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Fighting Hunger Using Previously Learned Lessons in East Africa and Ethiopia

In his 1968 bestseller *The Population Bomb*, biologist Paul Ehrlich wrote that “The battle to feed all of humanity is over” and he predicted massive famines in most of the less developed world (Bailey 1). He claimed that “billions would perish” and that these global famines could not be stopped by any means (Bailey 1). The situation in most of the countries which he was talking about was severe and over fifty percent of the world’s population experienced some sort of food insecurity each year at that time (Bailey 1). In addition to Ehrlich, many other scientists also believed that the world could not continue to support increasing population. Luckily, he was proved wrong by a massive effort on the part of Norman Borlaug and the countless thousands of scientists and agronomists across the world who participated in the aptly named “Green Revolution”. Started in the 1940s, it grew to encompass most of Asia, India, the Middle East and many parts of Latin America, making many of these countries self sufficient in cereal grain production (Hesser 68). Most countries, most notably India and China, did not endure the massive famines which were predicted; and many of these same countries are now food secure. The effect of the green revolution was significant; it doubled or tripled yields of most or all crops and it is credited with saving over a billion people through its effects (Bailey 1).

The development of the high yielding varieties began in Mexico in 1943, in a program jointly funded by the Rockefeller Foundation and the government of Mexico to increase cereal yields and decrease subsistence farming in Mexico (Hesser 32). Within ten years, Borlaug who was chosen to head the wheat program, and his team of Mexican and American scientists developed high yielding, short stalked, climate tolerant, rust resistant and fertilizer receptive varieties of wheat which spread throughout the world and resulted in massive reductions in hunger (Hesser 41). In addition, the team developed innovative techniques such as high volume crossbreeding, and shuttle breeding which allowed the wheat improvement process to occur faster and more efficiently (Hesser 41). But the most important result of this program was neither the innovations nor the cereal varieties; it was the hundreds of scientists who were trained in the many disciplines necessary to conduct research in crop production and improvement (Hesser 63, 64). These scientists became the leaders and promoters for adoption and utilization of high yielding varieties in their own countries. As Mexico became more self sufficient the Rockefeller Foundation realized “that the same program of training... [used in Latin America to train scientists]... could be used to train and motivate young scientists from the Middle East and south Asia” (Hesser 68). So on Borlaug’s initiative scientists from across the world were trained at the research station in Mexico. This was the backbone of the green revolution and the effort worked because these scientists and Borlaug were able to provide on the ground assistance and to teach local farmers and citizens the practices necessary for raising successful high yield crops.

Today, the work to eliminate hunger in our world is far from over; in 1992 about 823 million people were considered undernourished in the developing world. This number has remained virtually unchanged in the past 15 years, decreasing by only 3 million people to 820 million in 2001 -2003 (State 8). A disproportionate number of these people live in Sub-Saharan Africa which contains “sixteen of the eighteen most undernourished countries in the world” (Africa’s 1). A large number of these people live in sub-Saharan east Africa where 39 percent of the population is considered undernourished (State 33). This situation in these areas is much like what was happening in the areas in which the green revolution helped the most in the 1960s and 1970s. The problem of undernourishment in eastern Africa is not that there is nothing which will grow but rather that the indigenous people do not have the technology needed to produce a sustainable agricultural system which will ensure food security. They have to depend “on nature for water and fertility”, and either can cause the year to be a failure leaving the farmer and his

family hungry (Africa's 4). Just as Ehrlich predicted in the 1960s, many say the current situation in these countries is too far gone, too dire, and believe that it is impossible for agriculture to continue to provide food security for the entire world. One such doomsayer is Lester Brown, the founder of Worldwatch Institute who said in 1981 "The period of global food security is over ... The world's farmers can no longer be counted on to feed the [increasing world population]" (Bailey 1). But Ehrlich's predictions failed because of a massive extension effort on the part of thousands of people worldwide and the same can be true of eastern Africa especially the country of Ethiopia. While it is true that the situation in Africa is dire and more complicated than it was in the first revolution, there is still hope. A massive extension effort which would enable scientists and farmers to be trained to use new innovative techniques and to distribute high yielding varieties of cereal crops can greatly reduce hunger in east Africa.

Ethiopia is an east African country ranked in the bottom ten in the UNDP Human Development Index for 2006 (Where). It has a population of approximately 78 million people, most living in a rural subsistence setting (Urban). Forty-six percent of the population is undernourished and people live on an average of 1860 kilocalories per day (State 33, 37). Twenty-three percent of the population lives on less than one US dollar a day (State 37). The country's gross national income per-capita is \$90 annually (Rural). The average family size is six children and fifty percent of these children are under weight or under height for their respective age groups (Family, Statistics). In many cases women are the farmers and run the household (Africa's 4).

The size of the average subsistence farm size is 1 hectare (or less) and the main crops grown in the country are cereals, pulses, oilseeds, ensete (false banana), and coffee. Cereals such as teff, sorghum, millet, corn, and wheat are the country's primary sources of carbohydrates and are the staple foods of most of the population. (Rural, Ofcansky). Pulses (legumes) are grown as the primary source of protein and are most likely to be eaten in "wot" which is a stew-like dish (Ofcansky). Ensete is grown for its rhizomes and stems which produce large amounts of starch which are used to make flour; however, it is highly prized and hard to produce (Ofcansky). Coffee is grown as a cash crop by farmers but it has become increasingly less profitable because of the massive reduction in worldwide coffee prices in the past two decades (Ofcansky).

In a typical year, the average Ethiopian farmer makes just enough to keep his or her family fed for that year. In good years, there may be a surplus of crops but due to the country's limited transportation system in some areas (and non-existence in others), it is difficult to sell or barter grain beyond the local area. To make matters worse, there are little to no facilities in which to store the surplus. In bad years, any number of things going wrong will leave the farmer's family hungry (Africa's 4). While only 15% of the nation's population lives in urban areas, the urban citizen's plight in Ethiopia is not much better than his rural counterpart's (Interim 3). Thirty-three percent of the nation's urban residents live in poverty in Ethiopia, and urban poverty is caused by unemployment and/or underemployment (Interim 3). As mentioned before, transporting food to cities is difficult and this makes food difficult and expensive to get in the urban areas.

The battle with hunger in Ethiopia and other eastern African countries has been underway for many years; though there have been setbacks and failures in some places there have been some success in other areas. In the past decade alone: Ethiopia's proportion of under nourished people decreased by 15 percentage points from 61 percent in 1992 to 46 percent in 2001 (State 33). The average daily caloric intake increased from 1550 to 1860 kilocalories in the same period of time. In addition the number of people in developing world who are considered undernourished has not increased with population growth and this in itself is a gain (State 32). While these gains are not as aggressive as they were meant to be we have now learned that the fight against hunger in Africa is not futile and we can prevail if we rapidly implement the technologies that are and will become available.

For the reasons listed previously and to sustain gains already made, it is critical that a program be implemented that will result in a second green revolution in the whole of Eastern Africa. To this end, Ethiopia can be used as a model country for the rest of east Africa because it represents the typical situation in this part of the world, and the ideas and potential solutions discussed herein could be used in Eastern Africa. One of the fundamental tenants of the first green revolution was an agricultural extension effort to educate, inform, and aid the implementation of new innovative techniques and to distribute high yielding varieties of staple crops to the lesser developed countries in the world. The “main reason for the inefficiency of [farming in Africa] is that the crops on the great majority of small farms are not the high yield varieties in common use on other continents” (Africa’s 5). There have been high yielding varieties of the staple Ethiopian crops created and proven to work in eastern Africa and Ethiopia. In fact even in the 1980s when many of the world’s top food production scientists and statesmen meet they concluded “that much could be done in Africa to improve the conditions of small holder farmers with technology ‘already on the shelf’” (Hesser 158). The varieties just must be diffused throughout the country. As of now there continues to be a fundamental gap between what could (and should) be done and what is happening. While more development is always necessary (to adjust to new crop disease and improve stress tolerance and yield) these improvements do no good if they are not implemented into the societies which need them. This is where extension does what it does best - namely the diffusion of information, and goods.

On the ground, Extension has a proven track record of working to increase food security. Dr Marco Quinones heads an extension team in Ethiopia that is funded through the Sasakawa-Global 2000 (a nonprofit agency led by Dr. Norman Borlaug which encourages a green revolution in Africa). Dr. Quinones established Extension Management Training Plots in 1992 to demonstrate “correct agronomic practices”, such as the correct application of fertilizer, and the use of the high yield varieties (Debelo). These trials showed that with the use of high yield varieties it was possible for crop yields to double or even to quadruple in good years. Dr. Borlaug said that “The yields are at the worst double, nearly always triple, and sometimes quadruple what the traditional practices are producing.” The numbers back up his statement: the average yield over the seasons from 1993/94 to 2000/01 of corn in plots using the new practices was quadruple that of those using the old practices; wheat plots using the new practices yielded almost triple that of those without the practices; and teff yields doubled. (Bailey 2, Debelo). The opportunities for food security and possibly even a surplus from the people are great if the practices which have been developed by scientists are implemented in eastern Africa. This would be the first step towards the creation of a non-subsistence based society. The implementation goes beyond just giving farmers the seed, and showing them how to plant and raise the crop; true extension creates a stable society in which the people become self sustaining. For this to be successful, people must be intimately involved in the extension program.

This seems probable as Dr. Borlaug goes on to say that “African farmers are very enthusiastic about these new methods” (Bailey 2). Acceptance by producers is essential; any program to combat food insecurity must have the support of the people and the government of the country. A major part of any extension program must be the training of “Grassroots-level development agents” who are members of the community in which they will work (Debelo). These agents can truly empathize and best teach the people in their local communities how to use the practices. It gives the people the ability to help themselves. The training of these agents should be the primary goal of the extension because once they are trained they can participate in the training of those around them. The Sasakawa-Global 2000 extension has had great success in the higher education of mid-career extensionists through collaboration with the Sasakawa Africa Fund for Extension Education (Debelo). This program gives financial aid to help put these agents through college for a bachelor, master, or doctoral degree (Debelo).

Not only will extension increase the amount of food and promote the education of members or the communities but it will also ensure that sustainable, ecological agricultural practices are put into place.

More than three quarters of the land in sub-Saharan Africa has lost most of the nutrients necessary for the production of high yield crops. These lands have also lost most of their water holding capabilities, and much of their organic matter (Urgent). Because of increasing demand for food farmers are no longer able to allow fields to lie fallow to restore soil nutrients (Urgent). In Ethiopia it is estimated that 49 kilograms of soil nutrients per Hectare are lost each year (Urgent). This forces farmers to practice slash and burn agriculture to ensure they have nutrients for their plants. The Alliance for A Green Revolution in Africa (AGRA) is promoting an extension program to promote increased soil nutrition through proper application of fertilizers and organic matter. Water conservation is also promoted through the extension programs promoting efficient water usage (Water). These programs are essential to the continued food security of people in eastern Africa because they ensure sustainable practices which will ensure that land is arable.

Since women comprise most of the individual subsistence farmers in Ethiopia and most of eastern Africa (Africa's 4), the extension programs would benefit them greatly by ensuring their families food security through previously mentioned methods. Urban people would also benefit from the programs because the food surplus would become more common and the price of food would be decreased. Thus, the implementation of an extension program would benefit all involved.

In comparison to the first green revolution, there are more challenges to a program in Eastern Africa. First, Eastern Africa encounters drought on a frequent basis (Africa's 5). In the first green revolution, this was a minimal issue as extensive irrigation systems existed in Asia. However, in Africa, irrigation is just beginning to develop and is not an option in many regions. The International Fund for Agricultural Development (IFAD) is working to promote small scale irrigation throughout Ethiopia but due to "increasingly uncertain rainfall" and other climate phenomena it is difficult to ensure that there will be reliable water for crop production (Enhancing). Another major challenge is the lack of available infrastructure in Africa; it has been estimated by the World Bank "that until 2030 Africa will not have the transport infrastructure that was available in India in 1960" (Hesser 159). The lack of transportation makes it extremely difficult, if not impossible, to ensure that the necessary materials such as fertilizers, seeds and grain are distributed to those that need them (Africa's 5). In addition to these problems, continued armed conflict in the region is another challenge. These conflicts "disrupt productive activities and destroy infrastructure". For hunger and poverty reduction to occur, "peace and stability" are essential (State 29). These challenges and others must be faced in order to implement programs which will enable Ethiopians and other east Africans to feed themselves.

An ideal program would have the following characteristics. First, it promotes the use of improved crop hybrids and varieties through the distribution of seed to local farmers. Second, the program must educate the farmers about using proper techniques to maximize yield. The implementation of these two characters alone has been shown to double at the very least the yield of small scale farmers (Debelo). Third, the program must implement ecological and sustainable agricultural practices to ensure that soil, and water resources are wisely used in east Africa. These practices are critical to feed successive generations. Finally, the program implemented must train agronomists, scientists, and farmers for the areas in which the program is implemented. This will enable them to teach and aid in implementing techniques in their communities. If these ideas are implemented aggressively, they should increase the yield of crops, increase food security, and increase income of the farmers involved. The implementation also will eventually lead to the countries in east Africa becoming self sustainable when it comes to agricultural production.

Fifty years ago people were predicting the starvation of millions of people because of low yields and high population increases in lesser developed countries. People said that it was impossible for India, China, Mexico, and countless other countries to feed themselves. They predicted that sustainable agriculture in these countries was not possible. But because of a systematic effort on the part of a "vast

team made up of many organizations, officials, thousands of scientists, and millions of farmers - mostly small and humble - who for many years [had] been fighting a quiet, oftentimes losing war on the food production front.”, crop improvement in these areas began to occur and yields began to increase, doubling, tripling, even quadrupling in some cases (Norman). The world changed; a revolution was created that saved more people than any other in history. The same thing must happen today in Africa - extension practices must be implemented to prove today’s critics wrong and to feed the people. When this is done and done aggressively we will truly see a second green revolution.

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