

N A E | National Association of

Evangelicals

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Galen Carey

Loving the

Least of These

Addressing a
Changing Environment



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Loving the Least of These: Addressing a Changing Environment

A resource of the National Association of Evangelicals

The mission of the National Association of Evangelicals is to honor God by connecting and representing evangelical Christians. Founded in 1942, the NAE includes around 40 denominations and thousands of churches, schools and nonprofits, and serves a constituency of millions. The NAE provides resources, connection and influence to help evangelicals foster thriving communities and navigate complexity with biblical clarity. For more information about the NAE, visit [NAE.org](https://www.nae.org).

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Loving the Least of These

Foreward Walter Kim

Jesus certainly knows how to grab our attention. As the Gospel of Luke recounts, when Jesus entered the synagogue to begin his public ministry, he “stood up to read, and the scroll of the prophet Isaiah was handed to him. Unrolling it, he found the place where it is written: ‘The Spirit of the Lord is on me, because he has anointed me to proclaim good news to the poor. He has sent me to proclaim freedom for the prisoners and recovery of sight for the blind, to set the oppressed free, to proclaim the year of the Lord’s favor’” (Luke 4:16–19).

Then with a dramatic pause and the eyes of everyone fastened upon him, Jesus declared, “Today this Scripture is fulfilled in your hearing” (4:21).

While the good news is indeed for the whole world, Jesus expressed from the beginning his particular concern for the least and last among us. This is more than a spiritual metaphor. The vulnerable are the most and first on his mind.

Although the changing environment impacts all of us, the disproportionate devastation upon the most defenseless must break God’s heart. Creation, although groaning under the fall, is still intended to bless us. However, for too many in this world, the beach isn’t about sunscreen and bodysurfing but is a daily reminder of rising tides and failed fishing. Instead of a gulp of fresh air from a lush forest, too many children take a deep breath only to gasp with the toxic air that has irritated their lungs.

At the National Association of Evangelicals, we believe that the good news of Jesus encompasses all of life and empowers us to face the deepest challenges. We wish to navigate the complexities of our times with biblical clarity and a deep love that reflects God’s own heart for this world, especially for those least able to enjoy its blessings.

In these pages you will discover the Body of Christ applying various gifts and pursuing a common call to glorify God and manifest Christ’s love to the most vulnerable. Scientists, missionaries, pastors, community activists, biblical scholars and evangelical leaders contributed to and reviewed this work. This is a labor of love on behalf of those whom we are called to love.

Loving the Least of These

The challenges are great and the issues complex. We trust that you will find much here to stimulate your thinking and prompt your acting.



Walter Kim has been president of the National Association of Evangelicals since 2020, after serving as a pastor at Trinity Presbyterian Church in Charlottesville, Virginia, and at Park Street Church in Boston, Massachusetts. Kim received his Ph.D. from Harvard University in Near Eastern Languages and Civilizations, his M.Div. from Regent College in Vancouver, and his B.A. from Northwestern University.

A Note From the Author Dorothy Boorse

A great deal has happened since the first edition of this report was released in 2011. Between then and today (2022), world population increased from 7 to 7.9 billion people at the same time that millions were pulled out of poverty, at least before the global COVID-19 pandemic.¹ Deaths from malaria dropped worldwide and the first anti-malarial vaccine was produced.² More people gained access to sanitation and safe water. China, the most populous country, saw the disposable income of its inhabitants more than double.³

The COVID-19 pandemic swept the globe in 2020, shutting down economies, infecting more than half a billion people and killing more than 6 million people over the course of two years.⁴ This pandemic became “one of the greatest humanitarian issues in recorded history,” reported World Relief, the humanitarian arm of the National Association of Evangelicals. More than 97 million people fell into severe poverty, wiping out between three and four years of progress in poverty alleviation and driving millions into severe food insecurity. Hundreds of millions of children lost schooling, especially where remote education was unavailable.⁵ In the United States, around 10 million people lost their jobs, particularly in the low wage service sector. The number of people lacking food increased, inflation rose, and the gap between the wealthiest and poorest members of society widened.⁶ These realities increase the urgency to understand the impacts of a changing environment on those who are increasingly vulnerable.

Changes have occurred in the nonhuman parts of creation since 2011 as well. Many of those changes relate to an increase in the heat energy contained in the Earth’s oceans and atmosphere. Massive wildfires broke out in Australia, Russia and western North America.⁷ Giant sequoia trees in the Pacific Northwest of America began to die from drought and heat.⁸ Unpredictable rain and larger storms have increased flooding⁹ at the same time that deforestation has left mountainsides vulnerable to mudslides.¹⁰ Sea level rise has caused human displacement.¹¹ While in 2011, some people may have doubted that these phenomena were occurring, the effects of increased thermal energy in the atmosphere are now more apparent, and

increased numbers of Americans are concerned about climate change.¹²

Changes have also occurred among evangelicals in relation to creation care. The 2011 edition of “Loving the Least of These” noted The Cape Town Commitment, a document developed by global evangelical leaders in which creation care is described as part of the Great Commission.¹³ The Cape Town Commitment catalyzed collaboration among evangelicals and a global creation care network,¹⁴ including the Lausanne/WEA Creation Care Network, now active in more than 130 countries.¹⁵ Young American evangelical leaders formed Young Evangelicals for Climate Action, a wing of the Evangelical Environmental Network, in 2012. Many more churches and other Christian organizations started initiatives to address the changing environment. The NAE has followed environmental changes and how they affect our brothers and sisters around the world, releasing a resolution about climate change in 2015.¹⁶

This edition of “Loving the Least of These” covers some of the changes since the first edition in 2011 and highlights the need for action now. Our environment, changing in so many ways, requires our attention. This document covers four ideas: a biblical basis for Christian engagement, a look at changing environments around the world, insight into how environmental variability and extremes affect poverty conditions, and thoughts on what Christians should do about our rapidly changing environment. Each section includes reflection from an expert, and examples from people working with the issues are sprinkled throughout.


Dozens of people provided information and advice and reviewed the first edition of the document. This second edition added even more expert reviewers and advisers. Thanks to all of them! All main text quotes, except those cited from a published source, are from phone and email interviews I conducted.



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A Note from the Author



 **Figure 1.** Wildfires, such as this 2018 fire in California's Los Angeles and Ventura counties, burned in many places around the world.

Introduction

In the summer of 2021, a heat wave in western North America shattered the record books. In the small town of Lytton, British Columbia, the highest temperature ever measured in Canada was recorded at 121 degrees Fahrenheit (49.4 degrees Celsius) — something most would expect only to see in places like Death Valley, California.¹⁷ The heat wave also marked the deadliest weather-related event in the history of Washington state, officially claiming the lives of 112 Washingtonians. Over the heat wave's two-week span, a total of 1,400 heat-related deaths were reported across western Canada and the northwestern United States.

Further south, the 2021 fire season in the western United States was longer and more dangerous than in most other years, in part due to extreme heat, low precipitation and low snowpack exacerbated by ongoing drought. California alone experienced almost 9,000 fires that burned almost 2.6 million acres of land.¹⁸ Few people died, but thousands of buildings were burned and hospitalizations increased more than 10 percent due to poor air quality as toxic smoke engulfed the western United States and spread east. In July 2021, plumes of haze from California fires were visible on satellite images as smoke was pulled all the way to the Atlantic Ocean by high air currents.¹⁹

North America was not alone in experiencing an outbreak of dangerous extreme weather. Fires in 2019, 2020 and 2021 flared around the rest of the world as well.²⁰ Massive fires blazed in Russian peatlands, Indonesian forest, Greece, the Amazon basin, and countries in North Africa. The Australian wildfires of 2019–2020 burned so strongly that enormous pyrocumulonimbus clouds formed as intense heat from land created hot updrafts of wind. These masses of hot air carried plumes of smoke higher than have ever been recorded. Smoke from the fires affected 80 percent of Australians, or about 20 million people, and even destroyed some of the ozone layer.²¹ As many as 3 billion animals, including an estimated 61,000 koalas, were killed or displaced by the fires.

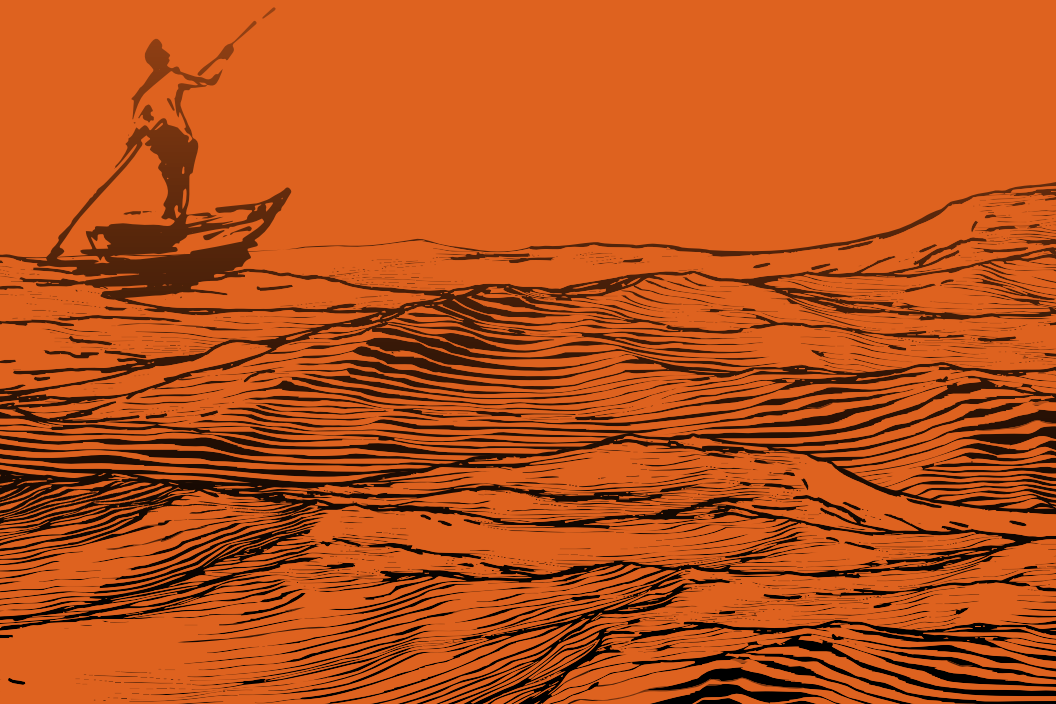
As Christians, we know that God loves his world and the people he created. He placed us in a special role as caretakers of this earth. We are to encourage the

fruitfulness of all God's creatures and promote the flourishing of humanity. As we will see, rapid changes in our environment increase dangers such as flood, sea level rise and the spread of disease, in addition to fires.

Humanity depends on healthy natural systems to survive. When one part of an ecosystem experiences degradation, the result can be felt in other systems as well. You and I, along with nearly 8 billion humans, occupy a world increasingly stressed by our activities — a world which could heal with more care. Let's look first at what the Bible tells us about humanity and our relationship to the rest of God's world.

Section 1:

**A BIBLICAL BASIS FOR
CHRISTIAN ENGAGEMENT**



Evangelicals look to the Bible for guidance in all areas of life. What can the Bible say to us in this world where pollution, heat waves, floods and droughts are frequent? The Bible does not tell us anything directly about how to evaluate scientific reports or how to respond to a changing environment, but it does give several helpful principles: Care for creation, love our neighbors and witness to the world.

LOVE GOD, CARE FOR CREATION

One of the best places to start is with Jesus' summary of the Old Testament:

“Teacher, which is the greatest commandment in the Law?” Jesus replied: “‘Love the Lord your God with all your heart and with all your soul and with all your mind.’ This is the first and greatest commandment. And the second is like it: ‘Love your neighbor as yourself.’ All the Law and the Prophets hang on these two commandments” (Matthew 22:36–40).

For evangelicals, loving God means spending time in worship and prayer. This is foundational. And there is another way to express our love for God. Jesus tells us: “If you love me, keep my commands” (John 14:15).

Loving God means obeying. This includes caring about what happens to God's creation, because God cares about it and because God gave us the job of caring for it (Genesis 2:15). We worship God by caring for creation. We don't worship creation. God created the world for his glory:

LORD, our Lord, how majestic is your name in all the earth! You have set your glory in the heavens (Psalm 8:1; see also Psalm 19).

God gave humans a special place in that creation, as we can see in the same passage: “You made them rulers over the works of your hands; you put everything under their feet” (Psalm 8:6).

Stewardship and Reconciliation

The term “stewardship” is often used to describe our relationship to the Church and

the gifts of our time, talent and treasure. This term is also used to describe human care and use of God's creation. We are like the servants in the parable of the talents (see Matthew 25:14–30). John Calvin understood the concept of stewardship:

Let him who possesses a field, so partake of its yearly fruits, that he may not suffer the ground to be injured by his negligence; but let him endeavor to hand it down to posterity as he received it, or even better cultivated. Let him so feed on its fruits that he neither dissipates it by luxury, nor permits it to be marred by neglect. Moreover, let everyone regard himself as the steward of God in all things which he possesses.²²

In 2015, the National Association of Evangelicals issued a resolution on caring for God's creation, which includes the following:

In solidarity with evangelical leaders from around the world, we endorse the creation care principles outlined in the Lausanne Cape Town Commitment, which states:

All human beings are to be stewards of the rich abundance of God's good creation. We are authorized to exercise godly dominion in using it for the sake of human welfare and needs. ... As we do so, we are also commanded to care for the earth and all its creatures, because the earth belongs to God, not to us. We do this for the sake of the Lord Jesus Christ who is the creator, owner, sustainer, redeemer and heir of all creation.²³

The earth brings glory to God, and God continues to care for and sustain the natural processes of the world. The psalmist says: "Praise the LORD, all his works everywhere in his dominion. Praise the LORD, my soul" (Psalm 103:22). Because God's glory is revealed in creation, we should be intentional about caring for his artistry.

In addition to "stewardship" as a description of our care for creation, the term "reconciliation" also applies. Because of human sin (see Genesis 3:17–19), our

relationships are broken with God, each other, ourselves and the rest of creation. God has a plan to reconcile “all things” as it says in Colossians 1:19–20:

For God was pleased to have all his fullness dwell in him, and through him to reconcile to himself all things, whether things on earth or things in heaven, by making peace through his blood, shed on the cross.

We are a part of that reconciling work. Promoting stewardship and reconciliation calls us to plan ahead and to use our God-given gifts, abilities and natural resources to care for this world in a way that honors God’s plan to reconcile all things to himself. In today’s reality, that includes considering the way our environment is changing.

God’s Sovereignty

While it may be tempting, it is unwise to assume that God would prevent us from drastically harming the earth. God is sovereign, yet he allows us to experience the natural outcomes of our actions. God lets us make poor decisions about our household budgets. He allows us to eat poorly or abuse our bodies with drugs. Likewise, even though God cares and provides for the creatures of the earth, humans have the freedom to make decisions that harm even the basic functions of ecosystems, such as polluting the oceans and deliberately or carelessly setting forest fires. God does not always shield us from the consequences of our actions in other areas of our lives, and we should not assume that he will do so when we are unfaithful stewards of the earth.

LOVE GOD, LOVE YOUR NEIGHBOR

In Matthew 22:39, Jesus gave us a second command: “Love your neighbor as yourself.” For us to be faithful in loving God, we must love our neighbor. In Luke’s account of the same incident, a bystander asks, “But who is my neighbor?” thus setting the stage for one of the best-known of all Jesus’ parables: the story of the Good Samaritan. “Loving my neighbor,” according to the parable, includes responding to the needs of someone who has been hurt. We are to feed him, clothe

him, care for his wounds and provide for him.

Care for people who are poor or oppressed is a resounding theme in both the Old and New Testaments, as, for example, in Deuteronomy 15:10–11:

Give generously to them and do so without a grudging heart; then because of this the LORD your God will bless you in all your work and in everything you put your hand to. There will always be poor people in the land. Therefore, I command you to be open-handed toward your fellow Israelites who are poor and needy in your land.

God gave the Israelites structures and rules that established provision for the poor. Relatives were to redeem sold land and support widows; cloaks could not be kept in pledge; poor people could glean in the fields. We are told to care for those who are hungry and thirsty, even if they are our enemies (see Proverbs 25:21–22; Romans 12:20).

Nothing could be clearer than Jesus' words in Matthew 25:36–46. Jesus tells his disciples that on Judgment Day, we will stand before God and answer for the way we treated those who were hungry, naked and sick, and for those who were strangers and prisoners: "Truly I tell you, whatever you did for one of the least of these brothers and sisters of mine, you did for me" (25:40). And, on the other hand, Jesus says, "Truly I tell you, whatever you did not do for one of the least of these, you did not do for me" (25:45). When we care for those who have little, we are ministering to Jesus himself: To care for the weakest is to care for Christ.

As followers of Jesus, we need to respond to the suffering of those most directly affected by the degradation of God's creation. In coming sections, we will see how climate change interacts with other challenges people face. We will also learn about solutions that combine relief, development, poverty alleviation and creation care.



Real World Example Vineyard Columbus

Jenney Rice, pastor of community outreach at Vineyard Columbus, leads a stewardship program at the growing, multi-campus church. Three prongs define the church's focus on creation care:

- The theological understanding of God as Creator and humans as God's image-bearers;
- The practical value of energy- and cost-reducing actions and outdoor activities; and
- The value of outreach to their community.

Vineyard Columbus has dived into creation care with an interest group, book reading, better purchasing of energy- and water-efficient goods, and a community garden. The garden is near the church's food pantry, which is another way the church lives with and cares for its neighbors.

LOVE GOD, WITNESS TO THE WORLD

Spreading the good news is a high priority for evangelicals, and rightly so. Jesus said, “Therefore go and make disciples of all nations, baptizing them in the name of the Father and of the Son and of the Holy Spirit, and teaching them to obey everything I have commanded you” (Matthew 28:19–20).

The Lausanne Movement was founded in 1974 by evangelicals such as Billy Graham and John Stott to “unite all evangelicals in the common task of the total evangelization of the world.”²⁴ In 2010, the Lausanne Congress on World Evangelization developed The Cape Town Commitment, which offers three basic principles: Human beings are lost; the gospel is good news; and the Church’s mission goes on.

The Cape Town Commitment also recognizes that our care of creation affects our witness to the world. The document states:

The earth is created, sustained and redeemed by Christ. We cannot claim to love God while abusing what belongs to Christ by right of creation, redemption and inheritance. We care for the earth and responsibly use its abundant resources, not according to the rationale of the secular world, but for the Lord’s sake. If Jesus is Lord of all the earth, we cannot separate our relationship to Christ from how we act in relation to the earth. For to proclaim the gospel that says “Jesus is Lord” is to proclaim the gospel that includes the earth, since Christ’s lordship is over all creation. *Creation care is thus a gospel issue within the lordship of Christ*²⁵ (emphasis added).

The document continues with a description of what mission looks like when creation care is included, saying:

We support Christians whose particular missional calling is to environmental advocacy and action, as well as those committed to godly fulfillment of the mandate to provide for human welfare and needs by exercising responsible dominion and stewardship. The Bible declares God’s

redemptive purpose for creation itself. Integral mission means discerning, proclaiming, and living out the biblical truth that the gospel is God's good news, through the cross and resurrection of Jesus Christ, for individual persons, and for society, and for creation. All three are broken and suffering because of sin; all three are included in the redeeming love and mission of God; all three must be part of the comprehensive mission of God's people.

Moved by God's love for the vulnerable, evangelicals are quick to give when disaster strikes. In 2017, after hurricanes Harvey and Irma pounded coasts from Florida to Texas, Christian relief organizations provided more aid than FEMA, the federal agency charged with disaster recovery in the United States. Churches provided food. Convoys of trucks brought necessities. Samaritan's Purse, a Christian aid organization, arrived with chainsaws and hammers to clear trees and patch roofs. Methodists helped people navigate government aid forms, and evangelicals of many other affiliations cheerfully joined in the tasks.²⁶

People need to see not only our witness in relief efforts after a disaster but

also that we understand what causes natural disasters to be so terrible. They need to see not only that we will clean up after the disaster but also that, whenever possible, we will help prevent situations that displace millions.

Many Christian development



Figure 2. Nigerians tend a tree planted to stabilize soils as part of a reforestation project. Many Christian organizations already include creation care, including climate change adaptation, as a part of their work. *Photo courtesy of World Vision.*

organizations include restorative environmental actions such as forestation in their anti-poverty efforts. Planting crops and trees that can tolerate drought, salt, heat and flooding will continue to be a critical part of lowering greenhouse gas emissions. More of these programs are needed. In the next section, we'll discover how changes in the environment are threat multipliers for people who experience poverty around the world. Recognizing and addressing this reality will strengthen our witness.

A Pastor's Perspective Bishop Timothy Clarke

Upon invitation, I wrote an article for the Faith and Religion section of my local paper, *The Columbus Dispatch*.²⁷ I agreed for two reasons. First, I doubted many would read it, so even if I were way off, only my congregants and people who like me would see it. The other reason was that there was something I wanted to say, that I felt needed to be said.

In the midst of national unrest in September 2021, I wrote about three opportunities that the Church had to make a mark on the world. One of those opportunities was to speak to the issue of climate change and its impact on our communities, nation and world. Surprisingly, the article was read! My thoughts on climate change received the greatest response.

There were readers who felt that I had been deceived and brainwashed by the “liberal agenda,” and others who said that they did not think a preacher, especially an African American preacher, even thought about climate change. In answer to that, let me say, “I have not been, and we do!”

In light of that reality, I want to address the impacts of climate change and other environmental threats as they relate to the African American community. Remember that the African American community both as a whole, even the faith community, is not monolithic. Regarding this issue, there are some in our community who are very informed and involved. Others are uninformed and unconcerned; those are the ones that must be reached and here is why.

There is an old adage about geopolitical connections: “When America gets a cold, the rest of the world gets pneumonia.” It is in some ways true of many Blacks in this country. Restrictions on housing loans, prejudice in hiring, injustices in access to education and other discriminatory actions have left many Black Americans without the financial resources that parents might pass down to children. Blacks are less likely to afford the costs of adapting to heat waves, evacuating in a disaster or moving out of flood-prone areas. Living in poorer neighborhoods means that highways, factories and power plants are more likely to be sited close by.

Climate change is affecting America, and it is impacting Blacks more than many others.

Whatever impact global warming has, either environmentally, economically or in terms of health, the disparity of that impact will likely be felt in the lives of minorities first and most fiercely. So as a Black man and a Black pastor, I have an obligation to shepherd my flock and to give them both information and motivation to be aware of and engaged in the issues of climate change.

Often people ask me, especially in the aftermath of the summer of 2020, “What do Black folk want?” My response often is, “The same things you want.” They want, we want, I want: safe communities, clean water, a bright future for their children, the promise of tomorrow. Those very desires are often denied to many of us. Climate change is yet another threat to their realization in our lives. What we want is what every human being wants and should have: a world as God created it to be. That ought to be our goal, and I believe it is part of the Church’s mission.

This issue of climate change is real. It is not a hoax. It is not a straw man. Changing climate is not, or at least should not be, a liberal versus conservative issue. It should not only be addressed by the scientific community or the political community; it must be addressed by the faith community as well.

If anyone ought to speak to the issue of the environment and the impact of climate change, it should be the Church. There are three reasons I believe that to be the case.

1. Scripturally — The Church has more at stake in this discussion than anyone simply because, as we often brag, “We are people of the book,” the book being the Bible. The Bible forms our theology, and the Bible teaches us that God created the heavens and earth and all that is in them. In my childhood church, we used to sing, “This is My Father’s World.” One line went, “This is my Father’s world, and to my listening ears, all nature sings, and around me rings the music of the spheres.” Because this is God’s world and we are his people, then what happens in and to that world should be of utmost concern to us.

2. Socially — Paul reminds us that we are ambassadors for Christ — the light of the world and the salt of the earth. As such, we must seek to work with those seeking to do good in God’s world, and while we may not always fully agree with all they do, the places and points that we do agree is where we must stand and serve. All of us can agree that everyone in the world deserves clean drinking water, fresh air and a safe environment. That is not a liberal or conservative, Democrat or Republican position. It is right; it is fair; it is just. Jesus reminds us that while we are not of the world, governed and guided by it, we are in the world and we are in the world for good.
3. Sacrificially — At the heart of the Church’s response to climate change must be this idea of sacrificial love and service, or another church word, “stewardship.” We are called to steward the earth and her resources, to steward what God has entrusted to us, and to return it to him in a way that honors and glorifies him.

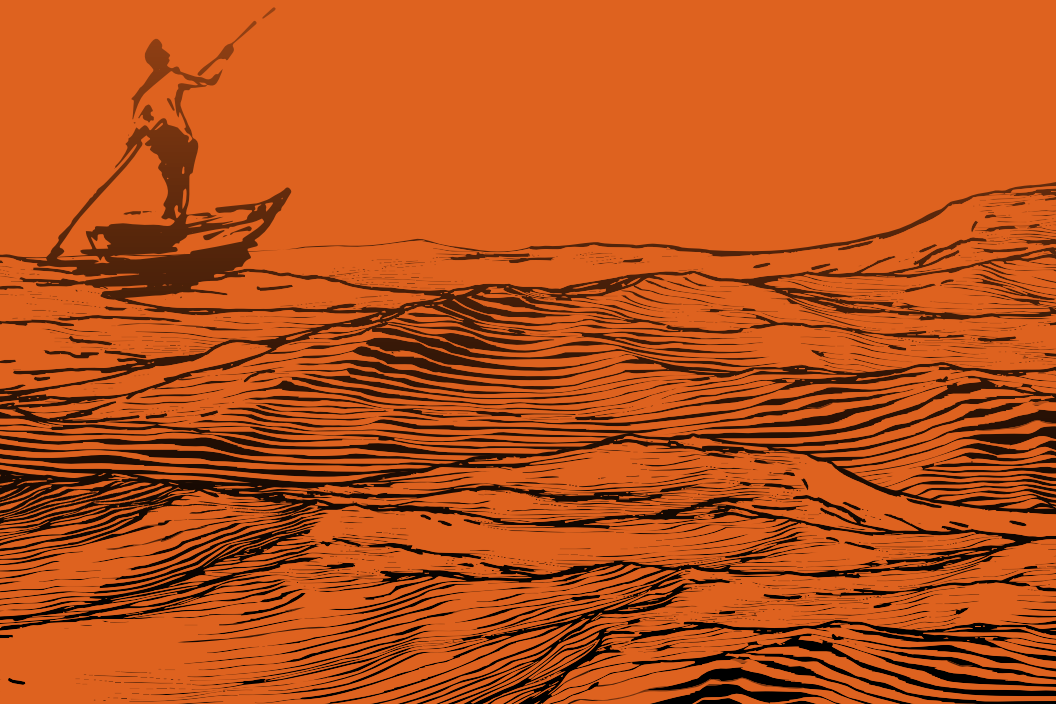
The Church has an opportunity — an open door as it were — to partner, to participate and to prove to the world who we are, what we believe, and who we represent.



Timothy J. Clarke is senior pastor of First Church of God and bishop of BEREAN Fellowship of Churches. He holds a D.Div. from Anderson University, a D.Hum. from Wilberforce University and a D.Div. from Mid-America Christian University. He is also a graduate of Southern California School of Ministry, Graduate Theological Foundation and Princeton Theological Seminary.

Section 2:

A CHANGING ENVIRONMENT



Climate change is more complicated than commentators and journalists often admit. Yet seeking to understand it is important, because climate impacts our responsibilities as Christians. In this section, we look at the science underlying our understanding of climate, discuss what research suggests about the future of Earth's climate, consider how to untangle scientific controversies and hear the faith journey of a Christian climate scientist.

THE BASIC SCIENCE

Climate is a combination of average weather patterns occurring in a region over a long time. These include factors such as humidity, temperature, windiness, cloudiness and precipitation. It is determined by the balance between absorbed solar energy and the energy emitted to space by Earth's surface and atmosphere.

The basic science of the Earth's surface temperature, and thus the climate, has been known for 200 years.²⁸ "Greenhouse gasses" (such as water vapor, carbon dioxide and methane) absorb infrared or "heat" radiation from the Earth's surface. This trapped energy acts a bit like a blanket, warming the Earth's surface in a phenomenon called the "greenhouse effect." Without this natural warming effect, life on Earth would not be possible.

Climate is dynamic, not static, and it changes over time due to external drivers (called "forcing factors") and natural internal variability.²⁹ Some of these changes happen on time scales and through processes that are easy to understand. For example, each year, the seasonal cycle of climate change is driven by Earth's rotation around the sun and the tilt of its axis.³⁰ Occasionally, large volcanic eruptions temporarily cool Earth by creating particle clouds that reflect solar radiation.³¹ Internal changes alter the distribution of energy in the ocean and atmosphere; for example, the El Niño-Southern Oscillation periodically creates pockets of warmer or cooler water in parts of the oceans, which affects some sea surface temperatures and mid-latitude weather. Within an 11-year span, sunspot cycles can cause small variations in climate.³²

These processes are well understood, even if they are not entirely predictable.

Over the last 1,000 years, the Earth's climate record has shown a lot of natural variability. Natural cycles and events, such as those mentioned above, greatly affect short-term variability. However, the global average temperature has risen at a rate that is greater than natural variability can explain. Evidence suggests that an increase in carbon dioxide and other greenhouse gasses accounts for most of the warming over the last 50 years.³³

Since the Industrial Revolution of the 19th century, when fossil fuels began to be widely used as energy sources, carbon dioxide (the primary greenhouse gas that is released when fossil fuels are burned) has increased by about 50 percent in the atmosphere.³⁴ When caused by humans, such factors that affect climate, like the increase in carbon dioxide emissions, are called “anthropogenic (human-caused) forcing factors.”³⁵

Much of the current debate in our society about climate change is about the relative importance of natural and human-caused factors. Is the recent change in Earth surface temperature due solely to natural forcing factors and internal variability? Those who take this approach tend to minimize the role of human activity in affecting the environment. Others attribute recent climate change almost exclusively to human activities, such as methane and carbon dioxide emissions and human-caused deforestation. Those who take this approach may fail to sufficiently recognize the effects of natural factors.

In contrast to the way climate change debates are often portrayed in the media, scientists who study climate rarely attribute climate variability exclusively to either natural or human forcing factors. Instead, they compare and evaluate the two. In the short term, natural variability is most likely to play the largest role. Natural cycles in wind and ocean currents cause the El Niño/La Niña cycles for example, which affect global temperatures and regional weather. On timescales of multiple years to decades or longer spans, human activity is almost certainly the dominant driver. One way to visualize these two effects is that natural variability (and intermittent volcanic eruptions) produce large, year-to-year changes in regional and global climate, resulting in a sometimes warmer- and sometimes colder-than-

average climate. Underlying this year-to-year variability is an accelerating increase in Earth's land and ocean surface temperatures and an increase in extremes of the hottest periods due to human activity.

This is explained in the article, "Climate Change: How Do We Know?" by the National Aeronautics and Space Administration (NASA):

The current warming trend is of particular significance because it is unequivocally the result of human activity since the mid-20th century and proceeding at a rate that is unprecedented over millennia. It is undeniable that human activities have warmed the atmosphere, ocean and land and that widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.³⁶

Preventing Bias in Science

Scientists have their own points of view. However, there are a number of mechanisms built into modern science that make it less likely that a conflict of interest or bias would keep scientists from reporting the truth:

- Scientists contributing to reports by the National Academies of Sciences (NAS) in the United States and the International Intergovernmental Panel on Climate Change are unpaid and do not get royalties from the final products. Their volunteer status lowers the risk of a bias toward what people want to hear.
- When the NAS organizes a panel to investigate the science behind something that may affect the American people, the research group includes experts from private and public sectors. Composition of these panels is known and open to public comment.
- Many scientists began climate research only after the data began to show concretely how much human activities were altering Earth's systems; they could study other questions if evidence showed humans had little effect.
- Many researchers have funding from other fields although they do some climate-related work. They review articles and evaluate grant applications submitted by climate scientists, ensuring another anti-bias oversight.
- Scientists compete to do repeatable science that stands up to review. This competition ensures that scientists continually revisit and test their processes and assumptions so that their findings continue to make sense in light of new data.
- When the evidence is very strong, scientists will move past one particular question and move on to related questions. Few scientists are still asking, "Is the Earth's atmosphere trapping thermal energy and heating the Earth's surface?" because the answer is clear. Now they are asking, "What effects will this warming have on crops, ocean currents or particular regions of the Earth?"
- Scientists come from all walks of life. They do not all live under the same

political system or get funding the same way. Some are deeply religious and others are not. Katherine Hayhoe and contributors Jessica Moerman and Thomas Ackerman, all mentioned later, are just a few of the prominent climate scientists who are evangelical Christians.

These facts help limit bias in science. Check out the Resources section at the end of this publication for some reputable sources.

CHANGES IN THE ENVIRONMENT

Evidence shows that the global climate is already changing. Some of this evidence includes the warming of oceans, melting of ice caps, rise in atmospheric temperature and increased evaporation. The National Oceanic and Atmospheric Administration released a report explaining 10 evidences for climate change, as seen in Figure 3.³⁷

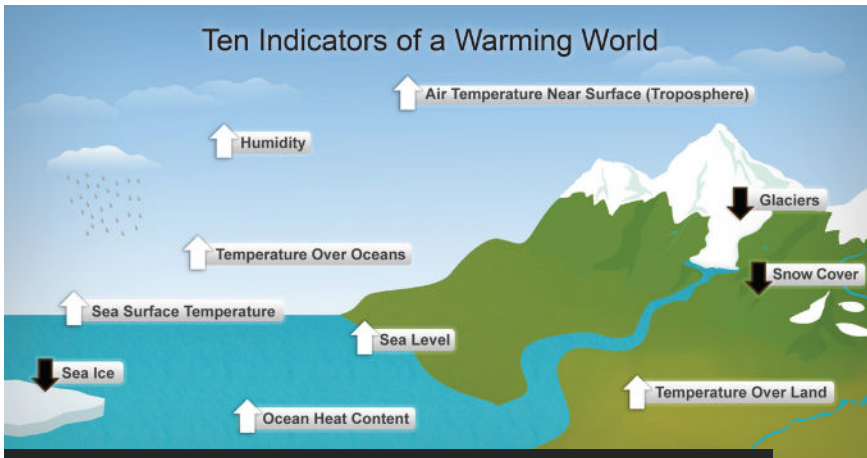


Figure 3. There are multiple effects of climate change already occurring. *Infographic from the National Oceanic and Atmospheric Administration (NOAA).*

Our growing understanding of the physics and chemistry of the atmosphere helps us predict how temperatures will rise as greenhouse gasses increase. A 2021 analysis by the scientific Climate Action Tracker estimated that, with current policies in place, by 2100, global average temperature would be increased by about 4.8 degrees Fahrenheit (2.7 degrees Celsius).³⁸ Changes of this magnitude are large and unprecedented in relatively short time frames.

Scientists estimate that the temperature change between the last glacial period and our current climate is an increase of about 10–14 degrees Fahrenheit (5.6–7.8 degrees Celsius). During other deglaciations, global temperatures increased 4–7 degrees Celsius over periods of about 5,000 years. Earth's climate has been generally stable for the last 10,000 years, with changes of less than 2 degrees Fahrenheit (1.1 degrees Celsius). Today's changes are much more rapid.³⁹ Even a few degrees of temperature change over a century mean a huge increase in total heat energy for the atmosphere and ocean. Our rapidly warming world already shows erratic weather, melting ice and glacier loss, rise in sea level, changes to agriculture, loss of forests, decline of fisheries, and increased human health problems.

POSITIVE IMPACTS

Before looking at those concerns, let's note that not all the changes due to human-caused climate change are negative. There are some positive impacts. The late Sir John Houghton, former head of the Intergovernmental Panel on Climate Change, noted that in Siberia and other areas at high northern latitudes, winters will be less cold and growing seasons will be longer. Shipping will be faster across ice-free northern waters. However, Houghton said, studies demonstrate that adverse impacts will far outweigh positive effects, more so as temperatures rise more than 2–3.5 degrees Fahrenheit (1.1–2 degrees Celsius).⁴⁰ Opportunities from ice-free northern waters also come with national security risks as countries vie for control of newly opened shipping lanes and natural resources.

Erratic Weather

Scientists estimated that the heat record in Lytton, British Columbia (121 degrees



Figure 4. Vietnam is a flood-prone country. Such floods are more common with a faster water cycle and sea level rise.

Fahrenheit/49.4 degrees Celsius) in June 2021⁴¹ would previously have been expected to occur only once in 1,000 years. They concluded that natural cycles could not account for the event. In fact, they calculated that without human-induced changes in Earth's energy, the heat wave would have been 150 times rarer.⁴² We can't attribute all heat waves directly to climate change, but climate change increases their frequency.

In contrast, in late January 2019, a rapidly moving stream of air circling the North Pole slowed down. Some of that frigid air moved southward and made its way toward the central United States and Canada. This wind brought extraordinary cold to the midwestern United States and central Canada for a few weeks in January and February. When the region warmed, thawing ice produced flooding. However, even though some places were exceptionally cold for short periods, 2019 was very warm. The following year, 2020, was second only to 2016 as the warmest year on record for the planet.⁴³ Careful analysis leads to the projection that summers such as the summers of 2016–2021 in North America are likely to be common by the middle of the 21st century.⁴⁴

It seems ironic, but the same warming that can increase drought can also increase floods. Deforestation, storms, sea level rise, rapid ice melting (which is discussed later) all cause flooding, more likely in a warming world (for example,

see Figure 5). We expect an increase in storm destruction and severity in the coming years, because a warmer world will lead to more evaporation of water from the ocean and land surfaces, more water vapor in the atmosphere, and more precipitation on average, with more intense rainfall events. At the same time, droughts increase and less rain falls in arid areas, because warmer air evaporates more from land surfaces. There is little evidence that storms will increase in number overall, but there is evidence for an increase in intensity of individual storms, leading to an increase in the most damaging types of storms.⁴⁵

Melting Ice and Glacier Loss

Polar ice, glacial ice and arctic permafrost are melting. This melting impacts low-lying areas, glacial rivers, polar regions and glaciers.⁴⁶

Melting harms wildlife and causes the release of even more greenhouse gasses.⁴⁷ One way it can do this is through positive feedback loops, which occur when a change triggers a series of events that makes the original change even greater. For example, warming of permafrost in the Arctic releases trapped gasses from the frozen ground. These, in turn, contribute to a rise in air temperature and greater warming of the ground.⁴⁸

There are negative feedback loops as well. An example of negative feedback is increased plant growth in some places as carbon dioxide increases in the atmosphere. That plant growth absorbs some of the carbon dioxide, lessening global warming. Those negative feedback loops are helpful, but they are not enough to keep Earth's climate from warming overall.⁴⁹



Figure 5. Glaciers in the Andes are shrinking. Many people must adapt to unpredictable water supplies as glacial streams and rivers dry.



Another example of positive feedback is the melting of ice. As ice melts, dark soil or ocean water is exposed, leading to more absorption of solar radiation, more warming and further melting.

This ice melt has important consequences for polar climate — and hence, global climate — but also has important consequences on a smaller scale. The world's attention has been focused on Arctic sea ice in recent years. The vast ice chunks that form, melt and reform over years provide resting places for sea birds, marine mammals and human hunters. Now, this ice is melting faster than it regenerates, altering Arctic food chains.⁵⁰

One specific example of positive feedback is the melting of glaciers in the Andes. The Bolivian capital of La Paz is a crowded, bustling city in an arid, rugged landscape. The water for the city comes, as it does for most of the people in the Andes, from glacial meltwater. The glaciers slowly let go of their precious resources during the summer and regain that water from snowfall during the winter. Climate change makes glaciers melt more rapidly than they otherwise would. In turn, the darker rock beneath absorbs more heat and speeds glacial melting even more. Already, mountainous countries that depend on glacial melt experience limited water resources.⁵¹

Prediction of glacial melting is complex. Individual glaciers are affected by the temperature of nearby ocean temperatures, wind currents and other variables. A glacier might grow for a few years even if the overall trend is melting due to an El Niño or La Niña event. What is generally agreed on is that the pace of glacial melting worldwide is far above what we would expect if there were no changes in the climate.⁵²



Figure 6. Shishmaref, Alaska, is already experiencing loss of land from storms, as portions of the island are washed into the ocean. *Photo courtesy of the American Association for the Advancement of Science.*

Sea Level Rise

As ocean temperatures rise, the water expands and raises the water level. Melting glaciers also contribute to the rise in sea level. From 1880 to 2020, sea levels rose 8–9 inches (20–23 centimeters).⁵³ A 2022 report suggested that future sea level rise is predicted to be another 10–12 inches (25–30 centimeters) by the year 2050.⁵⁴

Coastal Alaska is vulnerable to the rise in sea level.⁵⁵ Shishmaref, Alaska, is a sparsely populated community on remote Sarichef Island, a barrier island three-fourths of a mile wide and 3 miles long close to the Arctic Circle. The Native American inhabitants live on a diet of seals and other marine life. But the loss of ice, the rise of the sea, the melting of permafrost and an increase in severe storms have washed away part of the town and made it difficult for the residents to remain (Figure 6). Hunting and fishing are more dangerous, and a traditional way of life is collapsing. In 2016, members of the town voted to relocate from the sand-barrier island, although their families had lived there for generations. In a spirit of hope, they chose to call the move to a mainland site an “expansion.”⁵⁶ They hope to still use the barrier island as a base for fishing when the townsfolk have moved. Shishmaref is one of four coastal Alaskan villages determined in 2021 to be in danger of imminent destruction, meaning it would be uninhabitable within five years. In the next 25 years, at least 31 Alaskan native communities are at risk of destruction.⁵⁷

Tuvalu, a tropical island chain in the South Pacific, is the second smallest sovereign nation in the world. Its 12,000-plus inhabitants, more than 90 percent of whom are Christians,⁵⁸ all live less than 14 feet above sea level. Like those on Tuvalu, people living on islands in other nations such as Vanuatu (82 percent of whose inhabitants are Christians),⁵⁹ Kiribati and the Marshall Islands are losing their traditional way of life. Warmer waters, coral bleaching, erosion, extreme cyclones and other changing weather patterns, and tidal flooding contribute to the crisis.

Like Shishmaref, these island communities are on the front line of climate change. As sea levels rise and storms erode the coastline, islanders face the real

possibility that their homeland may soon be uninhabitable.⁶⁰ In the continental United States, the Atlantic, Gulf of Mexico and Southeastern coasts are particularly vulnerable to sea level rise — in part because coastal wetlands are subsiding at the same time that sea levels rise. A 2022 report produced from a collaboration of several U.S. agencies estimated: “Relative sea level along the contiguous U.S. coastline is expected to rise on average as much over the next 30 years (10–12 inches or 0.25–0.30 meters over 2020–2050) as it has over the last 100 years (1920–2020).”⁶¹

Agricultural Losses

In a warmer world, there is the likelihood that precipitation will increase in many parts of the globe. In other places, heat will accelerate evaporation, or wind currents will divert precipitation elsewhere. Some regions of the globe will experience increased drought.⁶² Australia, already the driest continent, is likely to become drier, as are parts of sub-Saharan Africa.⁶³ Scientists estimate that with a 3.5- to 4.5-degree Fahrenheit (2.0–2.5 degrees Celsius) global temperature increase, an additional 2.4 to 3.1 billion people will experience water stress.⁶⁴ This will deprive millions of food and income. For many of the poorest farmers, crops will fail because their fields are rainfed; even the same amount of rain might not suffice if its timing changes or becomes unpredictable.

In the absence of water stress, increased temperature and carbon dioxide can increase plant growth. While this might sound desirable, rapid growth often results in lower crop yields of grains, because more of the plant’s energy goes into leaves, stems and roots, and less into grain. Yields of corn, rice and soybean are expected to begin to drop by 2030 although the yield of wheat may increase.⁶⁵

Loss of Forests

Forests play a great role in the lives of people with the least personal wealth, providing fuel, food and other resources. Climate change worsens forest loss, acid rain and insect damage to trees.⁶⁶ Damaged forests have a difficult time slowing floods and taking up carbon dioxide.

In the United States, forests provide thousands of jobs.⁶⁷ The forest economy and the people it supports are threatened by a drier, warmer future.⁶⁸ Canada and Alaska, for example, have suffered the death of millions of acres of trees. Pests, which used to be killed by cold weather, now live longer, grow faster and eat more. The American South, from Texas to Virginia and Kentucky to Florida, has forests that are economic powerhouses, producing more paper pulp by volume than any other nation and supporting thousands of jobs.⁶⁹ The loss of trees in this region risks jobs.

A similar outbreak has killed millions of trees over several years in Germany, the Czech Republic and Austria. Because beetle-infested trees can still be harvested but are less valuable, a beetle infestation means the rapid harvest of cheap trees, a temporary glut in wood markets and a short boost to the local economy. In the long term, though, such an infestation will leave the region with far less forest, and the loss of a great deal of timber that would have been valuable if healthy.⁷⁰ A drier, warmer future, with more fires and outbreaks of beetles, threatens these forest economies and the millions of people they support.⁷¹ Loss of forests in turn, means a loss of soil, greater flooding and less trapping of carbon.

Loss of Biodiversity

Rising temperatures alter ecosystems and even cause the extinction of species. An increase in average annual temperatures of only 4–8 degrees Fahrenheit (2.2–4.4 degrees Celsius) will put between 20 and 30 percent of plant and animal species at risk.⁷² Many people rely on wild animal species for their livelihoods just as others rely on forests. Crops depend on wild pollinators, and plants may depend on



Figure 7. Many trees are dying from drought and pest infestation.



animals to spread their seeds. Ecosystems depend on organisms that break up soil, break down dead materials, produce usable forms of nitrogen in the soil, hold water in the soil, produce oxygen and absorb carbon.

A 2017 report on biodiversity and climate change included this comment:

Biodiversity underpins the functioning of ecosystems and the provision of ecosystem services essential for human well-being, such as food, clean water, pest control and protection against erosion. ... Important reservoirs of carbon are stored in forests, wetlands and other ecosystems. ... By contributing to ecosystem resilience, biodiversity can help both ecosystems and people to adapt to climate change.⁷³

While many mission organizations include medical care, education and sustainable agriculture, fewer have engaged in scientific work or conservation. A Rocha International is an exception, describing itself as “a global family of conservation organizations working together, in response to the worldwide crisis of biodiversity loss, to carry out community-based conservation projects.”⁷⁴ A Rocha USA works in the key areas of marine conservation, climate action and habitat preservation. One of its projects is researching marine plastic pollution. Other projects focus on taking up carbon dioxide in coastal areas by planting mangrove trees and sea grasses, and restoring oyster reefs in collaboration with nonprofits that help local communities improve their economies.

Damage to Fisheries

Another example of a potential loss is the change in fisheries worldwide. All over the world, bodies of water and the fish they house are in decline, although there are worldwide efforts to help clean the ocean. Overfishing and climate change together have harmed the cod fisheries of the North Sea. Warmer temperatures result in less food for cod larvae and fewer fish for people who depend on them.⁷⁵ Coral reefs, damaged by high water temperatures, are unable to provide the habitats necessary to the schools of fish and thousands of other organisms they house.

About 30 percent of the carbon dioxide released by burning fossil fuels is

absorbed by the ocean, where it forms carbonic acid, lowering the pH of the ocean. The pH scale measures a continuum from acidic to basic — from vinegar-like to baking soda-like. As carbon dioxide increases, the pH drops from slightly basic to a little less basic, becoming closer to the acidic side of the scale. This acidification is harmful, because lower pH makes it more difficult for many marine organisms to obtain the calcium carbonate that they need to build their shells and bones. Ocean acidification is one of the effects of rising carbon dioxide that is unrelated to temperature. We already see its effects on shellfish and coral reefs.⁷⁶

Marine fisheries contribute around \$401 billion to the global economy annually, including \$250 billion from aquaculture. Approximately 39.0 million people are employed in fisheries, and 20.5 million people employed in aquaculture.⁷⁷ In 2018, 3.3 billion people around the world got as much as 20 percent of their average intake of protein from fisheries.⁷⁸ However, fisheries are stressed by over-harvest, pollution, acidification and changes to the climate.

Pollution Challenges

The effects of a changing climate on human health are widespread. They include an increase in food-borne illness such as salmonella, an increase in tropical diseases, malnutrition from crop failures, cardiorespiratory distress from heat combined with airborne pollution in cities, extreme heat waves, wildfires and other health-related problems.⁷⁹ Many of these problems are already more common in poor populations.⁸⁰ Human health problems from climate change are discussed in more detail in Section 3. The following Real World Example focuses on a subset of human health: the combined effects of heat and air pollution.



Figure 8. Cases of asthma are increasing. Atmospheric heat prolongs pollen seasons, increases air pollutants like ozone and causes heat waves that make breathing more difficult. Asthma rates are higher among people in poverty, particularly minority communities.



Real World Example Mitch Hescocx and Jessica Moerman

Evangelical Christians sometimes understand the importance of acting on climate change more easily when they understand that fossil fuel pollution harms the health of our children, born and unborn. Christians believe that all children have the right to fulfill their God given potential — what Jesus called the “abundant life” (John 10:10). Jesus was not just referring to a spiritual connection but to a holistic health, of body and soul together.

Shortly before the COVID-19 pandemic, we (members of the Evangelical Environmental Network) were presenting at a conference on Gulf Coast restoration near Mobile, Alabama. During a dinner, one conference participant claimed that climate change was a liberal deception and that the science was far from settled. Nonetheless, the gentleman listened the next day as we shared medical research and anecdotes about how pollution from fossil fuels harms our children’s lungs, hearts and lives. The same actions and materials contribute to both a changing climate and serious health problems, particularly for children. Although there are

numerous health effects from a rapidly changing climate, the relationship between fossil fuels and polluted air is one of the most important. Air pollution can involve small particles getting into the lungs, breathing in toxins, inflaming surfaces of the respiratory system, causing cancer or birth defects, and causing inflammation throughout the rest of the body.

Coal, oil and wood burning (including from wildfires) produces soot, made of small particles, and other pollutants such as toxic ozone. These pollutants go into the air, or form when other pollutants are exposed to sunlight. Soot particles less than about one-thirtieth of the diameter of a human hair in size are designated “PM2.5” (particulate matter smaller than 2.5 micrometers). Children are particularly vulnerable to such pollution.⁸¹

Air pollution increases preterm and low weight births. The leading cause of preterm birth is intrauterine inflammation, and the leading cause of intrauterine inflammation is exposure to high levels of PM2.5. In 2019, global air pollution accounted for the deaths of almost half a million infants, amounting to 20 percent of newborn deaths worldwide, most related to complications of low birth weight and preterm birth.⁸² Children born prematurely or with low birthweight are at greater risk for death in the first month of life and have higher rates of major illness throughout their lives. The World Health Organization estimated that 6 million of 20 million preterm births in 2019 could have been averted by reducing exposure to PM2.5 during pregnancy.⁸³

Doctors are well aware of the health problems caused by climate change. One group, the Medical Society Consortium on Climate and Health, founded in 2016, represents more than 700,000 clinical practitioners, including 70 percent of U.S. physicians. The group raises three concerns:

- Climate change is harming Americans today, and these harms will increase unless we act.
- The way to slow or stop these harms is to decrease the use of fossil fuels and increase energy efficiency and use of clean energy sources.
- These changes in energy choices will improve the quality of our air and water and bring immediate health benefits.⁸⁴

The American Lung Association estimates that 40 percent of Americans are exposed to unhealthy levels of ozone (the main ingredient of smog), particle pollution (PM2.5) or other pollutants.⁸⁵ As we weigh the costs of limiting greenhouse gasses, we need to consider the economic benefits of being healthier.⁸⁶

Environmental risks are not distributed equally in society. Frontline communities (those closest to polluting industries) are over three times more likely to be exposed to highly polluted air than people farther from industrial and waste sites. People who live within 0.5 miles of oil/natural gas facilities are at risk for a 25 percent increase in low birth weight infants, increased brain, heart, spine or spinal birth defects, and a 25 percent increase in children's asthma.⁸⁷ Nearly 2.9 million American children attend school within such a danger zone around oil and gas facilities.⁸⁸

Air pollution is much worse in many parts of the world than it is in the United States. India has the worst air pollution in the world, having taken over from China recently. Globally, air pollution produced by burning fossil fuels alone causes premature death of approximately 3.6 million people each year.⁸⁹

Immediately after our presentation and discussion, the once-irate

gentlemen asked, “Are you telling me that climate change causes all these harms to our children?” “No,” we replied, “but the same activities that fill our air with the pollution that is threatening our kids also cause climate change.”

“For the sake of our kids, we better start taking action,” he replied. “The good news is,” we said, “by turning away from fossil fuels to clean energy, we can defend our children’s health, reduce greenhouse gasses and the threats of climate change, and build a clean economy with good-paying, family-sustaining jobs.” (In fact, a 2020 report by the International Renewable Energy Agency said that 40 million jobs would be created by 2050 with a transition to renewable energy.)⁹⁰

Ending fossil fuel dependence will help us care for God’s creation and all God’s children.

This article has been adapted from the Evangelical Environmental Network’s article, “Creation Care Is a Matter of Life, Human Life.”⁹¹



Mitch Hescox is president of the Evangelical Environmental Network, after serving as a pastor for 18 years and as a director of fuel systems for Allis Mineral Systems.

Jessica Moerman is vice president of science and policy of the Evangelical Environmental Network and co-founding pastor of Grace Capital City Church in Washington, D.C. She holds a Ph.D. in earth and atmospheric sciences from the Georgia Institute of Technology.

EVALUATING THE EVIDENCE

All over the globe, scientists have come to the same conclusions about our changing environment, endorsing the conclusions of the world body that studies climate change (the Intergovernmental Panel on Climate Change) and urging world governments to take urgent action to address climate change.⁹²

Even though scientific professional societies (including the American Association for the Advancement of Science,⁹³ American Chemical Society,⁹⁴ American Physical Society,⁹⁵ American Geophysical Union⁹⁶ and American Meteorological Society⁹⁷) attribute much of today's warming of the globe to human activity, many people are still unsure. Christians, as well as others, have voiced skepticism about climate change. Skepticism is healthy. In fact, modern science is based on skepticism. We start out unlikely to believe a new idea, and then, as we get more evidence, we form a clearer view of the world and either accept the new idea because evidence supports it, or reject the idea as evidence does not support it.

In issues that are highly divisive and argued in public forums, discussion can easily become confusing. The following are some ideas for sorting out scientific issues in the news:

Dig Deeper Into the Facts

How are environments around the world changing? Is there a physical explanation for the phenomenon? What could reasonable alternative explanations be? The questions we ask about climate change often relate to the relative importance of natural and human-caused factors, as discussed above. In the case of climate understanding, there is a great deal of scientific evidence that can answer these questions.

Understand How Science Works

The science of climate regulation is not built on a few specific examples. When an error in data measurement or interpretation is found, it does not mean that all climate science is wrong. Rather than being a house of cards, where a dispute about one piece of information could bring down the whole structure, the science of

climate regulation derives from millions of measurements with thousands of people looking at the data.

When we find an error and correct it, our predictive models and measurement accuracy improve. If subsequent research shows the same trends, we have a good idea that what we are seeing is accurate. Indeed, the climate trends scientists described in the 1980s–2000s have been confirmed repeatedly by subsequent research. For example, researchers compared 17 climate models designed to predict how much the global average surface temperature would change in coming years. We can test these models by comparing their predictions to the temperatures we actually measured. Fourteen of the models, made over five decades of climate modeling, “were generally quite accurate in predicting global warming in the years after publication,” particularly when the parts of the models dictated by humans (how much carbon dioxide we would release or how much rain forest we would cut down) were accounted for.⁹⁸

Avoid Polarizing Voices

Don’t look for good information from angry people who call others names or refer to conspiracy theories. Listen to those who are careful with their words, a biblical characteristic shown in James 1:19–20.

Listen

Look to official joint statements from professional societies. For example, the nation’s top scientists in the National Academies of Science and other professional societies represent the conclusions of tens of thousands of scientists. Several of these societies have already been noted.

Get to Know a Scientist

Get to know local scientists who are Christians. Let them help you sort through the scientific information in the media. Are there scientists in your church? Ask for advice. Of course, no scientist understands all scientific questions. Scientists also don’t have a single point of view but they can help you understand why there is uncertainty and show you where to find unbiased information. Sometimes people,

including scientists, talk outside their areas of expertise. Know the difference between an expert in the area in which you are asking a question and a person with a general interest.

The voices of Christians who are active in peer-reviewed climate science can help us. Contributors Thomas Ackerman and Jessica Moerman are examples. Another leading voice is Katharine Hayhoe, a Christian climate scientist and author of “Saving Us: A Climate Scientist’s Case for Hope and Healing in a Divided World.”⁹⁹ Hayhoe represents a message of hope: We know what the problem is, we know how to fix it, and we still can make a huge difference.

A Scientist's Perspective Thomas Ackerman

My father was a minister in the Christian Reformed Church, and my mother was educated as a high school mathematics and English teacher.

I grew up in a house full of books and ideas and arguments, and many of all three dealt with God and religion. My parents were totally committed to Covenant theology and raised their children from birth as members of God's family. All seven of us went to Christian schools; in these schools, we were taught that everything in the world belonged to God and that whatever career we chose was God's work. I then attended Calvin College. My years at Calvin were a pivotal period in my life, not only because of the fine education that I received, but because of the witness of my professors, who showed me that intellectual excellence and Christian conviction could exist in harmony. Throughout my education, I grew in my knowledge of and commitment to my faith.

I gradually found my way to an undergraduate degree in physics and then graduate school. By God's providence, I was led to the atmospheric sciences department at the University of Washington and a conversation with a professor there. He invited me to do a special research project with him — to investigate the possible effects of a commercial fleet of supersonic airplanes on the chemistry of the stratosphere. In one short quarter, I discovered what I wanted to do. My prior education, my love for the environment and my religious commitment all coalesced into what I can only describe as a call.

In my second year in atmospheric sciences, I read an article describing how Earth's climate is modulated by particles in the atmosphere and greenhouse gasses. I was fascinated by this subject and gradually switched my research to the study of planetary climate, which I continue to this day. I earned my Ph.D. more than 35 years ago. Since that time, I have had the great privilege of working as a research scientist for NASA, serving as the chief scientist of a large climate program run by the Department of Energy, and being a professor at two prestigious universities. I have published more than 150 peer-reviewed scientific papers in the field of climate on a wide range of topics. Through all this, I have remained firmly convinced that

God has called me to this work just as surely as he called my father, my younger brother and my son to be ministers of his Word.

As the years went by, many other climate scientists and I became aware of the potential for increasing greenhouse gas concentrations to warm the surface of Earth. The idea itself was not new (its roots can be traced to John Tyndale in the 1850s and Svante Arrhenius in the 1880s), but human influence on climate was. During the decade of the 1980s, concern among scientists grew. Our understanding of atmospheric physics, our measurements and our models told a consistent story of a warming of planet Earth due to human activity. For most scientists, there is no single moment of blinding light on the Damascus Road in which one is suddenly convinced of some scientific truth. Rather, it is a journey of study and research, of careful construction and testing of hypotheses. It is like working on a huge jigsaw puzzle with only a fuzzy picture as a guide. But, eventually, the combined efforts of many scientists lead to a much clearer picture, a firm theory of how Earth's climate works. Through such a process, my colleagues and I have reached an understanding of the role that carbon dioxide plays in maintaining our climate and how increasing concentrations will warm our planet, leading to changes in our climate. These conclusions, while not without uncertainty, are neither arbitrary or capricious; they are firmly rooted in the laws of physics and chemistry.

I have never felt a dissonance between these two aspects of my life: the study of the world and of God's Word. Through them both, I see God. Among my most treasured theological truths are the providence of God and common grace: "He causes his sun to rise on the evil and the good, and sends rain on the righteous and the unrighteous" (Matthew 5:45). God gives talents to all people, and among those talents is intellectual ability. Over the years, I have learned much about my discipline from those who do not believe in God. Does their disbelief in God taint their physical science? For the most part, I think not. To think otherwise is to deny the grace of God operating in our world.

We are called as children of God to seek justice and care for the earth that God has given us. Degrading the environment, polluting air and water, and misusing

valuable resources are obvious ways in which we Christians fall far short of God's commands. But now we are confronted by the fact that we are altering Earth's climate by our own activities, a situation that generates a set of complex moral and ethical questions. I am encouraged that the evangelical church has begun serious discussion of climate issues, including calls to reconsider our profligate use of the global environment. I hope and pray that its voice will become increasingly clear on these issues.

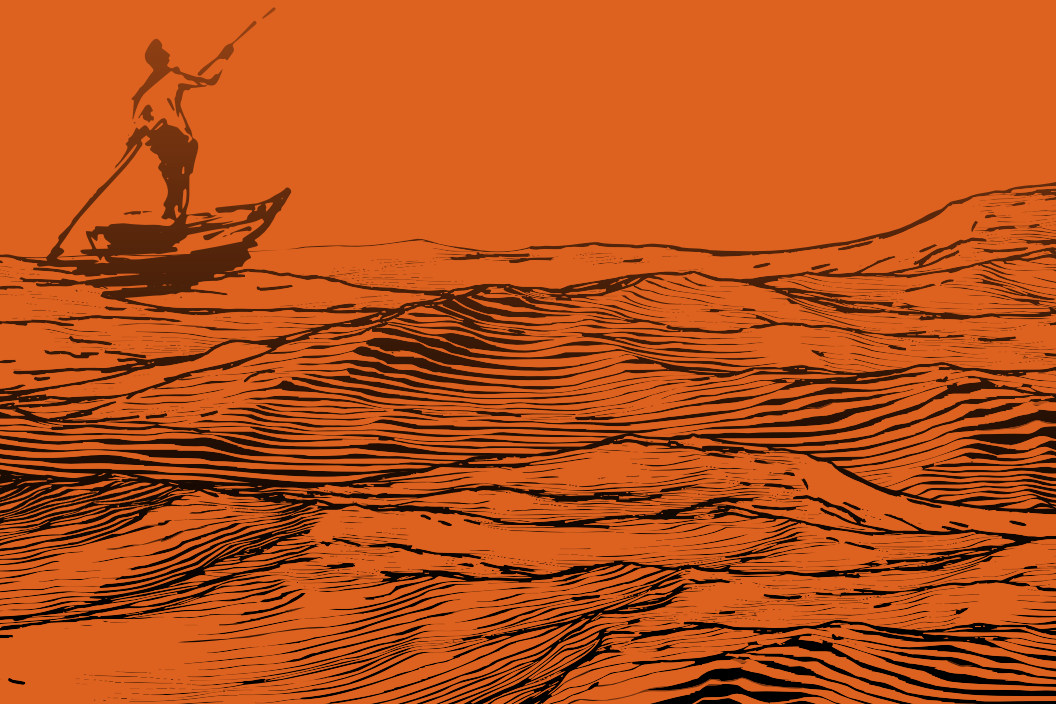


Thomas Ackerman is professor emeritus of atmospheric sciences and past director of the Joint Institute for the Study of the Atmosphere and Ocean at the University of Washington, where he received a Ph.D. in atmospheric sciences and an M.Sc. in physics.

Loving the Least of These

Section 3:

**HOW CLIMATE AFFECTS PEOPLE
IN POVERTY**



Bangladesh is a river delta the size of Wisconsin. Most of its territory is less than 30 feet above sea level; consequently, water and flooding are major facts of life. But the frequency and severity of weather extremes — major cyclones, killer floods and drought — are escalating.¹⁰⁰

Peter Vander Meulen, who served as the first director of the Christian Reformed Church's Office of Social Justice, shares the story of one Bangladeshi farmer. Alliuddin owns less than 3 acres of land and successfully manages multiple small, irrigated vegetable plots to produce enough food and income to feed, house and clothe his family (Figure 9). He uses irrigation water from the small branch of a stream with its source in the hills of Assam. In past years this stream had been a reliable source of water throughout the long dry season, but now it resembles a shallow, seasonal stream. Due to changes in rainfall patterns (shorter, more intense bursts of rain resulting in huge but short-duration runoff), once-perennial rivers are showing signs of becoming seasonal, and precious soil is eroding.

If Alliuddin's irrigation source dries up before his vegetables are harvested, he has only a few options. With funds, he may find an alternative water source, such as a shallow or deep motorized well. But the pace of change and the addition of other factors such as deforestation in the jungles and hills of India make these transitions more difficult.

From more than 500 million small farms around the world, farmers like Alliuddin produce around a third of the world's food.¹⁰¹ If Alliuddin and the farmers on similar small farms cannot cope with a changing climate, the world's

food supply, along with the lives of millions more, will be threatened.



Figure 9. Alliuddin and his family. *Photo courtesy of Peter Vander Meulen.*

Stories like Alliuiddin's illustrate how hard it is for poor people to deal with changes in the environment. The impact on those without resources can be summarized as four main problems:

1. Poor people are more affected by disasters, particularly in health outcomes.
2. The costs of prevention and survival (mitigation and adaptation) are higher relative to their income.
3. They are more likely to be displaced.
4. They are more likely to be affected by ensuing conflicts.

How Climate Affects People in Poverty

Problem	Impacts on People in Poverty	Examples
Disasters	<p>Poor people become more vulnerable after disasters as they often have:</p> <ul style="list-style-type: none"> • No savings to deal with crop or home loss; • Livelihoods that are more likely to depend on ecosystem resources; • No flood or other disaster insurance; and/or • Health risks. 	<p>Hurricanes Ida and Harvey wiped out many small coastal communities. Some communities with poor residents could not afford to rebuild.</p>
Health	<p>Increased climate change-related health problems result from both abrupt disasters and gradual changes, such as heat waves, spread of diseases, increased parasites, air pollution, droughts, fires and floods.</p>	<p>Poor children are more likely to have asthma, which is made worse by increased heat.</p> <p>Heat waves kill people who lack access to air conditioning, cannot pay to travel to cooler areas and cannot open windows due to crime risk.</p>
Costs of Adaptation	<p>People in poverty are less likely to have reserve funds to allocate to adaptation efforts. If they choose to spend money on adapting to or preparing for changes (such as building cisterns, moving a settlement, or adding technology to save energy or water), they do so at the sacrifice of other necessary items, such as food, education or health care.</p>	<p>Erratic rain over the last decades has forced farmers in Kenya to adjust. Farmers now plant almost any time it rains, because they don't know if the rains will continue. Still, the additional costs for extra seed do not guarantee crop success.</p>
Costs of Mitigation	<p>Preventing greenhouse gas emissions means changing the way the economy is structured. New technologies are first available to the wealthy and only later become available to poorer people.</p>	<p>In a fossil fuel-based economy, food costs follow a rise in oil prices, a phenomenon illustrated by the 2022 global rise in food prices following the beginning of the Russia/Ukraine war.</p> <p>Purchasing low emissions buses and vans for public transportation and investing in other alternative energy infrastructure costs money that poorer communities lack.</p>
Conflicts	<p>Lack of resources leads to violent conflicts over territory and goods.</p>	<p>Nomadic herders, fishermen and farmers in Nigeria clash over resources, such as land and water.</p>
Displacement	<p>Disasters, resource limitation and conflict can cause massive displacement of people within and between countries. Sea level rise is causing the relocation of coastal groups and islanders.</p>	<p>Coastal Alaskans leave their homes as the sea takes back their land. Pacific Islanders are relocating as their islands disappear.</p>

NATURAL DISASTERS

At the same time that North America was experiencing record-breaking heat waves in 2021, China had a rain event so unusual that even experts were flabbergasted. During three days in mid-July, Henan province experienced epic rains. Scientists called it a “thousand-year flood.” Zhengzhou, the provincial capital, was deluged by 8 inches (20 centimeters) of rain in one hour. Over three days, the downpour was almost equal to what the region would normally get in a whole year (24 inches/61 centimeters). Bridges were broken, dams burst, cars were swept into piles and a subway flooded. Such floods occur when hurricanes batter coastlines but are less common in inland areas.¹⁰²

Families impacted by poverty, especially in low-income nations, are the most vulnerable to abrupt changes in the environment.¹⁰³ Researchers studying 16 low-income countries found that people in poverty will become more vulnerable if the climate continues to change, because they have no buffer to help them deal with crop failures or other sudden changes.¹⁰⁴ Similarly, they are less likely to have flood or other disaster insurance or to be able to manage in the case of disasters (Figure 10).



Figure 10. Erosion on this Bangladeshi river has caused 400 families to lose their land over a period of years.
Photo courtesy of Peter Vander Meulen.



A Development Worker's Perspective Christopher Shore

The last thing most people living in poverty need is climate change. In the developed world, we may not feel the immediate impacts, because most of us have the resources not to feel them: When it's hot, we turn on the air conditioner. If we are thirsty, we turn on the tap or pour a cool drink from the refrigerator, even if it hasn't rained in weeks. Food arrives on our grocer's shelves each week, and we can afford to buy it. But for people who live on less than a dollar a day, air conditioning is not an option. They may not even have shelter. Finding water that is safe to drink or enough food to keep their children healthy may take several hours of the day. Much of their time is spent struggling to survive.

For the people World Vision serves throughout the world, climate change is not a fictitious or far-off threat. It's a very real intensifier of poverty today. For those already struggling under the weight of poverty, climate change increases vulnerability to environmental shocks that are outside their control, and it decreases the resources that would help them cope. The effects have already undone years of development investment by driving people climbing out of poverty back down the development ladder.

Climate change is a global phenomenon that affects people everywhere, but it hits economically deprived people hardest. For example, an African farmer who barely ekes out a living with insufficient seeds, tools and other equipment may now be getting more rain, less rain or the same amount, but in much more intense storms. There may be too much water for planting, too little water to germinate the seeds, or rain coming at the wrong time and wiping out the crop. This farmer likely has no crop insurance or government assistance to fall back on, very limited savings, and little or no access to credit. Any weather shock will drive her into deeper poverty, forcing her to sell her only assets, such as her animals or tools. She may even be forced to eat the seeds she needs to grow next year's crop.

Spend time with people already in vulnerable and environmentally degraded places such as Haiti, Ethiopia or Malawi, where deforestation has been intense and thorough. When rains or storms come, severe flooding, erosion and destruction

result. How do people rebuild and recover? Unfortunately, by using up all their resources, foregoing the education of their children, eating less and putting off medical care. Disasters set back the development process, which means that precious resources are spent on rebuilding rather than on projects that would improve quality of life.

Responding to a changing climate is a present-day reality. We work with communities to respond in a variety of ways, including the following:

- In Ethiopia, we partner with the World Bank and the people of Humbo, Ethiopia, to establish the country's first-ever carbon-trading forestry project, reforesting over 6,741 acres of degraded forest, increasing crop yields, and providing additional sources of income for the local communities.
- In Vietnam, a country among the top-five most affected by rising sea levels, we have established disaster-risk reduction plans in many communities located in the Quang Ngai province, along with training and supplies for 10 community rescue teams.
- In Benin, we are working with communities to set up protective barrages around fields and plant vetiver grass in the lowlands to conserve the limited rainfall they do get and to better delegate irrigation of the fields.

Climate change is making the fight against poverty much harder. These are just a few examples of how organizations are helping people dealing with poverty to adapt to the reality of our changing climate. It is a global issue that will require a global response.



Christopher Shore is the chief development officer for economic empowerment for World Vision (USA). He holds an M.B.A. from Western University.

HUMAN HEALTH

Global environmental changes result in health problems as heat waves, spread of diseases, increased parasites, air pollution, droughts and floods change the way we relate to ecosystems around us. The effect on poor children is especially notable. Christians are often very family, church and community oriented. We particularly care about children, as witnessed by the number of Christian charities, hospitals and educational institutions supported to meet the needs of our youngest. However, many people may not recognize all of the ways that a warming world interacts with human health.

Effects of climate on health are shown in the infographic from the 2016 report “The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment,” published by the U.S. Global Change Research Program (Figure 11).¹⁰⁵ Climate change and air pollution are caused by the same factors and harm the health of our children (see Real World Example in Section 2).

COSTS OF ADAPTATION

Adapting to a changing environment by moving, building safer structures or erecting water tanks costs money. For example, a 2020 estimate of the cost of adapting to changes in the climate (activities such as planting drought- or flood-tolerant crops; building new roads, levies and bridges; building water storage in dry areas; moving out of flooded lands; and preventing the spread of disease) was \$70 billion in developing countries. These costs are more pressing on people already struggling and are expected to quadruple by 2050, highlighting the wisdom of investing in adaptation now rather than later.¹⁰⁶ In fact, investments in adaptation are expected to yield \$2 and \$10 in economic benefits for every dollar spent.¹⁰⁷

A report by CARE International states:

Climate change is not the sole cause of poverty, but it works with other factors to intensify the vicious circle which traps people in poverty. This makes it harder to help people out of the downward poverty spiral. It is also

How Climate Affects People in Poverty








	Climate Driver	Exposure	Health Outcome	Impact
 Extreme Heat	More frequent, severe, prolonged heat events	Elevated temperatures	Heat-related death and illness	Rising temperatures will lead to an increase in heat-related deaths and illnesses.
 Outdoor Air Quality	Increasing temperatures and changing precipitation patterns	Worsened air quality (ozone, particulate matter, and higher pollen counts)	Premature death, acute and chronic cardiovascular and respiratory illnesses	Rising temperatures and wildfires and decreasing precipitation will lead to increases in ozone and particulate matter, elevating the risks of cardiovascular and respiratory illnesses and death.
 Flooding	Rising sea level and more frequent or intense extreme precipitation, hurricanes, and storm surge events	Contaminated water, debris, and disruptions to essential infrastructure	Drowning, injuries, mental health consequences, gastrointestinal and other illness	Increased coastal and inland flooding exposes populations to a range of negative health impacts before, during, and after events.
 Vector-Borne Infection (Lyme Disease)	Changes in temperature extremes and seasonal weather patterns	Earlier and geographically expanded tick activity	Lyme disease	Ticks will show earlier seasonal activity and a generally northward range expansion, increasing risk of human exposure to Lyme disease-causing bacteria.
 Water-Related Infection (<i>Vibrio vulnificus</i>)	Rising sea surface temperature, changes in precipitation and runoff affecting coastal salinity	Recreational water or shellfish contaminated with <i>Vibrio vulnificus</i>	<i>Vibrio vulnificus</i> induced diarrhea & intestinal illness, wound and bloodstream infections, death	Increases in water temperatures will alter timing and location of <i>Vibrio vulnificus</i> growth, increasing exposure and risk of water-borne illness.
 Food-Related Infection (<i>Salmonella</i>)	Increases in temperature, humidity, and season length	Increased growth of pathogens, seasonal shifts in incidence of <i>Salmonella</i> exposure	<i>Salmonella</i> infection, gastrointestinal outbreaks	Rising temperatures increase <i>Salmonella</i> prevalence in food; longer seasons and warming winters increase risk of exposure and infection.
 Mental Health and Well-Being	Climate change impacts, especially extreme weather	Level of exposure to traumatic events, like disasters	Distress, grief, behavioral health disorders, social impacts, resilience	Changes in exposure to climate- or weather-related disasters cause or exacerbate stress and mental health consequences, with greater risk for certain populations.



Figure 11. This infographic demonstrates examples of climate impacts on human health. *Infographic from the U.S. Global Change Research Program.*

likely that more people will fall into poverty if climate change undermines their current livelihood strategy.¹⁰⁸

Part of adaptation is developing early warning systems and better weather prediction. Such actions can prevent the loss of human life that comes from disasters, such as the storms that caused flooding in China in 2021. One report found that damages could be reduced by 30 percent with a 24-hour warning system for a coming storm or heat wave.¹⁰⁹

COSTS OF MITIGATION

To prevent the problem of a heating globe from getting worse, we need to stop emissions from burning coal, oil and gas. Such prevention is called mitigation. We need to specifically plan mitigation actions so that people who contribute little to the problem do not suffer the most. One great thing about mitigation is that some actions, such as wasting less food, water or energy, save money and lead to cleaner, less polluted air in addition to slowing carbon emissions. Indeed, estimates show that in China and India, the savings from improved health outcomes alone may completely compensate for the cost of reducing greenhouse gas emissions and substantially offset mitigation costs elsewhere in the world.¹¹⁰

DISPLACEMENT

The effects of storms, floods and droughts on individuals are obvious problems. But changes to the environment



Figure 12. This young Bangladeshi girl struggles with the difficulties that come from poverty and climate change. *Photo courtesy of Peter Vander Meulen.*

can also be a serious concern for societies at large, as groups of people migrate to seek more sustainable livelihoods. The three top environmental drivers of displacement are sea level rise, food insufficiency and conflict over resources. Because many factors are at play at any one time, it is hard to determine the role of environmental change in displacement. However, in some cases it is clear. Researchers have identified five of the Solomon Islands that have sunk under the waves and another six with severe shoreline erosion.¹¹¹

Refugees, internally displaced persons and stateless persons are among the most vulnerable to climate-driven change. Environmental changes, particularly disasters such as fires, drought, cyclones and hurricanes, push already poor people into deeper poverty. A 2021 report by the United Nations noted that between 2010 and 2020, there were 8,700 weather-related disasters and 245.6 million people displaced — more than double the number displaced by conflict (although some displacement is caused by both). Floods and storms dominate these disasters, alone accounting for 97 percent of people displaced by weather disasters.¹¹² More gradual changes, such as rising sea levels, desertification, drought and decreased agricultural output, will also cause people to migrate in order to support livelihoods.



Real World Example Jenny Yang and Lanre Williams-Ayedun

Turkana County in Kenya has been called the “oven of the world.” This desert land is prone to cyclical droughts, extended periods with extremely reduced precipitation. The area may go months without rain, and then experience rain rapidly, causing flash floods. The sun beats fiercely, baking the earth, with little vegetation to cool the air. Droughts are worsened by deforestation, overgrazing and increased ground temperatures. Many local herders have lost their livestock as a result. Malnutrition is rampant.

World Relief has worked with local churches in Turkana with the goal of increasing household resilience during drought. Our projects include developing conservation areas and breeding more drought-tolerant goats instead of cattle. We also introduce desert agricultural techniques such as water-efficient drip irrigation, water harvesting and the growing of drought-tolerant plants. Even so, Turkana is a vast area, and there are many communities that we cannot yet reach.

Mama Lobek is a single mother from a region near Turkana where

World Relief is not active (as of 2022). Facing the threat of starvation after a drought killed even her drought-tolerant goats, Lobek and her five children made the difficult decision to leave home. They walked for days from her home village to reach a village where World Relief was operating. When Lobek walked into the World Relief office, she weighed less than 84 pounds and was in a stage of chronic undernourishment. “I will accept God’s will for me, but I hope to see my children grow up,” Lobek said. Tragically, her situation is not unique.

At World Relief, we see the impacts of climate change in various parts of the world: unexpected low rain levels in Malawi, rampant and consistent flooding in conflict-ridden South Sudan, increasingly frequent and violent hurricanes destroying homes in Haiti. It is usually poorer people, with the fewest options to adapt to climate change’s effects, who are pushed further into poverty or conclude they have no choice but to leave home.

With so many of the most vulnerable around the world impacted by the effects of a changing climate, the Church’s response is clear: We have a responsibility toward our global neighbors to support those harmed by climate change, take personal and communal actions to support climate change adaptations, reduce our carbon footprint, as well as welcome those who have been displaced.

To those ends, World Relief has developed a network of churches, pastors and community leaders to distribute emergency food supplies at a grassroots level.¹¹³

World Relief takes two particular approaches in the places we work: to build resilience in communities and to create a network of local leaders with the goal that, eventually, people who live there can take over

the work World Relief does. In Turkana, work has focused not only on relief of immediate needs, but also on increasing irrigation for crops and connecting farmers to economic markets.



Jenny Yang is senior vice president of policy and advocacy for World Relief. She is co-author of “Welcoming the Stranger,” and holds a B.S. in international relations and affairs from The Johns Hopkins University.

Lanre Williams-Ayedun is senior vice president of international programs for World Relief. She holds an M.P.H. and M.A. in international relations and affairs from The George Washington University, and a B.S. in psychology from Michigan State University.

CONFLICT

Conflicts have many causes and are hard to attribute to just one factor. However, conflicts are likely to increase as a changing climate causes resources such as freshwater and food crops to become more limited. One study on the effects of climate change on Africa estimated that increased temperatures are associated with increased conflict, which “suggests a roughly 54 percent increase in armed conflict incidence by 2030, or an additional 393,000 battle deaths.”¹¹⁴

Conflicts over water are already common in many parts of the world and are likely to increase as the climate changes.¹¹⁵ In Nigeria, for example, nomadic herders, fishermen and farmers clash over resources such as land and scarce water.¹¹⁶

As a result of concerns about heightened conflict, natural disasters and migration, as well as the costs the military bears with the threat of sea level rise and its use of coastal bases, the U.S. Department of Defense has identified climate change as a national security issue.

In a 2021 report, the Department of Defense stated:

To keep the nation secure, we must tackle the existential threat of climate change. The unprecedented scale of wildfires, floods, droughts, typhoons and other extreme weather events of recent months and years have damaged our installations and bases, constrained force readiness and operations, and contributed to instability around the world. Climate change touches most of what this Department does, and *this threat will continue to have worsening implications for U.S. national security*¹¹⁷ (emphasis added).

CLIMATE AND VULNERABLE U.S. POPULATIONS

Changing climate isn't only an issue that affects those in low-income countries. A recent study showed that in the United States, poor people and minorities are hurt most, a disparity called “the climate gap.”¹¹⁸ For example, mortality rates from heat waves are twice as high among African Americans in Los Angeles as among other residents. People in urban areas, those experiencing poverty and those with medical

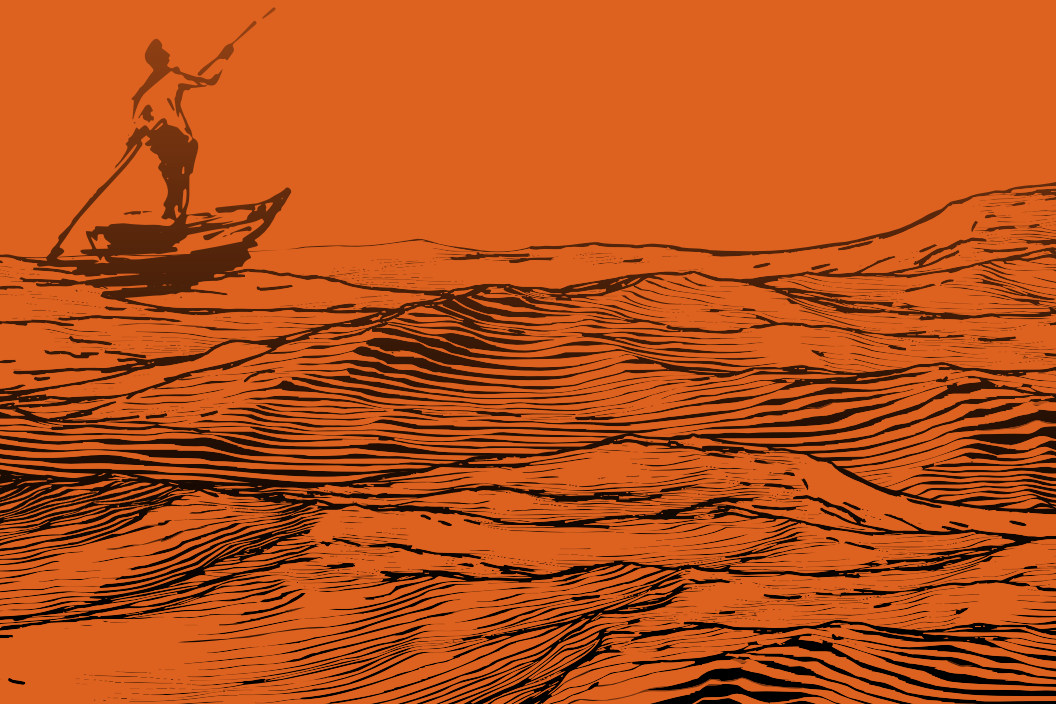
problems are more vulnerable to heat waves.¹¹⁹ African Americans are particularly likely to be disproportionately affected by a changing climate. Those who live in the Atlantic hurricane zone have been found to suffer heat death at 150 to 200 percent of the rate of non-Hispanic whites and have a 36 percent higher rate of asthma, which is made worse by heat. More of African Americans' income is spent on energy, and they are less likely to have insurance.¹²⁰

The 2021 heat wave of western North America included temperatures not seen there in the observational record since 1950.¹²¹ In Canada, nearly 500 people were killed by the wave of extreme temperatures.¹²² Scientists predict that such a rare heat wave will occur much more frequently by the end of the century, more so if carbon emissions remain high than if we can cut them sooner.

In California, agricultural and tourism workers — many of whom are Hispanic — are particularly vulnerable due to changes in job availability. In addition, households in the lowest income bracket use a three times greater proportion of their income for water than do those in the wealthiest income bracket.¹²³ Samuel Rodriguez, president of the National Hispanic Christian Leadership Conference, says, “The Hispanic community is likely to be disproportionately impacted by the effects of climate change. We need to speak to the moral, social and economic consequences that stem from the reality of climate change.”

Section 4:

WHAT SHOULD WE DO?



In the biblical story of Joseph, the climate changed and drought came. The people of Egypt might have starved. Instead, Joseph was wise and stored up crops for the years of hardship (Genesis 41:54), notes Dr. J. Matthew Sleeth in “Serve God, Save the Planet: A Christian Call to Action.”¹²⁴

Today, Sleeth says, we need to plan ahead for what climate changes might bring. Such planning will require preventing crises proactively. When disasters strike, evangelicals respond and give generously. Most churches take special offerings or allocate funds from their budgets to help those affected by hurricanes, earthquakes, floods and tsunamis. Sometimes, though, we miss opportunities to prevent problems — to help people prepare for coming disasters — both for those who are suffering now and for future generations.

Climate protecting actions fall into two categories:

- Individual actions — talk about climate change, inform yourself and take actions in our own lives.
- Joint actions — become part of the bigger solution by acting in communities (your church, secular groups with common interests, parachurch organizations, civic organizations) and by advocating for government and corporate action.

INCORPORATE CREATION CARE IN DISCIPLESHIP

In your individual life, bring care of creation to the Lord in prayer, in thanksgiving and with intercession for God’s world and for those most affected by its changes. Use your knowledge of and concern about environmental concerns as you share the good news with those around you. In Bible study groups, learn about creation care and its biblical foundations. Worship God with songs and prayers that reflect his might in creating the world. In your church, make sure your Sunday school programs, outreach activities and sermons include theology of creation care.

John 13:35 says, “By this everyone will know that you are my disciples, if you love one another.” In that spirit, support those in your congregation and your community who are most affected by our rapidly changing environment. Support

ministry organizations, such as World Relief, that provide climate adaptation and mitigation aid as they alleviate poverty. Invite fellow believers whose congregations are affected most noticeably by changing environments to speak at your church. Make your church facilities as environmentally friendly as possible and help others to do the same. Some resources can be found at [NAE.org/lovingtheleast](https://www.nae.org/lovingtheleast).

BALANCE THE ENERGY BUDGET

Stopping human-caused warming means balancing the Earth's energy budget. Just as our churches or individual families cannot spend above our income indefinitely, the Earth can no longer absorb carbon dioxide and methane into the atmosphere and oceans. We need to severely cut greenhouse gas emissions, such as carbon dioxide and methane and switch to non-fossil fuel energy sources. We also know that such a clean energy transition needs to be done in a just way.

Vulnerable people need to be included in planning. They must also be able to afford switching to more environmentally friendly consumer goods and able to experience the positive effects of change such as new products, new services and new jobs. To obey the command in Micah 6:8 to “act justly and to love mercy and to walk humbly with your God,” we cannot leave anyone out of a new economy. We should be aiding everyone to both adapt to and mitigate a warming climate.

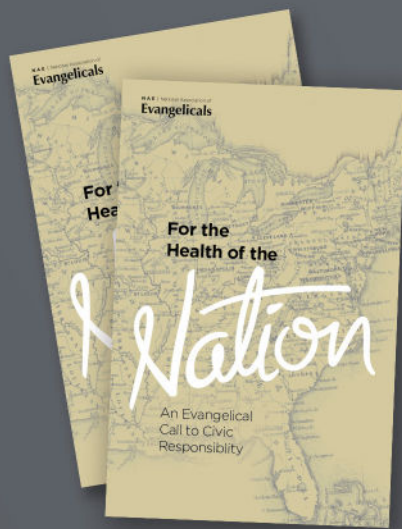
Mitigation means using more efficient appliances, shifting to public transportation and renewable energy-powered vehicles, prioritizing energy savings, eating more plant-based diets, and passing legislation that helps speed up the transition to renewable energy.

Climate Action in Spite of Politics

Unfortunately, in the United States, the discussion on human-caused changes to climate has become politicized. This reality has kept Americans from being able to make a strategy to move forward. Whether you are completely convinced that human actions are warming the planet or not, there are still good economic and other reasons to take actions now. Rising sea levels, decreasing pH of the ocean, movement of animals up mountains and toward the poles, loss of coral reefs, and increases in the severity of extreme events, fire and crop production are all well documented. We have to respond to them regardless of the cause. The activities that produce warming emissions also cause other problems (e.g., air pollution, burned forests, damage at fossil fuel extraction sites or during transportation), so the costs of solving one problem can result in the savings in multiple areas.

Fortunately, this moment in time offers not only difficulties, but also opportunities — for jobs, new businesses, inventions and financial savings. Due to market forces, coal mining jobs in the United States declined by more than 95 percent in 2020 from their peak in 1923; people once involved in the coal industry now need jobs in other sectors.¹²⁵ Fortunately, jobs in the clean energy sector, including equipment manufacturing, energy production, planning, services and other careers, are rising. The renewable and clean energy sector employed over 3 million Americans in 2021. The state of Nevada has seen the fastest increase in renewable energy jobs, almost 40 percent between 2018 and 2020 alone.¹²⁶

There are multiple reasons to work across the political aisle on climate action, including that both sides promote solutions from their point of view. For example, The Conservation Coalition (TCC), the largest politically conservative environmental group in the United States, produced the Market Environmentalism Academy, an educational platform hosting a series of short courses about pro-market solutions to environmental problems.¹²⁷ The Evangelical Environmental Network connects pro-life concerns with environmental problems and advances solutions that defend the health of children as well as life at all stages.¹²⁸



CONNECT CLIMATE TO OTHER AREAS OF CONCERN

In 2004, leaders of the National Association of Evangelicals adopted a consensus document, “For the Health of the Nation,” that summarizes our collective wisdom on why and how evangelicals should engage in civic affairs. The document, updated in 2018, identifies eight areas of common concern: religious freedom, marriage and family, sanctity of life, poverty, human rights, peace, racial justice, and care of creation.

The health of our nation, and the world, depends on progress in each of these closely interrelated areas. For example, if climate refugees are forced to relocate, this will have a profoundly destabilizing impact on world peace and security as the U.S. Department of Defense has clearly outlined. Environmental conflicts, in other words, often threaten the sanctity of human life, the integrity of the family, and the ability of governments to protect peace, human rights, individual freedoms, and national security.

Under Pastor Luisa Mendoza’s leadership, the congregation of Iglesia del Nazareno Nuevo Amanecer (New Dawn Church of the Nazarene) in Effingham, Illinois, is connecting the dots. Caring for creation and caring for parishioners’ health are part of their whole approach to witness.



Real World Example Iglesia del Nazareno Nuevo Amanecer

Luisa Mendoza, a busy pastor of a bilingual church, Iglesia del Nazareno Nuevo Amanecer (New Dawn Church of the Nazarene) in Effingham, Illinois, is working to make their fellowship as sustainable as possible. Her congregation, primarily Spanish-speaking immigrants, love and care for each other. Many do not read, write or drive, so part of Luisa's ministry is helping with education and transportation.

A Bolivian immigrant herself, Pastor Mendoza received a call from God to be a minister in the United States during a visit to family. She initially protested. The muggy, allergy-causing, buggy air of the eastern United States was not as pleasant as the cold clear air of her mountain home. But Luisa gave her will to God, and after a remarkable experience of recovery from bites and allergy symptoms, she moved to the United States to begin schooling.

Her relocation, Bible school degree and pastoral training led her to Effingham. Luisa and her husband, Raul, are committed to caring for the

world around them — both human and the rest of creation. They work to incorporate resource protection, care for animals and healthy foods into the life of the church. During children's church, children have gone out with gloves and garbage bags to pick up trash in the neighborhood. The church planted a community garden and discussed the importance of stewarding their bodies with healthy food and keeping food safe from chemical contamination.

Pastor Mendoza is interested in other environmental stewardship opportunities as well. Their small congregation cannot afford to waste any energy in running their building. Although their Nazarene Church district helps pay some bills, the congregation has been looking for cost-cutting measures. Amergen, a utility company, provided a grant for the church to perform an energy audit last year. Changes from older lighting to modern, efficient lighting offer the largest cost savings. Iglesia del Nazareno Nuevo Amanecer has also been connected to the U.S. Environmental Protection Agency's EnergyStar for Congregations program.¹²⁹ Since the energy audit, the church has implemented many of the no-cost changes and is looking for grants to pursue more savings.



JOIN IN THE GOOD WORK

Many organizations and ministries are helping vulnerable communities become more resilient in the face of climate change and are advocating for change. One such group is Young Evangelicals for Climate Action, an initiative of the Evangelical Environmental Network. Founded in 2015 to expand opportunities for evangelical young people who are eager to slow the rapid changes to the Earth's carbon budget, YECA focuses on leadership development and climate action advocacy.

We can join in advocating for wise action to decrease our carbon footprint, provide international assistance, promote sustainability and consider climate change in any long-term plans. We can also join secular organizations that share a common goal. As Bishop Timothy Clarke said in Section 1, we can collaborate with groups who may not share our faith in areas where we have common values. Embedding people of faith in all parts of the good work God has given us to do aids our witness to a world that needs Christ.

USING OUR MONEY

We are consumers. We can spend or invest money in ways that either ignore or take creation into account. We have power as consumers both in individual actions and as part of groups. When you buy products, look for those that will last a long time or, if disposable, that can be recycled or composted. When you purchase a plane ticket, consider paying for carbon offsets, such as those offered by Climate Stewards, a part of A Rocha International.

Many Christians are investors. Push your investments into corporations with sustainability goals, into emerging energy-efficient technologies and into new ventures with sustainability built into the fabric of their business. Demand transparency, accountability, and reports on their carbon footprint, success of carbon offsets, and ongoing climate actions. Ask companies to prioritize decarbonization of their activities.

There are, of course, other effective actions on climate change. NAE's Galen Carey lists several approaches we can take as individuals and churches.

An Advocate's Perspective Galen Carey

The world's climate is changing in ways that have already upended millions of lives. Poor and vulnerable people, especially children, have suffered the most, but the problems discussed in this publication threaten us all. When people are suffering and God's creation is groaning, Bible-believing Christians cannot sit idly by; we must respond. But how? Here are some of the ways we can make a difference:

- 1. Learn.** We can't all be climate scientists, but we can all learn more about the beautiful world God has made and entrusted to our care. Start with the Bible. Read this booklet. Organize a creation care study group in your church. Suggested resources for further study are available at NAE.org/lovingtheleast.
- 2. Pray.** Pray for discernment when sorting through confusing messages about climate change. Pray for vulnerable people who lack resources, as they are most impacted. Pray for our church and government leaders as they process opportunities to care for creation. Pray for the Earth itself, that its ecosystems would heal. Ask what God wants you to do about the threats to the health and survival of human beings, as well as the animals and plants on which we rely. No one can do everything, but everyone can do something. God will show you the next steps.
- 3. Prepare.** Develop an emergency plan for surviving storms, floods, fires, heat waves and other disasters that may affect your community. The Federal Emergency Management Agency has helpful planning guides. Consider how you can help other vulnerable people in your community be prepared for crises as well as your own family.
- 4. Serve.** Join or organize projects that assist those most at risk in your church or community. Reach out to neighbors who need your help. Serve with organizations both faith-based and secular that are working on climate change.

5. **Give.** Contribute to environmental missionaries, evangelical creation care organizations, and humanitarian ministries that are helping vulnerable communities become more resilient and adapt in the face of climate change.
6. **Conserve.** Live more simply and use energy more efficiently. Consider buying sustainable foods, recycling, composting, and switching to renewable energy sources and less polluting vehicles. Live with restraint. Take advantage of tax incentives to weatherize your home and business. Encourage your church and workplace to adopt money-saving energy efficiency measures. Make choices that express your love for God and care for his world and the people he has made.
7. **Advocate.** Join the NAE Advocacy Center at [NAE.org/takeaction](https://www.nae.org/takeaction) Support policies that promote responsible care of God's creation: Urge government leaders to support energy efficiency standards, clean (or low-pollution) transportation, low carbon goals, and sustainable agriculture. Ask our leaders to provide safe drinking water for our brothers and sisters, protect the air we and our neighbors breathe, and protect wildlife and their natural habitats. Let your members of Congress know that you want them to work together to develop sensible solutions to meet the challenges of a changing climate. Consider the policy proposals of those who seek your vote, and encourage others to do the same.



Galen Carey is vice president of government relations at the National Association of Evangelicals. He was a longtime employee of World Relief, serving in Croatia, Mozambique, Kenya, Indonesia and Burundi. He holds an M.Div. from Trinity Evangelical Divinity School and a D.Min. from McCormick Theological Seminary.

Conclusion

Evangelicals have a long history of caring about issues that cause poverty. One NAE member denomination, The Salvation Army, was founded nearly a century and a half ago specifically to reach out to those suffering from poverty. The National Association of Evangelicals was only two years old when it formed the War Relief Commission (now known as World Relief) to care for refugees during World War II. Even before that, of course, evangelical missionaries were building clinics, hospitals and schools around the world as integral parts of their witness to God's love and compassion through Jesus Christ.

It was a deep desire to follow the directions of Matthew 25 to care for “the least of these” that prompted the NAE to study the potential impact of environmental change on poverty. As evangelicals, we look to the Bible for guidance in all areas of life. While the Bible does not tell us specifically how to respond to a changing environment, it does give several helpful principles: Care for creation, love our neighbors and witness to the world. These principles inform our study and provide a basis for our action.

Together, we looked at the science underlying our understanding of climate and discussed what research suggests about the future of Earth's climate. We heard from brothers and sisters who are climate scientists and development workers. The story that science and experience are telling us about the Earth's climate is one that impacts vulnerable people around the world the most.

The threats we face are real, and the needs can feel overwhelming. We know that God is at work in our world, accomplishing his purposes. We follow the One who calmed the stormy seas, the One who conquered sin and death. We approach the future not with fear but with confidence and hope.

Loving the Least of These

Afterword Myal Greene

Too often, we don't recognize something as a problem until it affects us personally. One of the reasons it is hard to find common ground on climate change is because it affects each of us in unique ways.

As a boy growing up in the suburban United States, I was interested in environmental issues from a young age. I loved the outdoors. The thought that people's actions could damage the environment and squander our resources broke my heart. So I took action. I insisted on water conservation in our house. We were way ahead of the curve using cloth bags for grocery shopping way back in the 1990s, and I even organized a recycling program for my neighborhood. This was long before the city would pick up recycling. So I would collect bottles, cans and newspapers from other homes, and my mom would drive me to drop them off at the local recycling center.

Even though I was engaged in fighting climate change, it took me 20 years to truly understand the devastating effects of climate change on people's lives. In 2007, I moved to Rwanda, where almost the entire population relies on agriculture for their livelihoods. Farmer after farmer I met with spoke passionately about climate change, highlighting that the rainy season had been predictable for generations. But in recent years, the rains had changed and crop cycles were ruined. It was becoming harder to live off the land, and many families were suffering. That experience gave me a deeper personal understanding of why this challenge is so great.

Young people — our children, grandchildren, students, youth congregants and those we hope to bring to Christ — are inheriting a rapidly changing world very different from that of the 20th century. We are people of hope, and Scripture is clear: When one suffers, we all suffer. I hope this report helped you better understand how climate change affects the least of these. This report highlighted many of these stories: persistent droughts in Kenya, fires in Australia, hurricanes in Florida and respiratory stress in minority communities in the United States. We also read great stories of churches, agencies and individuals taking action to make a difference.

At World Relief, it is our work every day to stand with the vulnerable and equip churches to be agents of change in their communities. This means we have firsthand experience working with people facing the devastating effects of climate change. Our experiences around the world have taught us that if we want to be a catalyst for change that lasts, we have to address the root causes of poverty and not just address problems with temporary solutions. Even if we don't feel the effects of climate change as dramatically as our sisters and brothers in other parts of the world, we share one planet and must acknowledge that our actions have a direct effect on their lives.

None of us is exempt from Jesus' call to love the least of these, and right now, one of the best ways we can do this is by being both the reactive and the proactive people Jesus calls us to be. What we do has ripple effects on the most vulnerable of our world. Let's change how we live.



Myal Greene became the president and CEO of World Relief in 2021, after serving for 14 years with the organization. He holds an M.A. in global leadership from Fuller Theological Seminary and a B.S. in finance from Lehigh University.

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RELATED SCIENTIFIC RESOURCES

The U.S. National Academies of Sciences has produced innumerable reports and resources pertaining to climate change, found most easily at “Climate Resources at the National Academies” <https://www.nationalacademies.org/topics/climate>.

The U.S. National Oceanic and Atmospheric Association provides an annual report on climate along with many other resources <https://www.noaa.gov/climate>.

*Biblical and practical resources for further study and engagement can be found at NAE.org/lovingtheleast.

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Notes & Acknowledgements

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