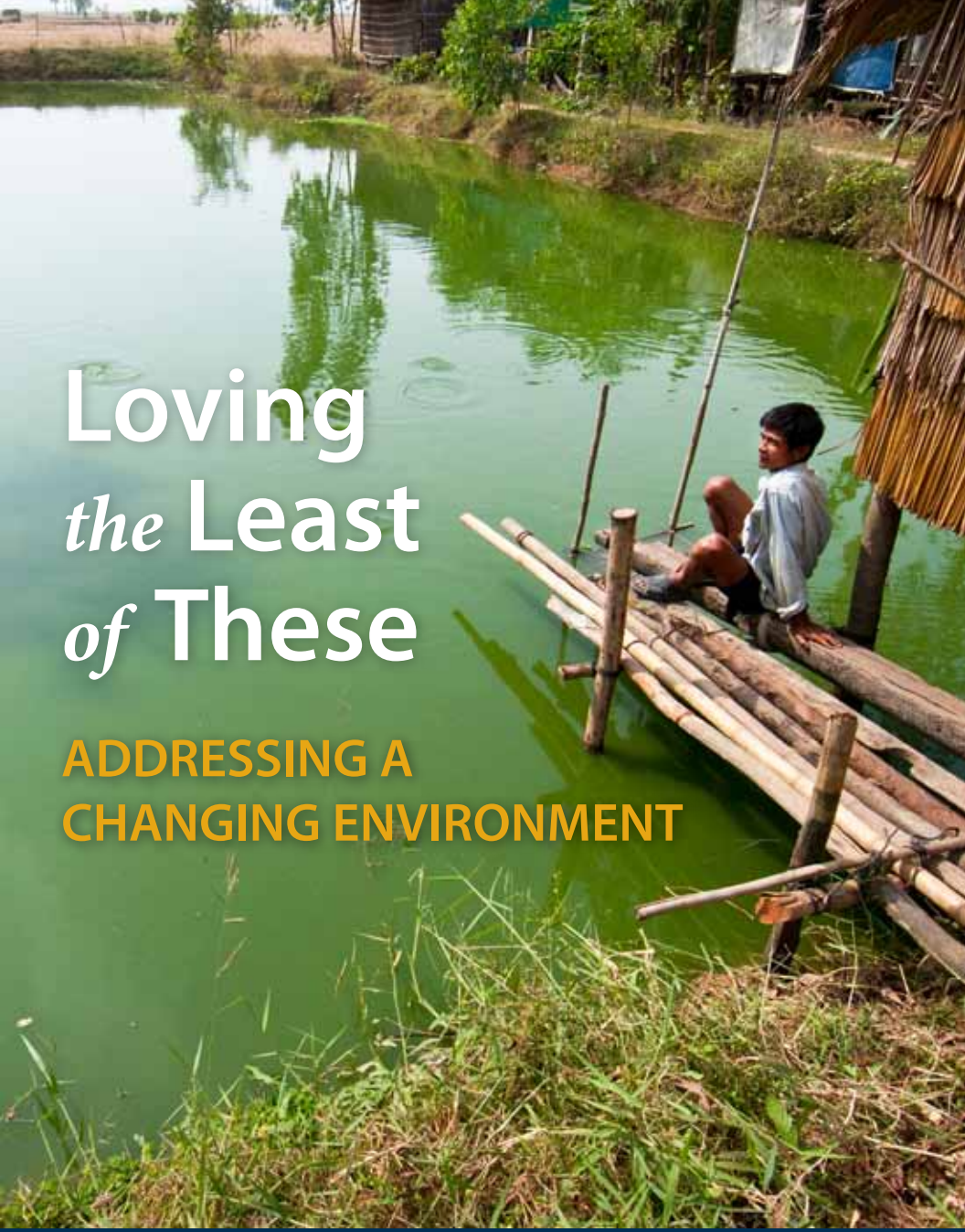

Loving *the* Least *of* These

ADDRESSING A CHANGING ENVIRONMENT

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Loving the Least of These: Addressing a Changing Environment
A conversation piece from the National Association of Evangelicals

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The mission of the National Association of Evangelicals is to honor God by connecting and representing evangelical Christians. Founded in 1942, the Association represents more than 45,000 local churches from more than 40 different denominations and serves a constituency of millions.

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PREFACE

Jesus said, "The poor you will always have with you" (Matthew 26:11). I thought that sounded like an excuse to ignore the poor. Then a pastor told me that Jesus was quoting from Deuteronomy 15:11 and that I should read the whole quote that Jesus knew so well: "There will always be poor people in the land. Therefore I command you to be openhanded toward your fellow Isrealites who are poor and needy in your land."

God calls us to care for those who are poor, vulnerable and oppressed. It is the Christian thing to do.

While others debate the science and politics of climate change, my thoughts go to the poor people who are neither scientists nor politicians. They will never study carbon dioxide in the air or acidification of the ocean. But they will suffer from dry wells in the Sahel of Africa and floods along the coasts of Bangladesh. Their crops will fail while our supermarkets are full. They will suffer while we study.

At the National Association of Evangelicals, we asked some of our Christian sisters and brothers to share their knowledge and experience regarding the effects of a changing environment on the poor. Our goal was to write a document useful to the evangelical community, pastors and laypeople. This is not an official policy statement of the NAE or its Board of Directors. Rather, it is a conversation piece. It is a call to care, to understand, to respond.

We heard stories from missionaries, statistics from scientists, and exhortations from pastors. Their words were collected into one document that was reviewed by two dozen Bible scholars, professors, and evangelical leaders—we wanted the thinking of many and not just of a few.

Please read with an open mind and with open hands. But most of all, join me with an open heart for the poor.

Leith Anderson

President
National Association of Evangelicals

A NOTE FROM THE AUTHOR

The changing environment is a serious concern around the globe. It is an issue for evangelical Christians today.

This document covers four ideas: a biblical basis for Christian engagement, a look at changing environments around the world, insight into how environmental variances affect the poor, and thoughts on what Christians should do. Each section includes text and examples, and each ends with a reflection from an expert to further the discussion.

First, we explore why evangelicals should even consider environmental change, focusing on the biblical call to honor God through stewardship, to love our neighbors, and to witness to the rest of the world. Ken Wilson offers a pastoral perspective on these ideas.

Second, we look at how environments are changing around the world and how to approach conflicting scientific data. Note that we do not include an exhaustive scientific look at climate change. Rather, this is a starting place for those who are interested to dig deeper. Scientist Thomas Ackerman reflects on his study of the world and God's word.

Third, we investigate how changes in the environment interact with poverty to worsen its effects by increasing conflicts and migration while decreasing the ability of the poor to improve their well-being. Development worker Chris Shore, of World Vision, shares the impact climate change has had on his work.

Last, we think about what our role as evangelicals should be and what, if anything, we can do to turn the tide for the sake of the poor. Galen Carey, vice president of government relations for the NAE, shares how he believes God is calling all evangelicals to care for the poor.

Climate change lies on top of many other factors affecting the natural world and affecting the impact of the environment on poverty. Photos and stories cited are examples of how environmental events affect the poor. We do not attribute any particular amount of any specific event to climate change, although such events are more likely in a changing climate.

More than two dozen people reviewed this document during various stages of the writing, another dozen offered their advice, and several others helped us find the people and information we needed. Thanks to all of them! All quotes, except those cited from a published source, are from phone and e-mail interviews I conducted.

One final note: This document is short. It was not our intent to include an exhaustive list of reasons to care for creation (there are many!) or to provide all the answers to the questions of why and how climate change is happening. Rather, this booklet serves as a starting point to think about and discuss how climate change affects the poor and what we, as followers of Christ, can do about it.

Dorothy Boorse

Lead Author
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INTRODUCTION

In 2010, Americans watched oil uncontrollably gush from a well drilled by the BP Deepwater Horizon oil rig in the Gulf of Mexico. Businesses were wiped out and livelihoods destroyed. Fishing suffered. Tourism stalled.

Although the oil spill was not related to climate change, it was eye opening for American Christians. Devastated coastal communities seen alongside a damaged environment helped us connect the ideas of care of our neighbors and care of creation in a new way. Some in the evangelical community spoke out with renewed vigor on the importance of caring for the world God has entrusted to us. For example, the Southern Baptist Convention passed a resolution on the disaster in the Gulf, calling on Christians to recognize the responsibility to care for the environment for future generations.[1]

Figure 1. *Images of the aftereffects of a huge oil spill from the Deepwater Horizon oil well in the Gulf of Mexico shocked many people and prompted a new look at the role Christians play in caring for the environment and those affected by the disaster. Photo courtesy of The Associated Press.*

On the other side of the world, also during the summer of 2010, a heat wave in Russia killed hundreds of people and triggered dozens of fires that burned for days around Moscow.[2] In Pakistan, floods affected more than 20 million people, damaged or destroyed almost 2 million homes, and devastated Pakistan's infrastructure, from irrigation systems to power plants.[3]

Figure 2. *Floods in Pakistan. Photo courtesy of Augustine Joseph.*

The magnitude of the heat wave and floods may have been related to phenomena that come with a changing climate. The Russian fires were increased by drought and by extremely warm regional temperatures.[2,4] The floods in Pakistan were worsened by severe heat and record-breaking monsoon rainfall, which were affected by the extremely warm ocean temperatures.[5] Although most scientists will not attribute any single weather extreme or natural disaster to climate change,[5] they agree that such events are increasing in frequency.[6-9]

What is climate change?

What does it mean for the poor?

What does it mean for Christians?

Read on, and consider.

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 principles that might be helpful: care for creation, love our neighbors, and witness to the world.

Love God, Care for Creation

One of the best places to start might be with Jesus' summary of the entire 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 many evangelicals, loving God means spending time in worship and prayer. This is foundational. But 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. We worship God by caring for creation. We don't worship creation. God created the world for his glory, and because of this, it reveals his glory to us:

> 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 also 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)

This special place, however, is not as owners. Although God gave humans dominion over the earth, the Bible is full of references to God's continued ownership. God does not give us complete control to do with creation as we will. Rather, the Bible makes it clear that our authority is only entrusted to us; God retains ultimate authority. "The earth is the LORD's, and everything in it" (Psalm 24:1).

Despite problems caused by human sin (see Genesis 3:17-29), the earth still brings glory to God, and God still cares for and sustains 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.

The term *stewardship* is often used to describe how we ought to think of our relationship to God's creation. We are like the servants in the parable of the talents (see Matthew 25:14-30). The natural world is a precious gift for which we will be held accountable. We hold it in trust for God, but we also hold it for the next generations. 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.[10]

It is tempting but 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 own 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, decisions such as polluting the oceans and deliberately or carelessly setting forest fires. God does not always choose to step in and save 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.

Exercising stewardship calls us to plan ahead and to use our God-given gifts, abilities and natural resources to care for this world he created. In today's reality, that includes considering our changing environment in order to evaluate how best to care for what he has entrusted to us.

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 of the poor and 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; the poor 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 25:36-44. 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" (v. 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" (v. 45). When we care for the poor, we are ministering to Jesus himself: To care for the weakest is to care for Christ.

There are millions of suffering people in the world, and thousands of Christians who offer them assistance. Unfortunately, the realities of climate change mean that those suffering millions may become billions. All of us who follow Jesus will need to respond.

Love God, Witness to the World

Evangelism 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).

In October 2010, more than 4,000 evangelical leaders attended the Lausanne Congress on World Evangelization in Cape Town, South Africa. 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."[11] At the conclusion of the 2010 conference, the Congress issued the Cape Town Commitment, which states three basic principles: Human beings are lost; the gospel is good news; and the Church's mission goes on.

The Cape Town Commitment recognizes that our care of creation affects our witness to the world, stating:

> 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.[12]

Sharing our faith with the world and seeing its people come to know Christ are integral parts of the Christian life. Many evangelicals support relief and development work, because they want to live out the command to care for the poor. We live out the gospel by meeting the poor and vulnerable where they are, showing them the love of Christ as we address their basic needs and point them to salvation in Christ.

Figure 3. *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.*

Moved by God's love for the vulnerable, evangelicals are quick to give when disaster strikes. When the earthquake hit Haiti in 2010, evangelicals donated millions of dollars, other resources, and time to meet the needs of the country, and they continue to take part in rebuilding the lives of the Haitians. This displays the love and compassion of Christ.

Yet 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. As we will see, changes in the environment are threat multipliers for the many problems faced by the poor around the globe. Recognizing this reality will strengthen our witness.

excerpt from the Cape Town Commitment:

Christ's Peace for His Suffering Creation

Our biblical mandate in relation to God's creation is provided in The Confession of Faith section 7 (a). 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, for example in farming, fishing, mining, energy generation, engineering, construction, trade, medicine. 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.

We lament over the widespread abuse and destruction of the earth's resources, including its bio-diversity. Probably the most serious and urgent challenge faced by the physical world now is the threat of climate change. This will disproportionately affect those in poorer countries, for it is there that climate extremes will be most severe and where there is little capability to adapt to them. World poverty and climate change need to be addressed together and with equal urgency.

A Pastor's Perspective

God is a relational God—a Father loving a Son, ever generating the life-giving Spirit. Things are more connected than we can possibly appreciate. We were created by God as part of a network of creatures who share his life breath—affecting each other and affected by the whole. As God's image bearers, we are to rule under his authority and on his behalf—tending creation as stewards (see Genesis 1:27-28; 2:15). Sin, however, separates us from God, from one another, and from our divine purpose. We lose our heart for the most vulnerable among us, including future generations who have no voice but God's.

Those who study the climate cite an accumulating body of evidence pointing to an increase in average temperatures across the globe. These climate scientists, thousands of them from many nations, are convinced that the rise in temperatures is real and dangerous. They dicker over the details, as expected. But the vast majority of them concur: Human activity, especially the burning of fossil fuels that release heat-trapping gases into the atmosphere, worsens the problem. Of all the possible causes that have been identified, human activity is the only one we can do something about.

The predicted effects of the increased carbon levels in the atmosphere are playing out: more intense heat waves; more intense flooding in some areas and more intense drought in others; ice sheets melting and sea levels rising; oceans becoming more acidic. The rapid pace of the changes is placing a burden on living creatures, including humans, and especially on those who most depend on the natural environment—the vulnerable poor. The poor have fewer options when their homes are flooded or their cities are hit by a heat wave or their farmland is affected by drought.

Scripture challenges us about our role within creation. We are co-regents with God, for better or worse. The choice is ours to make. Until our redeemed selves are revealed, the creation groans, waiting for us to exercise our stewardship for blessing (see Romans 8:19). This redemption is the work of Jesus, "the image of the invisible God, the firstborn over all creation" (Colossians 1:15).

Jesus, our redeemer, calls us to join him in caring for the poor, to whom the kingdom belongs (see Matthew 25:38-46). We cannot care for the most vulnerable among us without caring for the creation on which they depend. If there is reasonable evidence that our actions may be harming vulnerable populations and future generations, then we violate prudence and justice to insist on "absolute proof" before taking steps to lessen the harm. We risk being counted among "those who destroy the earth" (Revelation 11:18).

God grant us the grace to rise to this challenge with wisdom, in the name of the Father, Son, and Holy Spirit, who together hold all things.

Ken Wilson
Senior Pastor, Vineyard Church of Ann Arbor, Michigan

SECTION 2

A CHANGING ENVIRONMENT

Climate change is hard to understand; it is controversial, and it is more complicated than commentators and journalists often admit. Yet seeking to understand it is important, because climate impacts the poor and vulnerable. In this section, we will 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 the average weather patterns that occur 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.[13] "Greenhouse gases" (such as water vapor, carbon dioxide and methane) absorb infrared, or "heat," radiation from the earth's surface. This trapped energy acts 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.[13]

Climate is dynamic, not static, and it changes over time due to external drivers (called "forcing factors") and natural internal variability.[14,15] 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.[14] Occasionally, large volcanic eruptions temporarily cool Earth by creating particle clouds that reflect solar radiation.[16] Internal changes alter the distribution of energy in the ocean and atmosphere; for example, the El Nino-Southern Oscillation (ENSO) periodically creates pockets of warmer or cooler water in parts of the oceams, which affects some sea surface temperatures and mid-latitude weather.[15] Within an 11-year span, sunspot cycles can cause small variations in climate.[15]

These processes are well understood, even if they are not 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 the one mentioned above, greatly affect year-to-year variations. However, the global average temperature has risen at a rate that is most likely greater than natural variability can account for. Evidence suggests that an increase in carbon

dioxide and other greenhouse gasses accounts for much of the warming over the last 50 years.[14]

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 40 percent in the atmosphere.[17] When caused by humans, such factors that affect climate, like the increase in carbon dioxide emissions, are called, "anthropogenic (human-caused) forcing factors."[15]

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 resulting in methane and carbon dioxide emissions and human-caused deforestation. Those who take this approach may fail to recognize sufficiently 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. On the short term (a few years to a few decades), natural variability is most likely to play the largest role. On timescales of several decades to a century, human activity is most likely to be the dominant driver. One way to visualize these two effects is that natural variability (and intermittent volcanic eruptions) produces 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 a slow, but steady, forcing due to human activity that is driving an overall increase in Earth's surface temperature.

This is explained by a recent National Academy of Sciences report:

> Most of the warming over the last several decades can be attributed to human activities that release carbon dioxide (CO_2) and other heat-trapping greenhouse gases (GHGs) into the atmosphere. The burning of fossil fuels—coal, oil, and natural gas—for energy is the single largest human driver of climate change, but agriculture, forest clearing, and certain industrial activities also make significant contributions. Natural climate variability leads to year-to-year and decade-to-decade fluctuations in temperature and other climate variables, as well as substantial regional differences, but cannot explain or offset the long-term warming trend.[18]

Changes in the Environment

We see evidence that climate is changing now.[19] Some of these evidences include the warming of oceans, melting of ice caps, rise in atmospheric temperature, and increased evaporation. The National Oceanic and Atmospheric Administration (NOAA) recently released a report explaining ten of the evidences for climate change, as seen in the figure below.

Our growing understanding of the physics and chemistry of the atmosphere helps us predict how temperatures will rise as greenhouse gases increase. Scientists predict that the temperature of the atmosphere will increase between 3.5 and 11 degrees Fahrenheit by the end of this century.[20]

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 to 14 degrees Fahrenheit. That change occurred over about 5,000 years, and the climate has been quite stable for the last 10,000 years, with changes of less than 2 degrees Fahrenheit.[21-22] Even a few degrees of temperature change over a century mean a huge increase in heat energy for the atmosphere and ocean. A rapidly warming world will yield erratic weather, melting ice and glacier loss, rise in the sea level, changes to agriculture, loss of forests, decline of fisheries, and increased human health issues.

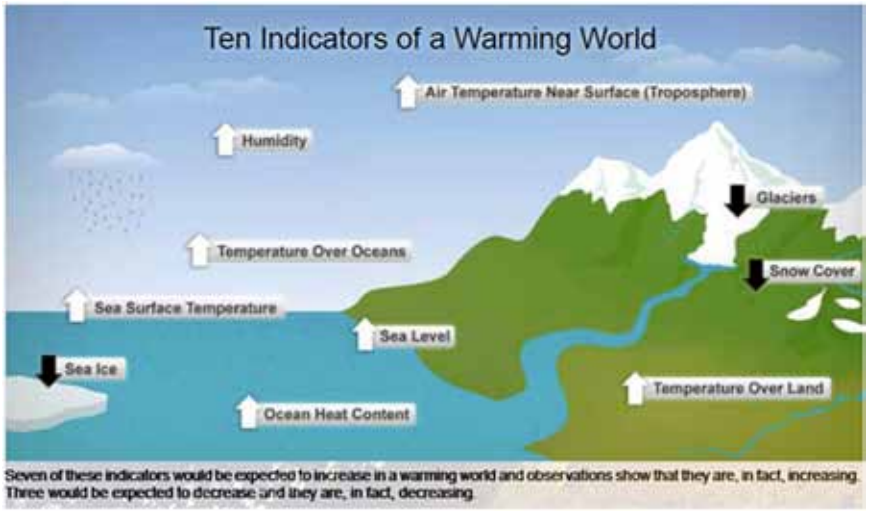

Figure 4. *There are multiple effects of climate change already occurring.*[19]

Erratic Weather

In Chicago in 1995, nearly 700 deaths were attributed to heat. In the summer of 2003, Europe experienced intense heat waves, estimated to be the highest in 500 years.[23] Heat-related deaths were estimated at 45,000 people or more.[24] Heat waves tend to kill the sick, the old, and the infirm, especially through cardiovascular failure and air pollution.[25] We can't attribute all heat waves directly to climate change, but climate change will likely increase their frequency.

In contrast, the winter of 2009–2010 was extremely harsh in parts of northern Europe.[26] This cold weather is partially attributable to changes in wind currents. Warm airflow was reduced in Europe, while arctic winds increased. Due to the complex feedbacks in the movement of both ocean and wind currents, climate change may redirect wind currents, warming some parts of the globe while causing extreme cold events in others. Consequently, even though some places were exceptionally cold, the period from January to April 2010 was the warmest on record for the planet.[27]

Careful analysis leads to the projection that summers such as the extremely hot one in Europe in 2003 are likely to be average by the middle of the 21st century and considered cool by the year 2100.[28]

We are also likely to experience an increase in storm destruction and severity. A warmer world will lead to more evaporation of water from the surface, more water vapor in the atmosphere, and more precipitation on average. This means a tendency toward more intense rainfall events and also less rainfall in some semi-arid areas.

There is no 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.[29] By one estimate, 250 million people in lower-income countries were harmed by extreme events from 2000 to 2004.[30] This is many times higher than the impacts in high-income countries, in part because poorer people often have to live in vulnerable areas.

Melting Ice and Glacier Loss

Polar ice, glacial ice and arctic permafrost are melting. This melting will have a number of effects on low-lying areas, polar regions and glaciers.[25]

Melting will have an impact on wildlife and cause the release of even more greenhouse gases.[31-32] One of the ways 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.[33] There are negative feedback loops as well. An

Figure 5. *Glaciers in the Andes are drying. Many people must adapt to less predictable water supplies as glacial streams and rivers dry. Photo courtesy of Rob Broek.*

example of a negative feedback is increased plant growth in some places as carbon dioxide increases in the atmosphere. Those negative feedback loops are helpful, but they are not enough to keep climate from warming overall.[34]

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 and hence, global climate, but also has important consequences on a smaller scale. 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 has made glaciers melt more rapidly than they otherwise would. Already, mountainous countries that depend on glacial melt experience limited water resources.[35-36]

In 2009, National Geographic News reported that the glaciers at Montana's Glacier National Park may be gone by 2020, endangering the region's wildlife, although some scientists are cautious about predicting the glaciers' demise. What is generally agreed on is that the glaciers of Glacier National Park shrank by 67 percent in the past 100 years.[37] Worldwide, the pace of glacial melting is far above what we would expect if there were no changes in the climate.[38]

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, but only in a small way. From 1870 until 2001, sea levels rose about 7.8 inches.[39] Conservative lower estimates of future sea level rise are between 1.3 and 3.2 feet by the year 2100.[40]

Coastal Alaska is vulnerable to the rise in sea level.[41] Shishmaref, Alaska, is a sparsely populated community on a remote arctic island. The Native

Figure 7. *Vietnam is another flood-prone country. Photo courtesy of World Vision.*

American inhabitants live on a diet of seal and other marine life. But the loss of arctic ice, the rise of the sea and an increase in severe storms have washed away part of the town and made it difficult for the residents to remain. Hunting and fishing are more dangerous, and a traditional way of life is collapsing. Today, the people of Shishmaref are trying to raise funds to move to a new location.[42]

Tuvalu, a tropical island in the South Pacific, is the second smallest sovereign nation in the world. Its 12,000-plus inhabitants all live less than 14 feet above sea level. Like Shishmaref, Tuvalu is 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.[43-44]

Agriculture

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.[45] Australia, already the driest continent, is likely to become drier, as are parts of sub-Saharan Africa.[46-47] Scientists estimate that with a 3.5- to 4.5-degree-Fahrenheit global temperature increase, an additional 2.4 to 3.1 billion people will experience water stress.[48] This will deprive millions of food and income.

In addition to water stress, temperature rise affects plants by making them grow more quickly. Increased carbon dioxide by itself also increases plant growth. While this might sound desirable, rapid growth often results in lower crop yields. For example, some studies have estimated that a 1.8-degree-Fahrenheit temperature rise will result in a 1 to 9 percent decrease in corn production.[48] Other crops show similar trends. In a few cases, crop yields rise with increased temperatures, but this is unusual. Unfortunately, many weeds respond better to an increase in carbon dioxide than do cash crops.[48]

Loss of Forests

Worldwide, forests play a great role in the lives of the poor, providing fuel, food, and other resources. Climate change worsens forest loss, acid rain, and insect damage to trees.[46,48-49] Damaged forests have a difficult time slowing floods and taking up carbon dioxide. In the southern United States, forests provide thousands of jobs.[50] The forest economy and the people it supports are threatened by a drier, warmer future.[51]

For example, the southern United States 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.[50] A drier, warmer future, with more fires and outbreaks of beetles, threatens this forest economy and the thousands

of people it supports.[51]

Alaska has 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 than they used to. Increased problems with pests and fires could cause a loss of 50 percent of the harvestable timber in Alaska, at an estimated cost of $332 million.[52]

Figure 8. *A forest of dead and dying trees in the American Southwest. Photo courtesy of Storm Usrey.*

Decline of Fisheries

Rising temperatures alter ecosystems and even cause the extinction of species. An increase in average annual temperatures of only 4 to 8 degrees Fahrenheit will put between 20 and 30 percent of plant and animal species at risk.[53] Many people rely on wild animal species just as others rely on forests. One 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. 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.[54] Over-irrigation and pollution are already harming an important African water resource. Lake Chad has a $45 million fishing industry that supports 150,000 fishermen. Unfortunately the lake has lost 92 percent of its surface area in 40 years.[55] A changing climate brings the lake just that much closer to collapse.[56] Globally, fisheries contribute between $225 and $240 billion to the economy annually. Researchers estimate that healthier fisheries

Figure 9. *Gathering precious water in Chad. Lake Chad provides water to more than 20 million people living in the four countries that surround it. Photo courtesy of Tearfund.*

could have prevented malnourishment for 20 million people in 2000.[57] However, fisheries are not only stressed by harvest and pollution but also damaged by changes to the climate.

Human Health Challenges

The effects of a changing climate on human health include an increase in food-borne illness such as salmonella, an increase in tropical diseases, malnutrition from crop failures, cardiorespiratory distress from heat and airborne pollution in cities and other medical problems.[58-59] Many of these problems are already more common in poor populations.[60-61] One example is the effect of heat waves, which can directly kill thousands, as Europe experienced in the summer of 2003.[23]

But not all the changes are negative. There are some positive impacts. 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. However, he said that careful studies demonstrate that adverse impacts will far outweigh positive effects, more so as temperatures rise more than 2 to 3.5 degrees Fahrenheit above pre-industrial levels.[62-63]

All over the globe, scientists have come to the same conclusions. In June 2009, the Academies of Science of 13 countries (Canada, France, Germany, the United Kingdom, Japan, Russia, the United States, Italy, India, China, Mexico, South Africa and Brazil) issued a statement 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.[64]

In spite of the fact that scientific professional societies (including the American Association for the Advancement of Science,[65] American Chemical Society,[66] American Physical Society,[67] American Geophysical Union,[68] and American Meteorological Society[69]) attribute much of today's warming of the globe to human activity, many people are still unsure. Let's look at some ways to evaluate evidence when science seems to be controversial.

Evaluating the Evidence

There are differing claims about any scientific controversy. It is hard to sort through the media hype to discover the truth. 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.

However, in issues that are highly divisive and argued in the public forums, the 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 lie with 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.

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 (NAS) and other professional societies represent the conclusions of tens of thousands of scientists.

One of the advantages of such statements is that they remove individual biases scientists may have. Scientists don't all vote the same way, don't like the same activities, may not even like each other, and would not agree to something as a group unless they thought it was accurate. Check the resource list for some reputable sources.

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.

Moving Past Controversy

In 2009, e-mails and documents released by hackers and taken from the University of East Anglia Climate Research Unit cast doubts on climate change research. Across the world, people felt shocked by what appeared to be fraudulent practices on the part of climate scientists. However, three independent reviews of the scientific center and its staff,[70-73] as well as a review of a collaborator at Pennsylvania State University,[73] agreed that the conclusions of the scientific community were sound. Other authorities including the National Academy of Sciences have reached similar conclusions independently.

For better or worse, the events of "Climategate," as it was called, shook many people who thought they understood climate change. It decreased trust of the scientific community. Several of the reviews, while holding that the science was sound, found that scientists did not share information well, or the processes they worked under were not open enough. These are serious problems in communication, and as a result of the scrutiny, stronger policies have been put into place to make sure data is shared and models are transparent.

In addition to reviews of the University unit, there were reviews of the Intergovernmental Panel on Climate Change (IPCC) itself and its 3,000-page 2007 report. One review of the IPCC 2007 report was by a panel commissioned by the United Nations and led by a team of independent volunteer scientists from several countries.[74] They gave the IPCC scientific process a mixed review. They concluded that the 2007 IPCC report was well supported with very few errors and with well-supported main conclusions, particularly in the first three volumes. However, the panel concluded that some of the summary statements in the separate summary volume focused narrowly on individual negative consequences. They also were critical of the process in place to deal with fact checking tens of thousands of statements and sources, although the errors that have been found have been very few.

The same climate trends that scientists were describing before the

controversy about procedure arose have been confirmed by subsequent research. For example, a report of a survey of all of the research since 2006 on climate change commissioned by the Swedish government found that "new research published since 2006 confirms earlier research results concerning ongoing climate change, human influence and possible future climate change … we believe that the published results show that some of the effects of continued global warming are more severe than previously thought and that future climate warming may be greater than previously estimated."[75]

One healthy outcome of these problems has been a change in the way some scientists operate–especially in communicating, transparency and data sharing. Such changes needed to occur. However, the e-mail leak of 2009 did not change the conclusions of scientific studies. All of the subsequent evidence and extensive reviews have upheld the scientific basis of climate change in spite of procedural flaws. Unfortunately, one of the effects was an erosion of trust of scientists by many in the general public. It may take time for the scientific community to regain that trust. New procedures and transparency as well as the voice of Christians who are active in peer-reviewed climate science will help. Thomas Ackerman, who gives expert voice in this document, is one such scientist.

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 gases. 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 Svente 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 hypothesis. 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 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 nor 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 the 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.

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SECTION 3

HOW CLIMATE AFFECTS THE POOR

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.[76]

Peter Vander Meulen, director of the Christian Reformed Church's Office of Social Justice, shares the story of one Bangladeshi farmer. Alliuddin owns less than three acres of land and successfully manages multiple small, irrigated vegetable plots to produce enough food and income to feed, house and clothe his family. 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

Figure 10. *Alliuddin and his family. Photo courtesy of Peter Vander Meulen.*

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 500 million small farms around the world, farmers like Alliuddin feed more than 2 billion people, almost a third of humanity. 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.[77-78]

Stories like Alliuddin's illustrate how hard it is for the poor to deal with changes in the environment. The impact on the poor can be summarized as four main problems: (1) Poor people are more affected by disasters. (2) The cost prevention and survival (mitigation and adaptation) are higher relative to their income. (3) They are more likely to be displaced, and (4) they are more likely to be affected by ensuing conflicts.

Table 1. *A Changing Environment and Poverty*

Problem	Impacts on the Poor	Example
Disasters	The poor become more vulnerable after disasters as they often have no buffer to deal with crop failures or physical damages to their homes. They are less likely to have flood or other disaster insurance.	After a flood in Peru in January 2010, villagers struggled to rebuild due to a lack of resources and the closing of a nearby historic site, Machu Picchu, which resulted in millions of dollars in lost tourist revenue.
Cost of Adaptation	The poor 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, they do so at the sacrifice of other necessary items, such as food, education or health care.	Erratic rain over the last decade has forced farmers in the village of Ndieyat in Kenya to adjust. Farmers now plant almost anytime it rains, because they don't know if the rains will continue. Still the additional costs for extra seed do not guarantee crop success.
Displacement	Migration disrupts livelihoods and often affects host and transit countries negatively.	Millions of Pakistanis were displaced by the record-breaking 2010 floods; many more refugees are expected in the next years.
Diminished Resources	Lack of resources leads to violent conflicts over territory and goods.	Nomadic herders, fishermen and farmers in Nigeria clash over resources such as land and water.

Natural Disasters

The poor, especially in poor nations, are the most vulnerable to abrupt changes in the environment.[79-80,34] In one study on the effect of climate unpredictability, researchers found that in 16 poor nations, poor people will become more vulnerable if climate continues to change, because they have no buffer to help them deal with crop failures or other sudden changes.[81] Similarly, poor people are less likely to have flood or other disaster insurance or to be able to manage in the case of disasters.

Figure 11. *Erosion on this Bangladeshi river has caused 400 families to lose their land over a period of years. Photo courtesy of Peter Vander Meulen.*

The cost of responding to changes in the environment can be high for rural villagers. After a devastating flood in Peru in January 2010, Jerrell Richer, director of the Goshen College Study-Service Term in Peru, told this story:

> Four consecutive days of rain inundated the region around the villages of Lucre, Huacarpay, near the town of San Jeronimo. The Cusco airport was closed, bridges were washed out, and the nearby railway line was partially destroyed. Several weeks later, students from Goshen College went to assist with the cleanup in a rural area devastated by the floods. People lost their homes and most, if not all, of their possessions. They were relocated to a tent city erected by the government on a nearby ridgeline.

The students assisted with cleanup and attempted to help with reconstruction, which was slow going due to lack of resources in this very poor community. Government promises of support were unfulfilled. There was very little money to purchase construction supplies. This poverty was made even worse by the closing of the nearby historic site,

Figure 12. *Goshen College students help rebuild after extreme storms hit Peru. Photo courtesy of Jerrell Richer.*

Machu Picchu, sacred city of the Incas and the most visited tourist destination in South America. Many foreign tourists cancelled trips, which resulted in millions of dollars in lost tourist revenues to the region.

The Peruvian floods were not due solely to climate change; they resulted from several causes. But climate change, by increasing the likelihood of extreme events, makes the livelihood of Peruvians more precarious.

Adaptation

Adapting to a changing environment by moving, building safer structures, or erecting water tanks costs money. For example, an initial estimate of the cost of adapting to changes in the climate (activities such as planting flood-tolerant crops; building new roads, levies, and bridges; building water storage in dry areas; moving out of flooded lands; growing drought-tolerant crops; and preventing the spread of disease) was $40 to $170 billion per year, about the cost of three Olympic Games series. However a subsequent, more-detailed assessment suggested that this estimate was too low.[82] A recent 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 likely that more people will fall into poverty if climate change undermines their current livelihood strategy.[83]

The improvement in predicting weather and developing early warning systems offers opportunities to prevent the loss of human life that comes from disasters such as the storms that caused flooding in Pakistan in 2010.[84-85] Such warning systems are a part of climate change adaptation and will require substantial investments.

Displacement

The effects of storms, floods and droughts on individuals are obvious problems. But changes to the environment can also be a serious concern for societies at large, as groups of people migrate to seek more sustainable livelihoods.

Many environmental refugees are expected as desertification, rising seas, disasters and wars produce climate refugees.[86-88] Bangladesh is expected to produce 20 million climate refugees by the year 2030.[87] Low estimates suggest upwards of 50 million environmental refugees by 2050; many estimates are higher.[87]

In 2008 alone, an estimated 36 million people were internally displaced as a result of sudden-onset natural disasters, including 20 million displaced by disasters associated with climate change.[89] In addition, it has been recognized that more gradual changes, such as rising sea levels, desertification, water scarcity and decreased agricultural output will cause people to migrate in order to support livelihoods.

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 to become more limited. In a 2009 study on the estimated effects of climate change on Africa, researchers concluded 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."[90]

Conflicts over water are already common in many parts of the world and are likely to increase as the climate changes.[91-92] In Nigeria, for example,

Figure 13. *This young Bangladeshi girl struggles with the difficulties that come from poverty and climate change. Photo courtesy of Peter Vander Meulen.*

nomadic herders, fishermen and farmers clash over resources such as land and scarce water.[93] This conflict is worsened by drought, one of the outcomes of climate change.

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.[94] In a 2010 report the Department of Defense stated, "While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict. ... In addition, extreme weather events may lead to increased demands for defense support to civil authorities for humanitarian assistance or disaster response both within the United States and overseas."[95]

Climate and Vulnerable U.S. populations

Changing climate isn't only an issue that affects those in third-world countries. A recent study showed that in the United States, poor people and minorities are hurt most, a disparity called "the climate gap."[96] 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, the poor and those with medical problems are more vulnerable to heat waves.[97] In the 1995 heat wave that killed 700 people in Chicago, those without transportation and air conditioning were more likely to die.[79] By the end of the century, heat waves as intense as the one in 1995 could occur every other year. And that's a low estimate. Other frequency estimates are higher.[80]

African Americans are 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 U.S. African Americans' income is spent on energy, and they are less likely to have insurance.[98]

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.[99] 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."

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 whom World Vision serves throughout the world, climate change is not a fictitious or a 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 the poor 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, 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. So any weather shock will drive her into deeper poverty, forcing

Figure 14. *Rural farmer and her children work in the fields. Photo courtesy of World Vision.*

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:

- Partnering with the World Bank and the people of Humbo, Ethiopia, to establish Ethiopia's first-ever carbon-trading forestry project. The project has been hugely successful, 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
Director, Environment and Climate Issues
World Vision International

4 Section

WHAT SHOULD WE DO?

If the things we have been reading are true—that we are called to love God and to love our neighbor, that our climate is changing, and this change will affect the poor most of all—then we, the evangelical family, have no choice but to act on this problem. What might such a response look like?

Pray for Wisdom

Evangelicals believe in the power of prayer. We should pray for discernment as we sort through confusing messages about climate change. We should pray specifically for those who are likely to be most affected by potential changes to our climate. Write and ask missionaries and aid workers you support how climate change may affect them, now or in the future. Commit to praying for them on a weekly basis. Invite others to join you in concern, study and prayer. Finally, pray for our leaders, who must work through complicated issues surrounding climate change.

Make Lifestyle Changes

People have long adapted their life habits and systems to the energy that is available to them. The challenge for us is to make changes voluntarily, for the sake of the poor and for the sake of God's creation, before they are forced on us by world events. We can do this with some of the following changes:

Live more simply. Most Americans can make lifestyle changes that will reduce their energy requirements. We can learn godliness with contentment and avoid being enslaved to materialism (see 1 Timothy 6:6-9).

Use energy more efficiently. Most of us waste a significant portion of the energy we consume. We could enjoy many comforts while using less energy. Churches should lead the way in energy efficiency, and many of them are beginning to do so! Our houses of worship should be models of good stewardship.

Switch to renewable energy sources. Several alternative energy options exist that do not increase greenhouse gases. These include wind, solar, hydroelectric and geothermal power. The challenge will be to develop them as viable energy sources on the scale we need and at a price we can afford.

Consider energy policy reforms. If we had to pay the full cost of the energy we use, we would certainly use it more wisely. Changes to our energy policy should be carefully studied and implemented in a way that rewards conservation and efficiency while cushioning the impact on those with limited means.

If you are unsure about the science of climate change, implementing some of the above changes is still beneficial for other reasons. Reducing the

Energy Star for Congregations

Saving energy in your church building makes common sense. The money saved can go into your missions budget, can pay for that youth minister you've wanted to hire. The list of benefits is endless. For this reason, many churches are using the Energy Star for Congregations program, a set of resources for congregations, in order to identify ways to lower their energy use. One resource is the pamphlet: Putting Energy into Stewardship: Energy Star Guide for Congregations.

Prestonwood Baptist Church in Plano, Texas, is an example of a church that successfully lowered its energy use. By careful planning, they made changes in 2006 and 2007, cutting their energy use by 33 percent, and lowering their annual energy cost by $725,000. At the same time, they are saving 10.5 million pounds of CO2 from entering the atmosphere. In 2007, the church won the 2007 Energy Star Award for Small Businesses and Congregations.

Other churches, both small and large, are making similar conservation efforts, saving money and protecting creation and the poor at the same time.

http://www.energystar.gov/ia/business/small_business/congregations_guidebook/Cong_Guide.pdf

Energy Star. 2007. In the News: Prestonwood Baptist Church. 2007 Energy Star Award for Small Businesses and Congregations, U.S. Environmental Protection Agency, U.S. Department of Energy

use of fossil fuels will preserve our limited supply for future generations, improve health through lower air and water pollution, and reduce dependence on foreign oil. Reducing our consumption will save money, which we can use to further the work of God's kingdom. Our care for creation will reduce revenues to regimes in oil-producing countries, some of which sponsor terrorism and/or religious persecution. And when nonbelievers see Christians take the lead in caring for the poor and for God's world, we win a hearing for the gospel.

Support Communities' Efforts to Adapt

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 be proactive—to help people prepare for coming disasters.

Millions of the world's poorest face potential hardship and suffering from changes in the environment. We can contribute directly to evangelical relief-and development-agencies that are planning for adaptation, poverty relief and development, conflict resolution and disaster relief both in the United States and abroad. We can also support international assistance by our government. Every nation, including our own, needs to analyze its vulnerabilities and make appropriate plans. We can encourage communities to incorporate consideration of climate change into their long-term plans. There are, of course, many other things evangelicals can do, and this is not an exhaustive list.

Recent years have seen considerable debate, at both the popular and the scientific level, about the reality, causes and potential impact of changes to our climate. While there are disagreements over details, a broad consensus is emerging among scientists. If these experts are right, our changing climate threatens the health, security and well-being of millions of people who are made in God's image. If our actions are contributing to the problems, making a bad situation worse, we need to know about it. And if there are things we can do to protect our neighbors, both at home and around the world, we should be ready to do our part.

The scientific consensus is not yet widely accepted within the evangelical community.[i] There are disagreements about the facts and predictions, suspicions about the motives of those who propose solutions, and concerns about unintended consequences if we adopt the recommended remedies. These are important issues that need prayerful study and discernment. Lives are at stake—lives of precious human beings for whom Jesus died.

Precisely because we are pro-life and pro-family, we are not content to roll the dice with our own and our neighbors' future. We take appropriate precautions. We pray for God's deliverance, and we seek to align our lives with our prayers. Providentially, some of the behaviors that would mitigate climate change are also beneficial for other reasons.

Reducing our consumption of foreign oil would improve our peace, security and well-being by limiting financial transfers to regimes that abuse human rights and sponsor terrorism, while also improving our trade balances. It would also preserve a valuable nonrenewable natural resource for future generations. Burning less coal would lead to cleaner air and improved health. Improving energy efficiency in our cars, homes and offices would free up money for investment in our families and businesses, and for advancing the gospel and caring for the poor around the world.

Some commentators rightly maintain that poor countries need affordable energy to grow their way out of poverty and finance environmental protection. Using market mechanisms and price increases to reduce fossil fuel usage, they warn, could have a disproportionate impact on the poor by denying them access to the energy they need. Could the cure be worse than the disease? We need to consider the very real possibility of unintended consequences.

However, it would be tragic and shortsighted to advise poor countries to follow the Western pathway to wealth through profligate nonrenewable energy consumption. Such a strategy would almost certainly hasten the negative impacts of climate change. In any case, the cost of oil, in particular, is likely to rise dramatically as demand increases and supplies plateau. A development plan for poor countries that relies on cheap fossil

fuels seems doomed to failure. Instead, all countries, whether rich or poor, will need to work toward more sustainable development pathways. Meeting the needs of future generations for clean energy and sustainable development will require extraordinary efforts on the part of scientists, engineers, inventors, researchers, politicians, and others using their God-given talents. The Church can support those working in these fields with prayer and encouragement. As the NAE has said elsewhere, "Human intelligence and will, guided by God's grace, can find ways to secure greater measures both of peace and of freedom, and to preserve and protect the dignity of man."[100]

We do not know what the future holds. But we do know who holds the future. "The gracious end of human history has been assured in the resurrection of Jesus Christ: God's kingdom will triumph, in God's time beyond time."[100] So we approach the future not with fear but with hope.

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[i]According to research published by the University of Maryland in 2011, 31 percent of evangelicals believe that "most scientists think that the problem of climate change is urgent and enough is known to take action." But among evangelicals who are aware of the scientific consensus, nine out of 10 say preventing climate change is an important goal.

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CONCLUSION

In 2004, evangelical leaders 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.[101] The document identified seven areas of common concern: religious freedom, marriage and family, sanctity of life, poverty, human rights, peace, and care of creation.

Arguments can be made for the priority of one or another of these concerns, but the big picture is that they are closely interrelated. The health of our nation, and the world, depends on progress in each of these areas. For example, the genocide in Darfur, in which Sudanese families have been torn apart, women raped, and thousands murdered, arose in part from a conflict over water and grazing rights. If millions of climate refugees are forced to relocate, this will have a profoundly destabilizing impact on world peace and security. Environmental conflicts, in other words, often threaten the sanctity of human life, the integrity of the family, and the ability of government to protect peace, human rights, individual freedoms, and national security.

In the biblical story of Joseph, the climate changed, and drought came. The people of Egypt might have starved. But, as J. Matthew Sleeth, MD, author of *Serve God, Save the Planet: A Christian Call to Action*, says, Joseph was wise and stored up crops for the years of hardship. Sleeth sees a clear parallel to today. "There was a climate crisis. The people obeyed. They conserved, and lives were saved." Today, Sleeth says, we need to plan ahead for what climate changes might bring.

Wealthy people and nations may be affected by changes to the climate, but we have resources to adapt. The poor do not. As followers of Jesus, committed to justice and compassion, we seek to understand the potential threats to the lives and well-being of poor and vulnerable people. We do not claim to know exactly what will happen as temperatures rise. But we can come alongside the poor and make it possible to adapt to rapid changes, and even by our own choices, to lessen the impacts of climate change.

Evangelicals have a long history of caring for the poor. One NAE member denomination, the Salvation Army, was founded nearly a century and a half ago specifically to reach out to the poor. The NAE 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 deep concern for the poor that prompted the NAE to study the potential impact of climate changes on the poor.

This is not an issue one person can solve, but together, by God's grace, we can make a difference. It would be easy to feel overwhelmed. We could throw up our hands in despair. Our faith, however, encourages us to persist: "Let us not become weary in doing good, for at the proper time we will reap a harvest if we do not give up" (Galatians 6:9).

Fig. 15. *Girl in Cambodia. Photo courtesy of World Relief.*

AFTERWORD

I arrived in Port-au-Prince, Haiti, on a rainy night in the late 1990s. As I stepped outside, I heard someone say, "Follow me." I found myself in water up to my ankles as I ran to a waiting vehicle. As we drove through the streets, I heard screams and cries coupled with the sounds of falling metal.

The driver said, "Those are people in Citi Soleil losing their homes. It happens every time we have a hard rain." I later visited Citi Soleil and understood the incredible fragility of what has been called one of the largest and most vulnerable slums in the world.

I was not aware of the denuded mountains, the overworked soil, and the use of chemicals that damage Haiti's ecosystems, making the country more vulnerable to floods and other disasters. A devastating earthquake in 2010 brought these issues to worldwide attention.

In Zambia in 2009, I watched an AIDS widow and mother of four clutching a handmade shovel and scratching the soil's hard surface. The energy needed far surpassed her strength. Seasons are now unpredictable. The rains barely came during the rainy season, followed by an early drought. As a result, this mother was still trying to plant a garden in some borrowed space in hopes there would be food for the next season.

As I stood there, helpless, I heard the words echo through my mind: Love your neighbor as yourself. I pondered the practicality of this. Later, on the same trip, I heard the bewildered village elders say, "We used to know exactly when to plant, and almost the day the rains would start, but something very strange is going on that we have never experienced, nor did our ancestors."

Yes, climate change is happening. While we debate the causes of climate change, people are dying from its effects. Do we "love our neighbor" only if it costs us little or nothing, agrees with our politics, is convenient, and doesn't interrupt our lives? In her book *Teaching a Stone to Talk*, Annie Dillard challenges us regarding the power of God. She writes, "The waking God may draw us out to where we can never return." This is a call to more fully understand the reality of loving our neighbors as ourselves. Living at this level brings new eyes—new understandings, new feelings, and yes—new and bold actions.

May God draw us out to where we can never return. May our neighbors live!

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RESOURCES for further study and action*

National Academies of Sciences offers a short, readable and free summary, "Understanding and Responding to Climate Change." See http://dels-old.nas.edu/climatechange/understanding-climate-change.shtml.

National Oceanic and Atmospheric Association provides an annual report on climate: http://www.ncdc.noaa.gov/bams-state-of-the-climate.

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Christian Organizations

A Rocha
AuSable Institute of Environmental Studies
Blessed Earth
Care of Creation
Compassion International
ECHO
Evangelical Environmental Network
Flourish
Plant with Purpose
Renewal
Restoring Eden
Southern Baptist Environment and Climate Initiative
World Relief
World Vision

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