end global hunger and prevent the spread of the pandemic HIV/AIDS that terrorizes the developing countries of Africa and Asia. Yet, with the potential that is held in biofuels, the future is beginning to look very bright.

The Family Farm: Afghanistan and Pakistan

Pakistan is certainly a country of diverse topographical conditions. The mountainous regions of the Himalayas, the Karakoram Range, and the Hindu Kush lay in the north, bordering Afghanistan. It also has the rich soils of the Punjab, courtesy of the Indus River valley, which provides the country with a breadbasket for the valuable crops of cotton, wheat, rice, and sugarcane (Blood). Yet, Pakistan struggles to keep up with the world economically and agriculturally, with more than twenty percent of the population living below the poverty line (*CIA Factbook*). The amount of usable farmland continues to decline as more land becomes converted to graze land. The earthquake that occurred in October of 2005 made matters worse, leaving over two million people without a home, and ruined its already precarious

state of its infrastructure. This has made access to markets even more difficult in poor, rural areas (*Rural Poverty Portal*).

Water has always been a difficult resource to obtain in Pakistan, and its absence has been the major hindrance to agriculture. The impoverished subsistence farmers who lack the resources and money to afford irrigation must rely on the rain to nourish the crops. In the typical farm of a family living in poverty, there is no running water, electricity, or fertilizers. Women doing much of the work, in some cases over seventeen hours of labor is required to keep the family alive (Kane). Women often will spend the entire day out in the fields harvesting and pulling weeds while attending to the young children. In addition, it is noteworthy to realize that women are not treated equally to men. Women do not have the right, in most cases, to make their own decisions and are often times completely segregated from men (Kane). It is also typically the women who must fetch the water, which is often more than a mile away. Water is then stored in either mud bins or jute bags. Living conditions are less than mundane. A house may be made out of mud bricks, sticks, or whatever can be found, and probably a thatched roof. There is usually not a floor; they sleep on the earth.

Afghanistan faces similar problems to Pakistan, if not more. Situated to the northeast of Pakistan, and with a population of about 31 million, over half of Afghanistan's people live below the poverty line (*CIA Factbook*). Afghanistan is the leading producer of poppy, although this is a concern. The cultivation of poppy leads to the production of opium, an illicit drug that the government as well as the U.N has fought hard to prevent from entering foreign markets. Poppy and opium have been the leading cause of the government's corruption. In addition to poppy, Afghanistan is a supplier of wheat, rice, cotton, and beans (*CIA Factbook*).

The Qur'an states, "Whosoever saved a life, it would be as if he saved the life of all humanity." Afghanistan, a Muslim state, is one of the poorest countries in Asia with millions of people living in extreme poverty. Despite the fact that eighty percent of the population rely on farming as the main source of income, only fifteen percent of the land is capable of being cultivated (Liebenson). A typical house is square or rectangular and made out of mud bricks. The size varies on available space and income. Those that live along the mountain may carve out caves to live in (Pazhwak). Nevertheless, success in both Afghanistan and Pakistan may not be far away.

Establishing a Market for Biofuels: Creating an Appealing Product

The Afghan farmers will need an incentive to terminate the production of poppy and be replaced with biofuel crops; and the Pakistani farmers as well will need a good reason to grow switchgrass instead of rice. Knowing that crops grown for fuel will have a greater economic return than food crops is an excellent incentive to convince Pakistan of the benefits of biofuels. Also, since Pakistan is limited in arable land, another incentive for growing switchgrass is its ability to thrive in marginal land. It only makes sense to invest in a product if it will benefit both sides- the producer and the consumer. Determining which crops are suitable for each country's particular soil will also be a decisive factor. Due to Pakistan's and Afghanistan's limited land, growing switchgrass may be an optimal solution (Laney). It will be vital for the newly emerging ethanol industry to provide other incentives to the countries who are struggling with crops that have been agriculturally dominate for centuries. Introducing a new crop to these farmers may not appeal to them at first; so it will be critical that the crops not only seem appealing but are appealing (Yon).

It is not surprising that rural agricultural areas in developing countries are economically inferior. Population decreases because no successful jobs exist, and the availability of land is continually decreasing (Laney). Infrastructure is typically in a state of disrepair, electricity and telephone wires may not be available. This makes communication and transportation virtually impossible. The successful

production of biofuels will require complete commitment and dedication to fixing the poor conditions of the failing agricultural communities (Sachs).

One way to convince farmers that a product is appealing is to show that it has a high economic return. Market analysis shows that biofuel feedstock prices are directly influenced by the price of oil. As the price of oil continues to rise, the price of biofuel commodities will increase as well, therefore increasing the farmer's profits (Laney). However, economic success is not guaranteed. While biofuels may have a good economic return, it may place a heavy strain on food production. If more emphasis is placed on biofuel feedstock, the supply of available food will decrease and the country will go hungry (Laney). It may be more economically feasible to use crops that are not needed for food production. Switchgrass and alfalfa are suitable for biofuel production and will not deplete food crop supply.

In making this important decision the country must determine the "how's" and "where's." Where will the crop be grown? How will it be grown? Can it be grown on marginal land? Does it require lots of water and fertilizers? Is there more than one growing season? Crops such as corn have only one growing season and deplete the soil of nitrogen. If Afghanistan or Pakistan decide to invest in corn as their biofuel crop, consideration of crop rotation or investment in fertilizers may be necessary. Since Afghanistan has limited suitable land, it may be favorable to invest in grasses such as switchgrass, which can grow in marginal land. The government will need to consider impacts of possible degradation and loss of habitat. If land will be cleared away for biofuels, as is currently the case in Southeast Asia, the possibility of loss of biodiversity needs to be considered as well (Runge and Senauer).

The Science behind Ethanol: Progress and Concerns

Ethanol may be one of the solutions in preventing abrupt climate change, but it is not nearly as efficient as gasoline for fuel in automobiles. Ethanol contains only two-thirds the energy of gasoline (Keppler). Also, it is very expensive to extract ethanol from crops such as corn or switchgrass. For the ethanol industry to be successful and competitive, the price of ethanol will need to be cheaper than current gasoline prices.

One of the factors making ethanol production expensive is the process of extracting cellulose. The cell wall contains three major components: cellulose, hemi-cellulose, and lignin. The cellulose is a string of sugars that crisscross the cell wall. The major purpose of the cellulose is to strengthen the cell wall and provide structure. However, the other two components, lignin and hemi-cellulose, are a major barrier in obtaining cellulosic ethanol. The lignin and hemi-cellulose attach to the cellulose very tightly, making it very difficult to isolate the cellulose during extraction (Peabody). Therefore, scientists are developing genes that do not produce lignin or only trace amounts. Lignin is important in keeping the "resilience" of the plant, but studies suggest that plants can be successful without it. Currently, the method used to rid the cell wall of lignin is through introduction of special enzymes, and heat treatment as well. However, this is a long and very expensive process (Peabody).

Because cellulose is one of the most abundant renewable resources, the use of cellulosic ethanol is noteworthy (Asrar). Cellulosic ethanol is found in trees, grasses, and certain other plants and crops. Cellulosic ethanol is much more efficient than ethanol created by the fermentation of sugar derived from carbohydrates. Switchgrass, which is low input grass, is very favorable to cellulosic ethanol production not only for production of energy, but to feed livestock as well. Alfalfa is also favorable because it fixes nitrogen and requires significantly less fertilizer than corn (McGinnis).

The Poverty Trap: The Status of Globalization and the Role of Developed Nations

Economist Jeffrey Sachs often notes that families in developing countries remain poor because they are stuck in the poverty trap. In this trap, growers cannot send surplus food to market and therefore cannot obtain any monetary gain. Growers lack surplus goods because crops are deficient in water and nutrients, and fertilizer is often too expensive for the farmer to purchase. Farmers that lack basic farming tools oftentimes are left without food and money during seasons when the rain fails to fall.

Jeffrey Sachs also notes that poverty is exacerbated by the fact that poor, rural areas oftentimes lack a telephone, and the road system is so poor (or in some cases non-existent) that surplus goods produced within the community cannot be attracted to local markets due to limited accessibility. Nevertheless, Sachs suggests that these problems can be fixed through a series of simple, basic solutions of which many are outlined in the Millennium Development Goals. There are three major contributors in the success of developing nations, including the wealthy nations, donor participants, and the developing country itself.

Sachs notes that it is the wealthy nations who will play a major role in helping the developing countries rise from the bottom. It is typical for wealthy nations to loan money to developing countries to help when in a dire situation, but then the wealthy nation expects the loan to be returned. Poor nations, such as Afghanistan and Pakistan, have difficulty repaying such loans, so it is more realistic to supply grants over loans. Grants give the developing countries an incentive to perform well. Investments help in relieving pressure off the country's government because the government does not have to focus on repaying outrageous loans (Sachs 275).

While it is up to countries such as the United States and the European Union to do their share by paying 0.7 % GNP, as outlined in the Millennium Development Goals, countries such as Afghanistan and Pakistan will need help from donor participants. The Bill and Melinda Gates Foundation has taken enormous strides in helping to achieve the Millennium Development Goals by donating a large amount of financial aid. An increase in aid from non-profit organization such as the aforementioned will help in achieving the goals.

Finally, it is up to the rural sections of the developing countries to do a role in decentralization. As Sachs states, "Investments are needed in hundreds of thousands of villages and thousands of cities. The details will have to be decided at the ground level, in the villages and cities themselves, rather than in the capitals or in Washington. Decentralized management of public investments is therefore a sine quanon of scaling up. (Sachs 278)." This means that the rural cities need to decide what is needed and how it is needed. The rural sections will need to take the role of recommending what the country needs and how the donor participants will contribute. As Sachs often states, before the countries can climb the rungs of the ladder, they need help getting on the ladder. Wealthy nations and donor participants need to help the developing nations get onto the ladder (Sachs 279).

Therefore, it is vital that the wealthy nations give a financial boost to Afghanistan and Pakistan to begin the process of biofuel production. Once Afghanistan and Pakistan have not only the incentives but also the financial requirements, a successful economy of biofuels and ethanol can begin to flourish.

Conclusion

The year 2015 is not too far away, and lots of work is still needed to achieve the Millennium Development Goals. There are many obstacles affecting the scientific and economic progress of biofuel production. Ethanol is already a household name, so the next step is to make it a reality. Biofuels allow a huge opportunity for developing countries such as Afghanistan and Pakistan to rise out of the poverty trap.

There are three major steps in getting Afghanistan and Pakistan successfully involved in the biofuel industry. The first step is to determine which crop will be utilized, whether it is low input crops such as switchgrass, or if it will be food crops, such as corn or soybeans. Afghanistan and Pakistan will have to determine not only which crops will suit individual needs, but also which are most efficient and will not deplete food supply. The second step is securing property rights and determining where the crops will be grown. If the countries decide to invest in alfalfa or switchgrass, then marginal land can be utilized. However, if food crops are utilized, then the government will have to set aside large amounts of land to grow the crops. If this is the case, then depletion of food supply will have to be considered. The third and final step is for financial investments to be purchased. Afghanistan and Pakistan will need financial aid from developed nations such as the United States and the European Union, and will also need help from other organizations: governmental and non-governmental. The financial aid will provide the proper investments to get the process started. The investments will provide money to set aside land for the new crops, fix infrastructure, and provide necessary farming equipment. Once this begins, farmers will begin producing crops with more value. As demand for ethanol increases, the farmers will earn more money. As a result, individual income could rise from a dollar a day to ten dollars a day or more, therefore slowly reducing the amount of people living in extreme poverty.

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