By Bethlehem (Beti) Lombardi
Powell County High School
Deer Lodge, MT
Ethiopia, Factor 6

Ethiopia: Land Degradation in the Sahel and Beyond

I was born in Ethiopia, a land of great hunger that has experienced severe land degradation. I saw firsthand what happens when people are poor, hungry and they overuse the land. They make decisions based on short- term hunger needs, and not based on sustainable agriculture and what is best for the land in the long term.

My Grandmother Tsehay grew corn on a small plot of land next to her two room house. The stalks were used for fuel, and the corn helped to feed my grandmother, my sister, an elderly neighbor, and me. To supplement her income, she rented out one of the two rooms in her house. This provided income to purchase more food and to buy charcoal for fuel when the corn stalks ran out. I would make coffee as my grandmother sat in the front of the house and pulled the seeds from cotton balls and spun the fluffy cotton into thread. We could gaze out upon the barren hills surrounding our valley where all of the trees had been cut down for the production of charcoal. Neither my grandmother nor any of her neighbors ever practiced conservation tillage, and they had either directly or indirectly contributed to deforestation and land degradation. Even if they had known about the benefits of sustainable agriculture, conservation tillage, and agroforestry, the simple fact was we were hungry and needed the corn stalks and other crop residue for our cooking fires. We had to use our precious money to purchase charcoal when the stalks ran out. We were like millions of others in the Sahel region: we made decisions based on short term hunger needs.

In 2012 the Ethiopian population was 84.2 million people and increasing to 85.8 million by 2013 as projected by the Central Statistical Agency based on the 2012 Inter-Censal Population Survey. The average household size was 4.8 in1994. In 2007 the household size of the country slightly decreased to 4.7(4.9 in rural and 3.8 in urban) most notably in the urban areas.

The Ethiopian diet consists of a main dish called wat (a hot spicy stew), accompanied by injera (a large spongy sourdough pancake made of teff flour and water). Teff is grown on the Ethiopian highlands, an area that is highly susceptible to soil erosion and severe land degradation. There are many varieties of wat, like chicken, beef, lamb, vegetables, lentils, and ground split peas mixed with berbere (dried red hot pepper). Wat at is served on top of the injera which is served in large basket. The food is eaten with fingers by tearing off a piece of the injera and dipping it in the wat. The main drink in Ethiopia is buna which is coffee. Buna is drunk in a traditional way known as a “buna or coffee ceremony.” Buna is the number one crop of Ethiopia and the main cash crop.

The world produces enough food to feed the entire global population of seven billion people, and yet one person in eight on the planet goes to bed hungry each night. In some countries, one child in three is underweight (World Food Program 2015). Why does hunger exist? How will agriculture respond to a growing world population? The challenge to adequately feed every man, woman and child is great. When we consider that most of the population growth in the next 40 years will occur in the developing world, the prospect of feeding an additional two billion people within our lifetime is indeed a daunting task. When we look at the areas of greatest hunger in our world, we often find a correlation with land degradation, overworked soils, malnutrition and gripping poverty.

One hundred years ago, the rural parts of United States were not much different than the Sahel. If we look back into our history, to the time of Norman Borlaug’s childhood at about 1920, the middle of

America--including Borlaug's Iowa homeland-- was made up of subsistence farmers who had to function at full throttle just to eat. Farmers in America had to learn the lessons of land degradation the hard way and over time, have improved the way in which they care for the land. They had neither the time, nor the money, to climb out of poverty (Noel Vietmeyer). Created in great part by their methods of farming and climate change, a vast swath of America was turned into a dust bowl by the 1930's. They made decisions based on short-term hunger needs. Wind erosion ravaged the land and caused great hardship and hunger. Something had to change; land degradation was ruining the very land that opportunity seekers were clamoring to move into.

Thanks to technological transformations adopted during the 1920's and 1930s, the US became one of a few countries whose food production outstripped its baby production (Noel Vietmeyer). Today's farmers are continuing to improve minimum tillage of the soil by constantly adapting their farming methods and incorporating new technologies. We can and should share our knowledge and technology to help further prevent land degradation in the Sahel and other parts of the developing world, such as the land of my childhood Ethiopia.

The Sahel is a transition zone of semi-arid grasses and shrubs, stretching across the African continent between the Sahara desert to the north and the tropical savannas to the south. This area covers eleven countries from Ethiopia in the east, to Senegal in the west, and runs almost 4000 miles from the Red Sea to the Atlantic Ocean. The Sahel is about the same size as the four largest states in the U.S., with over one hundred million people living there.

Eighty to ninety percent of the population is actively involved in agriculture (Stephen Doso Jr 2014). They are primarily subsistence farmers and they are very poor and very hungry. They share similar cultures and livelihoods even though they have different religions and languages. As the population of the Sahel expands to 200 million people by 2050, the ability of the land to support more agriculture will diminish even further without a dramatic change in agricultural practices.

The land's ability to provide enough food is due to many factors, including natural events and human activity. Natural events include an intense rainy season that causes sudden soil erosion and strong winds which cause considerable loss of soil and nutrients. Human activities include overgrazing and overuse of the land. The land is often in a state of severe degradation. There are ways to reduce land degradation in the Sahel and other parts of the developing world. Adopting these methods will improve the health of the land and thus improve the health of the people in the Sahel.

One is conservation tillage. Conservation tillage practices are a very powerful tool that reduces erosion by protecting the soil surface and allowing water to infiltrate instead of running off. Instead of plowing and disking their fields before planting, farmers should leave the residue of the previous crop on the soil surface. The layer of decaying plant material provides protective litter and begins to create conditions to improve the biological health and the nutrient capacity of the soil. An additional benefit is the soil stays cooler and there is less evaporation of soil moisture.

Stone bunds are an old idea put into new practice in the Sahel. The stone bunds are similar to the contour farming that we use on the hilly farms in our country. Stone bunds are built with quarry rock or stones along the natural contour of the land. The stone bunds form a barrier that slows down water runoff allowing rainwater to seep into the soil and spread more evenly over the land. The rocks or stones give more permanence and support to the terrace-like structures. The slowing down of water runoff helps by building-up a layer of fine soil and manure particles from which better crops can grow. One of the first benefits of this practice will be an increase in ground water levels. This will directly and immediately benefit the local population as the wells that they draw their drinking water from will fill with a cleaner and more abundant water supply (Farming First 2012).

Half-Moons and improved planting pits (called Tassa) are yet another way to improve the lives of the farmers and improve soil health. An added benefit to this type of farming in an arid region is that it collects, concentrates, and stores the rain water (IFAD 2011). The half-moons are earthen embankments in the shape of a semi-circle with the tips of the bunds on the contour; they capture run-off water and soil from sloping land. Planting pits are used on flat lands, they are dug on existing farm fields before the onset of the rains using a hoe to break the surface crust and build a shallow pit that collects and stores rain water. If organic fertilizer from livestock is available then it is put into the pit to improve soil fertility (IFAD 2011).

With the Sahara Desert expanding southwards at a rate of 30 miles per year, the United Nations estimates that two-thirds of Africa's arable land could be lost by 2025 if this trend continues . A land conservation idea that I like is called the Great Green Wall it is a living wall of trees (a wind break) that will help prevent the Sahara desert in the north from encroaching on the inhabited lands of the Sahel. The plan is to build a wall of trees nine miles wide and almost 4000 miles long across eleven African countries. The project was approved by the African Union in 2007 and has already been started in Senegal in the west (Time Magazine 2013). The key to making a project like this work is for the local people to see more value in keeping the trees alive than harvesting the trees for fuel wood and charcoal. Agroforestry such as this provides many benefits in addition to keeping the desert at bay. Benefits can include a cheap source of fodder, poles, fruits, and fuel wood (in the form of small dead twigs). Additional benefits can be gained from nitrogen-fixing trees, shade from the tree canopy and mulch cover for the soil. Wind and rain erosion prevention are greatly increased with shrub and tree roots because they can bind the soil together better than smaller plants can. Integrated farming (agroforestry) involving a mixture of forestry, grazing and farming can maximize land use per unit area. This is very useful in the Sahel where cropland is limited and the population is growing rapidly (Stephen Doso Jr. 2014).

If we again compare the US to the Sahel, we will note that within 50 years of the 1920's the US population increased from about 100 million to 200 million people and we were no longer a population of poor subsistence farmers, but were well on our way to taking better care of our land and producing a surplus food supply (Noel Vietmeyer 2009). This could be the case for the Sahel. The current population is about 100 million people and in less than 50 years it is expected to grow to more than 200 million. The work must begin now to correct land degradation, revitalize the soil health and put the people on a fast track to sustainable agricultural production.

As in my early childhood, land degradation today is just one part of the complex equation that has kept millions of people in gripping poverty and a constant state of hunger. Too many developing countries lack key agricultural infrastructures, such as enough roads, warehouses and irrigation. Farmers often cannot afford improved seeds so they cannot plant the crops that would provide for their families and improve the environment. They also need improved alternatives to burning charcoal and crop residue for cooking fires. Investments in land management and water conservation and drought-resistant seed, can bring big improvements in the Sahel and other developing parts of the world. Subsistence farmers need conservation tillage and sustainable agricultural technologies to make the leap from being part of the problem to being part of the solution. African agriculture has a greater potential for feeding a growing world than any other region. In one of the last papers that Norman Borlaug published he stated "African agriculture is our greatest challenge, more than any other region, food production in the sub-Saharan Africa remains in crisis. No Green Revolution has occurred here" (Borlaug and Dowswell, 2005). However I think my generation can and will change that. We have incredible tools of science and technology that we can use for the betterment of agriculture and the environment. If we couple that with the great minds of my generation we can feed the ever growing population of our world and make a great leap forward in the elimination of hunger.

References

Bashaw, B. (2009, December). *Deforestation and Land Degradation in the Ethiopian Highlands: A strategy for physical recovery* [Journal article]. Retrieved March 19, 2015, from http://www.nesglobal.org/eejrif4/index.php?journal=admin&page=article&op=download&path%5B%5D=9&path%5B%5D=84

Borlaug, N. E. (2003). *Feeding a world of 10 billion people: The TVA/IFDC legacy*. Muscle Shoals, Ala., U.S.A.: IFDC.

Doso Jnr, S. (2014). Land degradation and agriculture in the Sahel of Africa: Causes, impacts and recommendation. *Journal of Agriculture Science and Applications, 3*(4).

Farming First. (2012, September 10). Stone bunds as soil and water conservation measures in Sahelian countries. Retrieved March 19, 2015, from http://www.farmingfirst.org/2012/09/stone-bunds-as-soil-and-water-conservation-measures-in-sahelian-countries/

Hesser, L. F. (2006). *The man who fed the world: Nobel Peace Prize laureate Norman Borlaug and his battle to end world hunger : an authorized biography*. Dallas, Tex.: Durban House.

International Fund for Agricultural Development. (2011). Regreening the Sahel: Developing agriculture in the context of climate change in Burkina Faso. *IFAD*.

IRIN News. (2008, June 2). Sahel: Backgrounder on the Sahel, West Africa's poorest region. Retrieved March 19, 2015, from http://www.irinnews.org/report/78514/sahel-backgrounder-on-the-sahel-west-africa-s-poorest-region

Mann, C. C. (2008, September). Our Good Earth:The future rest on the soil beneath our feet. *National Geographic*, 1-6.

Pontes, L. (2014, July 24). Global plans of action endorsed to halt the escalating degradation of soils. Retrieved March 19, 2015, from Food and Agriculture Organization of the United Nations website: http://faowashington.org/category/environment/land-degradation

Schafer, S. (2014, December). Brazil eyes production potential. *Top Producer*, 44.

Time magazine. (2013, June 11). *Africa's Ambitious "Great Green Wall"* [Video file]. Retrieved from https://www.youtube.com/watch?v=jI_nRHg-0l4

Vietmeyer, N. (2008). *Borlaug: Right off the farm*. Lorton, Va.: Bracing Books.

Vietmeyer, N. (2011). *Our daily bread: The essential Norman Borlaug*. Bracing Books.

World food programme. (2015). What causes hunger? Retrieved March 20, 2015, from http://www.wfp.org/HUNGER/CAUSES