

*Is not this the fast that I choose:
to loose the bonds of injustice, to undo the thongs of the yoke,
to let the oppressed go free, and to break every yoke?
Is it not to share your bread with the hungry,
and bring the homeless poor into your house;
when you see the naked, to cover them,
and not to hide yourself from your own kin?
Then your light shall break forth like the dawn,
and your healing shall spring up quickly;
your vindicator shall go before you,
the glory of the Lord shall be your rear guard.
Then you shall call, and the Lord will answer;
you shall cry for help, and he will say, here I am.*

Isaiah 58:6-7



*Agriculture and
Food Security
in a Changing
Climate*

HUNGER and Climate Change



Evangelical Lutheran
Church in America
God's work. Our hands.

The prophet Isaiah's words teach us that to help those who are hungry, to work for justice for all people, is to experience the transformative and connecting power of God. As Lutheran Christians, freed by the grace of God and the death and resurrection of Jesus Christ to serve our neighbors, this directive leads us to give of ourselves and to work and advocate for justice.

We live in a broken world with too many cases of injustice. More than 1 billion people around the world lack food security, which means they do not have economic or physical access to sufficient food to lead a healthy and productive life. Food insecurity has many causes. Poverty is an obvious cause, as is location—food is more scarce in some areas than it is in others. Climate is also a root cause of much food insecurity—those who live and farm in harsh climates with frequent drought or repeated flooding are food insecure.

Changing Weather Affects Farming and Local Food Security

Scientists predict major shifts in weather patterns and increases in extreme weather events around the globe if we do not begin to reduce emissions of carbon dioxide and other “greenhouse” gases from our homes and cars, our factories and farms. These shifts in climate will profoundly affect the global food supply and the food security of billions of people.

Farming is highly vulnerable to shifts in weather patterns. As these patterns become less predictable and more extreme, food supplies will suffer in many regions.

Food security is already an intricate puzzle, with implications for poverty, hunger, migration, gender equality and even political stability. Climate change and shifting global weather patterns will only add to this complex mix of issues and impacts.

Poverty and Hunger in Farming Communities

According to the U.N. Food and Agriculture Organization, about 75 percent of the world's hungry people live in rural areas where the main source of income is agriculture. About 2 billion people live and work on small farms in countries with emerging and developing economies. Many produce only enough to feed and support their families.

Increases in droughts and flooding will impact farmers worldwide, but small farmers with few resources are particularly vulnerable. They are more likely than farmers in wealthy nations to depend on rain to nourish their crops. They are less likely to have access to techniques and technologies, such as drought resistant crop varieties, that would enable them to adapt to changing weather conditions.



Athanase Mugabo, a subsistence farmer in the eastern part of Rwanda, is worried that his crops of maize and beans will wither and die just as they did last season. He did not get any harvest at all that year, even after replanting: The rains were not sufficient. “They came in torrents at first but went away after a few weeks. By the time they returned, the crops had withered.”

Mugabo and other small farmers in Rwanda are concerned about unpredictable weather patterns, including multiyear droughts and flooding that make it difficult to grow the staple crops that feed and support their families. Many are noting that on the whole the climate is much drier than it was only a decade ago, and primary sources of domestic water—small rivers, swamps, wetlands and lakes—are diminishing.

The Lutheran World Federation Department for World Service, with support from ELCA World Hunger, is working to help small farmers adapt to changing conditions. Initiatives include programs to replant trees and prevent soil erosion and to replace firewood cooking stoves with alternative sources of fuel so that trees are not cut down.

In the small community of Las Jolotas, Nicaragua, subsistence farmers like Felicita and her son, Ariel, are dealing with rainfall patterns that have grown increasingly unpredictable. Some years the rains fall late and seeds die without producing any harvest; other years the rains cause flooding, and seeds are swept away.

Farmers in Las Jolotas traditionally save just enough seeds from the previous harvest to plant during the next rainy season. If those seeds are lost, the results are devastating. Farmers may have to borrow money at high rates to purchase more seeds for planting and may have to take on additional work to pay the loans back. Some farmers have stopped planting during the rainy season, choosing instead to migrate to El Salvador, Costa Rica or even the United States to look for work. Family members left behind struggle to keep food on the table and children in school while their land lies fallow.

To support Felicita and her family as they try to adapt to the effects of climate change, The Lutheran World Federation—working with the Faith



CHRIS MORTENSON

and Hope Lutheran Church of Nicaragua—helped them dig a shallow well. The water from the well is gravity-fed to irrigate crops during the dry season. The well protects Felicita and her family from uncertain weather patterns. In turn, the increased food security ensures that they will have enough to eat and will not have to migrate to faraway places, disrupting and perhaps ending Ariel's schooling and leaving their culture and community behind.

Migration

Many such farmers work marginal lands in dry regions and areas vulnerable to flooding. When poor weather conditions lead to failed crops, these farmers must find other means to feed themselves and their families, even abandoning their farms to migrate to urban areas in search of work.

Farmers living in coastal areas or on small islands are particularly vulnerable to the displacement disruptions that climate change will bring to their communities. About 50 percent of people in small island nations live within 1.5 kilometers of the shore in agricultural communities. Rising sea levels resulting from melting glaciers or unusually frequent tropical storms and hurricanes will reduce agricultural production and decrease the amount of available, arable land. Rising seas will also allow salt water to intrude into coastal water supplies that are needed for irrigation, damaging topsoil and decreasing food production.

Gender Equity

Many small farmers and farm workers in countries with developing economies are women, who produce between 60 and 80 percent of food grown in those nations. Climate change uniquely affects women, both as food producers and because they are most likely in charge of procuring and preparing food in their households. Yet the focus of many agricultural programs is on men, ignoring the role that women play in the global food system.

Political Stability

Disruptions in the food supply can impact political stability: In 2008 the price of many staple grains, such as corn, wheat, and rice, rose sharply, and commodities were scarce in some countries. Although food prices increased around the globe, poor nations, where households spend anywhere from 60 to 75 percent of their income on food, were especially hard hit. High prices for staple crops were blamed for political unrest in a number of countries, including Pakistan and Haiti.

The crisis in 2008 was caused by a number of factors working together, including crop failures due to drought, increasing demand for food from a growing middle class in China, Brazil, and India and the increased use of corn in the production of bio-fuels rather than as food. However, the 2008 crisis also shows the potential global impact of widespread disruption of crop yields due to climate change.

Effects of climate change will be felt around the world

Africa: Climate experts predict up to a 50 percent reduction in crop yields by 2020, particularly in areas where crops are heavily rain-dependent. They also estimate that by 2020, 75 million to 250 million Africans will suffer increased shortages of water due to climate change.

Asia: Scientists predict that crop productivity could decline dramatically (more than 30 percent), especially in areas already suffering from scarcity of arable land. Subsistence farmers are most at risk, as are areas dependent on marginal crops, such as sorghum and millet. Central, South, East, and Southeast Asia will see a decrease in freshwater availability, adversely affecting more than 1 billion people by the 2050s.

Europe: Crop productivity will likely decrease in southeast Europe and along the Mediterranean. There is likely to be a greater demand for water irrigation for essential crops by 2050, specifically a 2 to 4 percent increase for maize cultivation and a 6 to 10 percent increase for potatoes. Yet while water demand increases, its availability will decrease due to drought. The number of people at risk from these effects could jump from 16 million to 44 million by the 2070s.

Latin America: By the 2020s, up to 77 million people could suffer from a lack of adequate water supply. Production of some staple crops, including rice, are likely to decline as temperatures rise, as will the productivity of livestock and dairy animals.

North America: Regions such as the Northern Great Plains and Great Lakes may have increased productivity of crops, while the Southern Plains, Delta states, and possibly the Southeast and portions of the Corn Belt could see agricultural productivity fall because of higher temperatures and changes in water availability. Livestock production may also be affected as shifting weather patterns impact grasslands and water supplies and as temperatures rise. Predicted increases in drought conditions in Western states will impact water availability for farming in that region.

Small Islands: Coastal agriculture will be adversely affected by sea-level rise, sea-water intrusion into freshwater areas and an overall decline in water supply. Changes in weather extremes (e.g. flooding and drought) will likely have a very negative effect on agricultural production away from the coast.

Sources

Intergovernmental Panel on Climate Change, *Climate Change 2007: Impacts, Adaptation and Vulnerability*
Pew Center on Global Climate Change, *A Review of Impacts on U.S. Agricultural Resources (1999)*



AGRICULTURAL RESEARCH SERVICE/USDA

Impacts on U.S. Agriculture

Wealthy nations are not immune to the affects of climate change on agriculture. Farms in the U.S. are equally vulnerable to changing weather patterns, although U.S. farmers have more resources to adapt to a changing climate. This has implications for both U.S consumers and for the global market. U.S. farms not only produce food for our own citizens but also play a key role in the global food supply. According to the U.S. Department of Agriculture (USDA), U.S. farms account for more than 25 percent of the total global trade in wheat, corn, soybeans and cotton.

Essential U.S. crops like corn and soybeans will suffer in some parts of the country as temperatures rise and extreme weather becomes more common. Although more moderate temperatures will allow crops to be grown in new areas in northern states and increased levels of carbon dioxide will initially increase crop growth rates and productivity, even highly fertile lands in the Midwest will become less productive for staple crops as temperatures continue to rise.

In addition, increasing drought conditions in western states will impact our main areas of fruit and vegetable production in California and the Pacific Northwest as farmers compete with growing urban areas for decreasing water supplies.

©ISTOCK/ZUBIN LI

Climate Change Impacts on a Staple Crop

Three billion people around the world eat rice each day. Sixty percent of Asia's poorest and most undernourished people depend on rice as their staple food. But a recent report published by the National Academy of Sciences found that rising temperatures over the last 25 years have cut global rice yields by as much as 10 to 20 percent in some parts of Asia. As climate change continues and both day and nighttime average temperatures continue to rise, yields of this critical crop will continue to drop, with serious consequences for global food security.

Source: *Science Daily Online*, August 10, 2010



Bio-fuels and Food Security

Bio-fuels, made from plants or plant residues, are often touted as a way to reduce the global use of oil while still allowing the transportation sector to continue its growth worldwide. However, these fuels may not be as “carbon neutral” as their media coverage would have us believe.

In countries that grow sugar cane or palm oil for bio-fuels, forest land is being converted to grow these crops on a large scale. Such deforestation is a leading cause of carbon dioxide emissions globally and may, in fact, outweigh the reduction in carbon emissions from substituting bio-fuels for fossil fuels.

In the U.S., corn and soybeans are the primary crops grown for bio-fuels using fossil fuel-based fertilizers and fossil fuel-based farm equipment. Ethanol plants run on electricity produced by coal and other fossil fuels, and the ethanol is shipped to gas stations using a transportation system that is still primarily based on oil.

Because of these factors, a full analysis of all aspects of bio-fuel production may be needed before they can be considered truly carbon neutral.

Agriculture: Cause, Victim and Solution

What, then, is the solution? As we’ve seen, food security in low-income communities around the world will be most impacted by rising temperatures, but crop yields and the food supply will be impacted in all countries as the climate changes. Agriculture is part of the problem. According to the latest Intergovernmental Panel on Climate Change report, about 13.5 percent of the world’s greenhouse gas emissions come from the global agricultural sector. About 75 percent of global agricultural emissions come from poor countries; agriculture in wealthy countries is responsible for only 25 percent of those emissions.

Overall, the United States is the second-largest and most historic emitter of greenhouse gases in the world—second only to China. Emissions from our cars, power plants and factories make up the majority of our emissions, but farming practices are responsible for a portion of the emissions.

Farms and ranches use chemical fertilizers that release nitrous oxide into the atmosphere, raise livestock and store manure that release methane, and till the soil, releasing carbon dioxide. Carbon dioxide is also released by the fossil fuels used by farm machinery and in storing and transporting food and livestock as it makes its way from farm to table.

However, although U.S. farms and ranches are responsible for only a part of overall greenhouse gas emissions, they are also a victim of the changing weather patterns that climate change brings. U.S. farms and ranches can also play a significant role in efforts to reduce emissions.

What can U.S. farmers and ranchers do? The good news is that the U.S. agricultural sector holds great promise for helping to further prevent and even reverse the effects of the Earth’s changing climate.



©ISTOCK/DIANE DIEDERICH

For example, new technologies make it possible to capture and store methane for conversion into energy, effectively reducing greenhouse gas emissions while creating an alternative form of energy. Rural farming communities also have the space that will be needed to expand the generation of other types of renewable energy, such as wind and solar power. This creates both income for farmers who lease their land and jobs for their communities in building and maintaining new energy infrastructure.

Bio-fuels, such as ethanol and soy diesel, are already generating farm income. Rural economic benefits and potential types of fuels made from trees, plant waste and switchgrass also hold promise for farm and rural economic development. Best practices in soil and crop management like no-till planting, as well as tree planting and grassland restoration, can result in greater amounts of carbon captured and stored, thus decreasing the quantity of its emission into the atmosphere.

Farmers may be reluctant to implement new farming practices because of the increased costs they may incur in order to do so. However, these investments will likely result in a reduction of greenhouse gas emissions and subsequently help our neighbors overseas. They will also have the potential to offer a substantial economic opportunity to farmers as the federal government moves to regulate emissions of carbon dioxide and other greenhouse gases.

Industrial emitters will need to find ways to offset their emissions. They might be able to do this through market mechanisms that establish a price for carbon emissions and through a system of reducing and trading emissions permits (known as “cap and trade”) or other means, such as a carbon tax or regulation of emissions under existing laws such as the Clean Air Act. Farms and ranches offer a way to reduce emissions and store carbon and will have a critical, and potentially financially lucrative, role to play in efforts to address climate change.

Farmers in countries with developing economies also have a key role to play in reducing emissions and can be helped by training and better access to technology. More sustainable practices in forestry, soil and water management, and livestock production can both reduce emissions and make farms more productive and better able to adapt to changing weather conditions. The work of Lutheran development organizations along with our partner churches and organizations in countries with developing economies are already helping to make these changes happen, but more efforts are needed.

In semi-arid parts of central and northern Tanzania, the frequency of extreme weather events, such as droughts and floods is increasing, leading to significant threats to water



supplies and to food production, which is largely rain dependent throughout the region. When crop yields are inconsistent from one year to the next, local food supplies are impacted and with it household food security.

With help from ELCA World Hunger and Global Mission, a local partner organization is working to help farmers adapt to changing weather conditions. The project helps develop infrastructure for harvesting rainwater by gathering and storing rainwater as it runs off surfaces, and aids in the construction of sand dams to store surface water when river levels are higher in the rainy season. This gives farmers access to a stable water supply for irrigation.

Additionally, the project is strengthening local capacity to manage water for agriculture by training farmers in sustainable farming practices that conserve water and soil, such as low-till farming, forestry, and planting of perennial, rather than annual, crops.

How Should We Respond?

Isaiah tells us to seek justice, to feed the hungry and help those living in poverty, to seek a connection with our neighbors and with God. As Lutherans, we heed those words. We support the work of organizations like The Lutheran World Federation and Lutheran World Relief to help farmers around the globe adapt to changing climate conditions and increase food security for their families and their communities.

The challenge of climate change requires not only that we continue our commitment to helping our neighbors but also that we accept new challenges to help protect them, and all of God's creation, from future harms.

As climate change continues and escalates, the world's food supply will become increasingly insecure and hunger within many regions will increase. Globally, the agricultural sector offers major opportunities for reversing some of the effects of climate change and adapting to changing weather patterns in order to secure the world's food supply.

If U.S. farmers adopt more sustainable practices for tilling the soil, managing livestock, and growing crops and taking advantage of opportunities to generate cleaner energy on their lands,

they can be a part of a new and cleaner energy economy that helps to solve the global climate crisis.

In addition, our research institutions and expertise, as well as our international aid programs, can offer assistance to struggling farmers in countries with developing economies as they work to adapt to changes in climate and to mitigate their own emissions of greenhouse gases. These farmers account for 70 percent of the global agricultural sector's emissions but have little ability to develop and adopt better practices that could lead to better food security around the globe.

We are in relationship with our Earth, our only home, and with our neighbors in poverty-stricken regions overseas. Although we have cared for and used the Earth's resources to provide an abundance of staples that helps feed the world, current agricultural practices have also contributed to climate change.

Despite human actions that result in harm to the planet and our suffering neighbors overseas, God is in, with and under the Earth, redeeming it and the rest of creation. We are each called to be God's hands in the world, working to right the relationships that have gone wrong.

Written by Susan Evans and Mary Minette.

Design by Kathryn Brewer, Brewer Communications, Inc.

Produced by ELCA Washington Office and ELCA World Hunger of the Evangelical Lutheran Church in America.

Scripture quotations are from the New Revised Standard Version Bible, copyright © 1989 by the Division of Christian Education of the National Council of the Churches of Christ in the USA and used by permission. All rights reserved.

Web sites linked from this message reflect the positions of the outside organizations and may not necessarily reflect an official position of the ELCA.

Copyright © 2010 Evangelical Lutheran Church in America. All rights reserved.



WHAT CAN YOU DO?

Lutherans have an opportunity to participate in God's redeeming work on this issue of climate change, farming and food security:

Learn more about the issues of climate change, hunger and poverty and help educate others in your congregation and community.

You can find additional resources at www.elca.org/caringforcreation and www.elca.org/hunger.

Advocate for programs that reward farmers for adopting agricultural practices that reduce greenhouse gas emissions and for programs that encourage the development of clean energy sources in rural communities. To learn more about advocacy opportunities, go to www.elca.org/advocacy and sign up for the ELCA e-Advocacy Network.

Support ELCA World Hunger and Global

Mission in their partnerships to help farmers adopt more sustainable practices, adapt to a changing climate and increase local food security by making a donation to the ELCA World Hunger Appeal at www.elca.org/hunger.

Advocate for U.S. international aid pro-

grams that are aimed at promoting more comprehensive and sustainable approaches to food security, including mitigating and adapting to climate change. Learn more about legislative and administrative efforts to better address the needs of small farmers and to improve food security from Lutheran World Relief at www.lwr.org/foodsecurity/.