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Chad, Factor 6: Sustainable Agriculture

### **Chad: Agricultural Sustainability**

“Some 805 million people in the world do not have enough food to lead a healthy active life. That's about one in nine people on earth.” (“Hunger Statistics”). Food security means not having to worry about where your next meal will come from. By 2050, the amount of grain produced will have to double to provide for, and double again to sustain, the estimated 9 billion people in the world at that time (Tilman et al. 671). One way to meet this demand is by implementing sustainable agriculture practices. Sustainable agriculture can lead to larger production of healthier food. The knowledge of ecological agricultural practices needs improvement and is necessary because without sustainable practices that lead to an increase in food production, the estimated population mentioned before will not be supported.

Chad, a country in central Africa, is just over three times the area of California (“Africa: Chad”). It can be broken into three different zones: Saharan, Sahelian, and Semitropical. The Semitropical zone covers the southern third of the country. The Sahelian and Saharan zones, each named for their respective deserts, take up the last two-thirds to the north. A desert is characterized by dry land with very little to no vegetation (“Case Study: Drought in the Sahel”). Because of this, the people living in these regions are most vulnerable to food security issues.

In addition to food security issues, Chad is the poorest country in Africa (“Rural Poverty in Chad”). The majority of the population lives in rural areas. Only 21.8% of the population lives in urban areas (“Africa: Chad”). Access to healthcare is rare, as is access to a good education. Children can expect to complete primary school but move on to be educated by their family for domestic and economic tasks in their early teens (Abbink). Many people don't even speak either of the country's official languages, Arabic and French, but instead up to 120 local dialects (“Rural Poverty in Chad”). Without access to education, many people cannot obtain items that they need or do not know what they need to improve current situations.

Most families survive by subsistence farming on land shared with their extended families. The amount of land the family farms is around an acre per person (“Arable Land (Hectares per person)”). A family consists of about six people, parents and an average of four children, and there can be multiple families living on one farm. The women of the families do most of the work including: the main work in the rural economy, handle family responsibilities and child care, care for small livestock, and tend family gardens (Abbink). Farmers commonly keep cattle, sheep, goats, and camels as food sources or to help with work and transport. Crops that farmers usually grow are grains such as sorghum and millet. Other foods grown are peanuts and starchy roots such as cassava and yams (“Nutrition Country Profiles: Chad”). Current farming practices consist of the combination of a slash-and-burn technique, crop rotation, and periods of time that the land lies dormant (“Climate & Agriculture”). Chad's current farming techniques are not necessarily the best for their climate and soil type.

Farming techniques are not the only problem. Other obstacles to improved agricultural productivity, access to food markets, and adequate nutrition include environment degradation, lack of food or agriculture-related natural resources, and lack of knowledge about ecological agriculture practices. Environment degradation is occurring because the nutrients in the soil are inadequate for production and current practices make this issue even worse. Major soil erosion occurs especially in the areas of the country that have long dry seasons followed by downpours. Desertification can happen for many reasons such as overgrazing or over-cultivation especially if following drought (“Case Study: Drought in the Sahel”). Chad's natural resources are not resources used in agriculture. Their natural resources consist of

natron (a type of salt), petroleum, gold, uranium, titanium, and bauxite (“Chad”). To create and maintain sustainable practices, Chad’s farmers need a way to access and purchase the nutrients their crops need. Educating farmers on how to work with their environment to create and use ecological practices is also very important because some current practices could be damaging the land already.

Sustainable agriculture is defined as “practices that meet current and future societal needs for food and fiber, for ecosystems, and for healthy lives that do so by maximizing net benefit to society when all costs and benefits of the practices are considered” (Tilman et al. 671). “With recurring droughts across the Sahel region, traditional farming is threatened by a shortage of rain and pastureland” (“Climate & Agriculture”). Food availability and quality would improve because there would be more land to farm and the food would be grown with the nutrients it needs to grow its best. Improvement in crop yields, efficiency of nutrient and water use, and ecologically based management practices are all parts of creating and maintaining sustainable agriculture practices. More food, improved access to food, and healthier food will lead to a higher quality of life for the people and a better future for the country.

Currently in Chad, the lack of sustainable agriculture causes insufficient production of food because the families cannot keep desertification or soil erosion from destroying their land. Access to adequate nutrition is decreased because the families cannot obtain many of the supplies and technologies they need for sustainability. Farmers are not able to add necessary nutrients to the soil for the plants to grow to their fullest. Sustainability is measured by what a farmer will put into the soil compared to how long the soil continues producing (Downs). Current trends for agricultural sustainability are worsening because there isn’t much done to fix current practices and make them into a sustainable system. Recent measurements do not show signs of improvement, rather signs of deterioration (“Chad Food Security”). These measurements are proof that agricultural sustainability is necessary in Chad.

Improving Chad’s agricultural sustainability would increase the amount and quality of food because the land would be maintained in a way that agriculture could continue for longer. Environment sustainability would be preserved because the agricultural practices would reduce desertification and soil erosion as well as keep nutrient stores in the soil at sufficient levels. Preserving the natural ecosystem is important because any more land lost to desertification or soil erosion would decrease the amount of food that could be produced. Farmers need to maintain their land to ensure maximum food production, and a sustainable system of agriculture is one way to do this.

Another way agricultural sustainability would improve Chad is that economic development would increase and poverty would be reduced. Food production would rise giving smallholder farms and families the ability to trade any extra food they have. Trade would provide these families with resources that they need which they may not have had access to before. Women would particularly benefit because they take care of most of the work on family farms. If a sustainable system is implemented and maintained, the caretaker, women in this case, would have less to maintain on their own.

Major issues that affect sustainable agriculture in Chad are climate volatility and water scarcity. The climate in the northern part of the country is dry with little rain (“Climate & Agriculture”). Soil erosion is a major factor in these areas because there is not much vegetation to keep the soil in place when it does rain. Major water sources are accessible primarily to the people that live around them. Lake Chad, the Chari River, and the Logone River are located to the south and east. There may also be oases located in the desert lands to the north, but they are seldom. The dry climate and limited access to waterways causes many issues with agriculture.

Climate volatility and water scarcity are not the only major issues that affect Chad’s agriculture. Plant science could be used to find breeds of plants that are hardy enough for the dry climate and will provide a good food source. Crop rotation using plants that take different nutrients from the soil will help replenish

other nutrients during each rotation. Crop rotation is practiced in Chad, but many farmers do not have access to the resources necessary for planting different types of crops to achieve nutrient replenishment. Knowledge of ecological agricultural practices needs improvement to maintain a sustainable system. Educating the farmers about crop rotation and sustainable practices would improve their quality of farming and production size.

To effectively address sustainable agriculture to improve the food security in Chad, I would recommend implementing a system of farming that uses some current practices combined with innovative irrigation systems. Crop rotation is a good practice that I would recommend continuing. To improve the current practice, farmers will need access to nutrient-fixing plants that double as a food source, such as beans. Also, rather than the slash-and-burn technique currently used, controlling and maintaining the before mentioned plants could help to prevent soil erosion. As for irrigation, there is currently no way for farmers, without access to waterways, to irrigate their crops. Implementing a runoff-capture system could allow farmers to use the rain that would otherwise be lost to irrigate crops. Farmers could slope and terrace their land which would make any runoff flow in one direction. This runoff could be captured and stored for use during a dry-spell.

Most of these suggestions could be taught to the farmers. The UN could provide farmers with the education they would need to maintain sustainable farms. One of the UN's goals is to promote sustainable development. Educating farmers in Chad on how to maintain their land ecologically would be within that goal. The national government of Chad could offer farmers a way to trade seeds of different types of plants, especially nutrient-fixing plants, so that farmers would have access to new crops each growing season. Rural farm families could work together with their local communities to change their land into sloped terracing to create the runoff-capture system.

There would be a great amount of effort put into the creation of sustainable systems, but the outcome would leave the people with additional food, healthier food, and prevent further destruction of the land. I would also allow farmers to use their land for longer without having to have long periods of allowing it to sit empty. A system using sustainable agriculture would provide Chad with better food security and fewer people struggling to feed themselves and their families.

## Works Cited

- Abbink, Jon G., ed. "Culture of Chad." *Countries and Their Cultures*. Advameg, 2015. Web. 15 Mar. 2015. <<http://www.everyculture.com/Bo-Co/Chad.html>>.
- "Africa: Chad." *The World Factbook*. Central Intelligence Agency, 23 June 2014. Web. 5 Mar. 2015. <<https://www.cia.gov/library/publications/the-world-factbook/geos/cd.html>>.
- "Arable Land (Hectares per Person)." *The World Bank*. World Bank Group, 2015. Web. 15 Mar. 2015. <<http://data.worldbank.org/indicator/AG.LND.ARBL.HA.PC>>.
- "Case Study: Drought in the Sahel." *BBC*. BBC, 2014. Web. 22 Mar. 2015. <[http://www.bbc.co.uk/schools/gcsebitesize/geography/water\\_rivers/drought\\_rev3.shtml](http://www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/drought_rev3.shtml)>.
- "Chad". *Encyclopædia Britannica*. *Encyclopædia Britannica Online*. Encyclopædia Britannica Inc., 2015. Web. 23 Mar. 2015 <<http://www.britannica.com/EBchecked/topic/104144/Chad/54930/Resources>>.
- "Chad - Agriculture." *Encyclopedia of the Nations*. Advameg, 2015. Web. 28 Mar. 2015. <<http://www.nationsencyclopedia.com/economies/Africa/Chad-AGRICULTURE.html>>.
- "Chad Food Security." *Global Food Security Index*. Economist Group, 2015. Web. 28 Mar. 2015. <<http://foodsecurityindex.eiu.com/Country/Details#Chad>>.
- "Climate & Agriculture." *Our Africa*. SOS Children's Villages, 2015. Web. 26 Mar. 2015. <<http://www.our-africa.org/chad/climate-agriculture>>.
- "Definitions." *Global Yield Gap Atlas*. U of Nebraska L, 2015. Web. 22 Mar. 2015. <<http://www.yieldgap.org/glossary>>.
- Downs, Marty. "Can Sustainable Intensification Feed the World While Reducing Environmental Impact?" *The Nature Conservancy*. Nature Conservancy, 2015. Web. 28 Mar. 2015. <<http://www.nature.org/science-in-action/science-features/measuring-sustainability-in-agriculture-focusing-on-outcomes.xml>>.
- "The History of Chad." *Chad Heart of Africa*. Eastgate Web, 6 Jan. 2012. Web. 16 Mar. 2015. <<http://chadheartofafrica.com/index.php/about-chad/history>>.
- "Hunger Statistics." *World Food Programme*. World Food Programme, 2015. Web. 28 Mar. 2015. <<http://www.wfp.org/hunger/stats>>.
- "Is Sustainable Agriculture Possible in the Sahel?" *IRIN Humanitarian News and Analysis*. IRIN, 16 Apr. 2012. Web. 25 Mar. 2015. <<http://www.irinnews.org/report/95258/is-sustainable-agriculture-possible-in-the-sahel>>.
- "Nutrition Country Profiles: Chad Summary." *Nutrition Country Profiles*. FAO, 2010. Web. 28 Mar. 2015. <[http://www.fao.org/ag/AGN/nutrition/TCD\\_en.stm](http://www.fao.org/ag/AGN/nutrition/TCD_en.stm)>.
- "Overview." *World Food Programme*. World Food Programme, 2015. Web. 12 Mar. 2015. <<http://www.wfp.org/countries/chad/overview>>.

"Rural Poverty in Chad." *Rural Poverty Portal*. IFAD, 2014. Web. 5 Mar. 2015.  
<<http://www.ruralpovertyportal.org/country/home/tags/chad>>.

Tilman, David, et al. "Agriculture Sustainability and Intensive Production Practices." *Nature* 8 Aug. 2002: 671-77. *Cedar Creek Ecosystem Science Reserve*. Web. 22 Mar. 2015.  
<<http://www.cedarcreek.umn.edu/biblio/fulltext/t1860.pdf>>.

"Towards Multifunctional Agriculture for Social, Environmental and Economic Sustainability."  
*International Assessment of Agricultural Knowledge, Science and Technology for Development*.  
United Nations Environment Programme, Apr. 2008. Web. 23 Mar. 2015.  
<[http://www.unep.org/dewa/agassessment/docs/10505\\_Multi.pdf](http://www.unep.org/dewa/agassessment/docs/10505_Multi.pdf)>.