



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

## Caring for God's creation: CLIMATE CHANGE 101

*The earth is a planet of beauty and abundance; the earth system is wonderfully intricate and incredibly complex. But today living creatures, and the air, soil, and water that support them, face unprecedented threats. Many threats are global; most stem directly from human activity. Our current practices may so alter the living world that it will be unable to sustain life in the manner we know.* (ELCA Social Statement: "Caring for Creation: Vision, Hope, and Justice," 1993)

### STEWARDSHIP GOD'S CREATION

The stresses of climate change are real. It affects practically every fiber of our existence, including health, food security, water, hunger, agriculture, migration and national security. Our goal must be to support policies that safeguard God's creation. **We must address the effects climate change and other environmental factors have on all of creation, but especially on our most vulnerable brothers and sisters. We are challenged to fulfill our moral obligation to future generations.** In Genesis 1, we are commanded to be stewards of all of creation. This is a daunting task, but also an honor entrusted to us by God. We must accept the responsibility and live up to the challenge.

Unfortunately, we have not been great or even good stewards, but opportunities do abound. The condition of the world today is intertwined with rays of hope and human responsibility. This was succinctly stated by His All-Holiness Ecumenical Patriarch Bartholomew, archbishop of Constantinople-New Rome, when he visited Lambeth Palace in England to discuss the climate crisis ahead of the U.N. summit in December 2015:

*"There has never been so much turmoil on our planet, but there has never been greater opportunity for communication, cooperation and dialogue. Basic human rights such as access to water, clean air and sufficient food should be available to everyone without distinction or discrimination. We are convinced that we cannot separate our concern for human dignity, human rights or social justice from the concern for ecological preservation and sustainability."*

### ACTION IS NEEDED AT THIS MOMENT, BUT WHAT MUST BE DONE?

**We must implement measures to alleviate greenhouse gas emissions and make sure our communities are equipped to adapt to the impacts of climate change.** Combating climate change is the responsibility of every individual and every nation. At the worldwide level, this needs to be a global cooperative effort. At the individual level, each person has an important role to play. *(See page 4 for more information.)*

The most powerful tool in our toolsheds is prayer. We do live in a time of conflict, uncertainty and crises. Amid all of this there is eternal hope and guidance from Jesus Christ. Let us pray.

***"O God, where hearts are fearful and constricted, grant courage and hope. Where anxiety is infectious and widening, grant peace and reassurance. Where impossibilities close every door and window, grant imagination and resistance. Where distrust twists our thinking, grant healing and illumination. Where spirits are, daunted and weakened, grant soaring wings and strengthened dreams. All these things we ask in the name of Jesus Christ, our Savior and Lord. Amen."*** (ELW p. 76)

## CLIMATE, WEATHER, GLOBAL WARMING AND CLIMATE CHANGE - WHAT'S THE DIFFERENCE?<sup>1</sup>

According to the National Aeronautic Space Administration (NASA) **WEATHER** is the short-term changes we see in temperature, clouds, precipitation, humidity and wind in a region. The **CLIMATE** of a region is its weather averaged over many years.

**CLIMATE CHANGE** is any long-term change in the earth's climate, or in the climate of a region. This includes warming, cooling, and changes besides temperature. The [United Nations Framework Convention on Climate Change](#), in its Article 1, defines climate change as: "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."




## WHAT IS GLOBAL WARMING AND HOW DOES IT AFFECT CLIMATE CHANGE?

**GLOBAL WARMING** is the long-term increase in the Earth's average temperature. The main cause of global warming is the **greenhouse effect**. The greenhouse effect occurs when **greenhouse gases** trap heat radiating from the earth to space. This causes the earth's temperature to increase (warm).

## WHAT ARE GREENHOUSE GASES?<sup>2</sup>

## WHAT CAUSES CLIMATE CHANGE?<sup>3</sup>

The earth's temperature depends on a balancing act with the earth absorbing energy in the form of heat (warming) from the sun and releasing energy back to space (cooling). There are several factors that causes the earth's temperature to rise or fall:

-  1) Variations in the [sun's energy](#) reaching earth;
-  2) Changes in the [reflectivity](#) of the earth's atmosphere and surface; and
-  3) Changes in the [greenhouse effect](#), which affects the amount of heat retained by earth's atmosphere.

There has been a dramatic increase in carbon dioxide concentration in the atmosphere since 1950, primarily due to human activity.

## GREENHOUSE GASES ARE...

**"Water vapor.** The most abundant greenhouse gas. It increases as the Earth's atmosphere warms, but so does the possibility of clouds and precipitation, making these some of the most important feedback mechanisms to the greenhouse effect.

**"Carbon dioxide.** A minor but very important component of the atmosphere. It is released through natural processes, such as respiration and volcano eruptions, and through human activities, such as deforestation, land use changes and burning fossil fuels. Humans have increased atmospheric CO<sub>2</sub> concentration by more than a third since the Industrial Revolution began. This is the most important long-lived "forcing" of climate change.

**"Methane.** A hydrocarbon gas produced both through natural sources and human activities, including the decomposition of wastes in landfills and agriculture, especially rice cultivation, as well as ruminant digestion and manure management associated with domestic livestock. On a molecule-for-molecule basis, methane is a far more active greenhouse gas than carbon dioxide but is much less abundant in the atmosphere.

**"Nitrous oxide.** A powerful greenhouse gas produced by soil cultivation practices (especially the use of commercial and organic fertilizers), fossil fuel combustion, nitric acid production and biomass burning.

**"Chlorofluorocarbons.** Synthetic compounds of industrial origin used in many applications but now largely regulated in production and release to the atmosphere by international agreement due to their role in destroying the ozone layer."<sup>3</sup>

H<sub>2</sub>O

CO<sub>2</sub>

CH<sub>4</sub>

N<sub>2</sub>O

CFCS

## WHAT IS THE EVIDENCE THAT CLIMATE CHANGE IS HAPPENING?<sup>4</sup>

The Intergovernmental Panel on Climate Change and NASA scientists state unequivocally that climate change is real. There is compelling evidence supporting climate change, as shown below.

### "SEA LEVEL RISE.



Global sea level rose about 8 inches in the last century. The rate in the last two decades is nearly double that of the last century.

### "GLOBAL TEMPERATURE RISE.

The earth has warmed since 1880. Most of the warming occurred in the past 35 years.



### "WARMING OCEANS.

The oceans have absorbed much of this increased heat, with the top 700 meters (about 2,300 feet) of ocean showing warming of 0.302 degrees Fahrenheit since 1969.

### "SHRINKING ICE SHEETS.

The Greenland and Antarctic ice sheets have decreased in mass.

### "DECLINING ARCTIC SEA ICE.

Both the extent and thickness of Arctic sea ice has declined rapidly over the last several decades.



### "GLACIERS RETREAT.

Glaciers are retreating almost everywhere around the world – including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa.

### "EXTREME EVENTS.

The number of record high-temperature events in the United States has been increasing, while the number of record low-temperature events has been decreasing since 1950. The U.S. has also witnessed increasing numbers of intense rainfall events.



### "OCEAN ACIDIFICATION.

Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. This increase is the result of humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the oceans. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year.

### "DECREASED SNOW COVER.

Satellite observations reveal that the amount of spring snow cover in the Northern Hemisphere has decreased over the past five decades and that the snow is melting earlier."



## HOW DOES CLIMATE CHANGE AFFECT LIFE ON EARTH?<sup>5/6</sup>

### Health hazards

The Centers for Disease Control and Prevention states that climate change poses safety and health hazards. Hazards for human health include:

- air pollution
- allergens
- wildfires
- temperature extremes
- precipitation extremes
- diseases carried by vectors (ex: mosquitoes)
- food and waterborne diarrheal disease
- food security
- mental health / stress-related disorders

### Agriculture and food supply

The U.S. Environmental Protection Agency stated that climate change affects the food supply, even in the United States. Types of food supplies affected include:

- crops
- livestock
- fisheries
- international food supply and security (*which leads to humanitarian crises and national security concerns*)

### Ecosystems

Ecosystems are affected by climate change in the following ways:

- changes in the timing of seasonal life cycle events**
- animal and plant habitat range shifts**
- food-web interruptions**
- damage to natural buffers for extreme events**
- increased pathogens, disease and parasites**
- increased risk of certain species becoming extinct**

### Forests

Climate change impacts our forests in these ways:

- growth and productivity**
- insect outbreaks and invasive species**

### Transportation

These forms of transportation risk "delays, disruptions, damage and failure due to climate change:

- land-based transportation**
- air transportation**
- marine transportation**

### Energy

Energy is important to the wellbeing of communities. Climate change alters our energy supply and demand due to these factors:

- temperature increases**
- water resource availability**
- sea level rise, storm surge and extreme events**
- wind speed, cloud cover and renewable energy**

### Society

Climate change results in changes in society, including:

- increased vulnerability and social inequalities**
- disruption of economic activities and services**

### Water resources

Climate change modifies all of the ways we interact with water:

- water cycle and water demand**
- water supply**
- water quality**
- water resources for various sectors**

## **HOW IS CLIMATE CHANGE CONNECTED TO HUNGER AROUND THE WORLD?\***

The effect of climate change falls, and will continue to fall, most heavily on the people around the world who are least able to mitigate the effects – people living in poverty. As a leading industrialized nation that has disproportionately contributed to greenhouse-gas emissions, it is incumbent upon the United States to rectify this injustice.

[ELCA World Hunger](#) has helpful resources for you to use in your congregation and community as you explore the reality of climate change and its connection to hunger.



## WHAT CAN OUR GLOBAL COMMUNITY DO TO COMBAT CLIMATE CHANGE?

**Only together can we fulfill God's call to be stewards of the earth.** Governments at every level, private companies, families and individuals all have steps to take to combat climate change. Here are just a few:

**GOVERNMENTS: CONTINUE COOPERATION AND COMMITMENT TO REDUCE GREENHOUSE-GAS EMISSIONS.** Countries around the world entered into the [Paris Agreement](#), which went into effect on Nov. 4, 2016. All the countries agreed to work to limit global temperature rise to well below 2°C (a goal of 1.5°C or less). In order to reach this goal, our governments must continue to work together and remain committed to the Agreement.

**ENERGY SECTOR: IMPLEMENT ENERGY EFFICIENCY MEASURES AND SWITCH TO RENEWABLE ENERGY SOURCES.**

**FOREST SECTOR: IMPROVE FORESTATION MANAGEMENT PRACTICES** such as reducing emissions from deforestation.

**INDIVIDUALS: BECOME EDUCATED ABOUT CLIMATE CHANGE, THEN EDUCATE YOUR COMMUNITY.** We must become educated about climate change. The U.N. Educational, Scientific and Cultural Organization (UNESCO) has more than 30 programs in the sciences, education, culture and communication to assist in creating knowledge, in educating and in communicating about climate change, and understanding the ethical implications for present and future generations.<sup>8</sup>

**MAKE SIMPLE CHANGES IN YOUR HOME.** Small measures, such as installing energy efficient lighting and appliances, and high energy efficiency heating and cooling systems are great ways to start. Check out the [Energy Star Program](#) for other measures.

**REDUCE YOUR WASTE.** When you avoid purchasing items that eventually end up in the trash, you prevent not only polluting the earth, but also the air. Waste sent to landfills produce methane.

## RESOURCES

1. NASA, "What are Climate and Climate Change?," <https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-climate-change-58.html>.
2. NASA, "A Blanket Around the Earth," <https://climate.nasa.gov/causes/>.
3. USEPA, "Causes of Climate Change," [https://19january2017snapshot.epa.gov/climate-change-science/causes-climate-change\\_.html](https://19january2017snapshot.epa.gov/climate-change-science/causes-climate-change_.html).
4. NASA, "Climate change: How do we know?," <https://climate.nasa.gov/evidence/>.
5. CDC, "Climate Effects on Health," <https://www.cdc.gov/climateandhealth/effects/>.
6. USEPA, "Climate Change Impacts by Sector," [https://19january2017snapshot.epa.gov/climate-impacts/climate-change-impacts-sector\\_.html](https://19january2017snapshot.epa.gov/climate-impacts/climate-change-impacts-sector_.html).
7. ELCA World Hunger, [ELCA.org/hunger](http://ELCA.org/hunger).
8. UNESCO, "Addressing Climate Change," <http://en.unesco.org/themes/addressing-climate-change>.