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Introduction to "Confronting the Climate Crisis: Catholic Theological Perspectives"

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INTRODUCTION

Jame Schaefer

Confronting the Climate Crisis: Catholic Theological Perspectives is the culmination of a three-year study by participants in the Catholic Theology and Global Warming Interest Group of the Catholic Theological Society of America (CTSA). This interest group was established in 2008 when several members of the CTSA shared a desire to respond theologically to the complex and vexing problem of global climate change. Some had already been addressing environmental issues from the perspectives of the various sub-disciplines of theology in which we have been trained (e.g., biblical, historical, systematics, ethics) because inherent in our vocation as theologians is a calling by God to be responsive to the moral issues and signs of our times. Furthermore, we value our role in relation to the teaching authority of the Church and wish to be responsive to the bishops who stress living in harmony with God's creation as "a moral responsibility" (John Paul II, 1989)[1] and

1 Pope John Paul II's 1990 World Day of Peace Message was the first papal statement dedicated to human responsibility for living compatibly with the natural environment, a teaching he continued in his subsequent encyclicals, messages, statements, and actions to make Vatican City ecologically "friendly. Pope Benedict XVI, who has been dubbed "the green pope" because of his many teachings on the human relation to God's creation and continuing his predecessors' initiatives in Vatican City, urged world leaders to "[s]ave the planet before it's too late" when speaking at the 2007 world youth rally. Dressed in a green vestment when celebrating Mass in Loreto, Italy, he underscored the responsibility that humans have toward the natural environment: "New generations will be entrusted with the future of the planet...which bears clear signs of a type of development that has not always protected nature's delicate equilibrium." He continued: "A decisive 'yes' is needed in decisions to safeguard creation as well as a strong commitment to reverse tendencies that risk leading to irreversible situations of degradation," and he urged "a strong alliance between man and earth" (Pullella 2007b).

who specifically urged biblical experts, theologians, and ethicists "to help explore, deepen, and advance the insights of our Catholic tradition and its relation to the environment," and especially "the relationship between this tradition's emphasis upon the dignity of the human person and our responsibility to care for all of God's creation" (U.S. Conference of Catholic Bishops 1991, 13).[2] Our efforts to address the climate crisis in this anthology is an example of a way in which theologians can respond to the Church magisterium.

The first step of our newly-initiated interest group was an examination of the scientific evidence through experts available to each of us on our campuses, other institutions, and reports by climate experts. Following this individual endeavor was a group consultation with David Quesada, Ph.D., Associate Professor of Physics at the University of St. Thomas in Miami who specializes in atmospheric and mathematical physics and has been gathering and interpreting data pertaining to climate change. Our cumulative conclusions were and continue to be indisputable based on the plethora of data collected and verified by scientists throughout the world: (1) changes in the global climate are accelerating; (2) these changes cannot be attributed exclusively to natural causes; (3) in-depth investigations of possible unnatural causes point to emissions of carbon dioxide, methane, nitrous oxide, water vapor, and other greenhouse gases from human activities; (4) adverse effects from these emissions are ongoing and affecting others who have little part in causing these climate disruptions; and, (5) future generations will be affected directly and also indirectly through effects on other species, ecological systems, and the biosphere. The fact that effective measures are not underway to mitigate these problems, the need to adapt to what cannot be mitigated, and to avoid suffering especially of the poor and vulnerable prompted us to probe sources in the Catholic theological tradition from our various perspectives with the hope of providing some relevant, meaningful, and helpful ways of addressing the climate crisis.

2 Other bishops individually and regionally have issued similar calls and statements pertaining to the need for humans to accept their responsibilities in relation to other species and the natural environment. Statements by Catholic bishops are available from www.inee.mu.edu.

COMPELLING SCIENTIFIC FINDINGS

What is this evidence that prompted our study of the climate crisis and compelled our production of this anthology? Climatologists and other scientists recognize that some extraterrestrial and terrestrial factors are primarily responsible for most of the past episodes of changes in Earth's climate. Extraterrestrial factors include solar output, Earth-Sun geometry, and interstellar dust, while terrestrial factors from oceans, the atmosphere and land include volcanic emissions, mountain-building, continental drift, atmospheric chemistry, atmospheric reflectivity, land reflectivity, and atmosphere/ocean heat exchange (Physical Geography.net 2010). However, these factors cannot fully account for the climate changes that are occurring today, accelerating, and predicted for the future with various levels of certainty issued by the Intergovernmental Panel on Climate Change (IPCC), an international association established by the United Nations Environmental Programme and the World Meteorological Organization in 1988 to assess peer-reviewed scientific, technical, and socio-economic reports by scientists throughout the world. On the basis of these data, the IPCC is charged with the arduous task of providing "a clear scientific view on the current state of knowledge" about changes in the global climate and its "potential environmental and socio-economic impacts" (IPCC 2010a).

The key scientific fact with which the IPCC has had to grapple is a sharp increase in Earth's average surface temperature by approximately 1.4 °F (about 0.75 °C) since the mid-nineteenth century (IPCC 2007a, 22-23).[3] The key culprits responsible for this increase are human activities through which carbon dioxide, methane, nitrous oxide, and other "greenhouse" gases are emitted into the atmosphere, intensify the natural greenhouse effect that warms Earth, and increase the global temperature (Mastrandrea and Schneider 2010, 12-14; IPCC 2007d). According to climate scientists who gather their data from various sources including ice cores that span thousands of years, tree rings, the extent of mountain glaciers, changes in coral reefs, and pollen in lake beds, atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased markedly since 1750 as a result of human activities and far exceed pre-industrial levels (IPCC 2007d).

3 See also National Oceanic and Atmospheric Administration (NOAA) 2010 and National Aeronautics and Space Administration (NASA) 2010.

Scientific reports analyzed by the IPCC indicate that the largest growth in these gaseous emissions between 1970 and 2004 came from energy production, other industries, and transportation, while gases from residential and commercial buildings, forestry (including deforestation), and agriculture sectors grew at a lower rate (IPCC 2007e, 36). Thus, our activities are "forcing" changes on the global climate that exceed the effects caused by natural factors.

Among these changes are increases in the average global air, land, and ocean temperatures in the northern hemisphere that are causing decreases in snow cover and thickness of sea ice; widespread melting of snow and ice that is causing a rise in the sea level; increases in precipitation in eastern parts of North and South America, northern Europe and northern and central Asia; decreases in precipitation in the semi-arid land south of the Sahara Desert, the Mediterranean area, southern Africa and parts of southern Asia; and, an increase in the intensity of weather events including more extreme tropical cyclone activity in North America (IPCC 2007e, 36-38).

Physical systems are also adversely affected. For example, glacial lakes have enlarged and increased in numbers as glaciers and ice melts. Ground instability has increased in permafrost regions while rock avalanches have increased in mountain regions. Increased runoff is occurring in many glacier and snow-fed rivers. And, lakes and rivers have warmed in many regions causing changes in the thermal structure of bodies of water and degraded water quality (IPCC 2007e, 30-33).

Effects on ecological systems are also significant. Within land systems, spring events (e.g., leaf unfolding, bird migration, and egg laying) are occurring earlier, and ranges in plant and animal species are shifting upward. Within marine and freshwater systems, rising water temperatures are causing higher levels of salinity, shifts in ranges of algal, plankton and fish abundance, earlier fish migrations in rivers, and stresses on coral reefs. The loss of coastal wetlands and mangroves are attributed to a combination of climate changes and human adaptations of these ecological systems (IPCC 2007e, 32-33).

Adverse effects on human health from human-forced climate change have also been identified. Among these are increased heat-related mortality in Europe, changes in infectious disease vectors in parts of Europe, and earlier onset of and increases in seasonal production of allergenic pollen in high and mid-latitudes of the Northern Hemisphere (IPCC 2007e, 33).

A conclusion from a plethora of climate studies over the past decade is important to recognize: the sharp increase in the global temperature has occurred rapidly with uneven effects across geographic, economic, and social divisions. As John Holdren, Director of Harvard University's Science, Technology, and Public Policy Program and Co-Chair of the U.S. President's Council of Advisors on Science and Technology explained recently, the rise in the global temperature is "rapid compared with ordinary historic rates of climate change" and "rapid compared with the adjustment times of ecosystems and human society" (2010, 1). Furthermore, the effects of global climate change "on human well-being are and undoubtedly will remain far more negative than positive" (ibid.). Our choices are to mitigate the effects of human-driven climate changes, adapt to them, and suffer (ibid. 3).

Predictions of Future Effects

Because the major greenhouse gases from human activities remain in the atmosphere for periods ranging from decades to centuries and more will inevitably be emitted, the IPCC, the U.S. Environmental Protection Agency, and other major research institutions throughout the world anticipate that the average surface temperature of Earth is likely to increase between 1.1-6.4 °C/2 to 11.5 °F (USEPA 2010; IPCC 2007a, chap 10). This range is the outcome of computer models into which known data are entered and a range of likelihoods obtained (see Mastrandrea and Schneider 2010, 23-26). How much and how quickly Earth's temperature will actually increase remains unknown given the uncertainty of the amount of future greenhouse gases, the planet's response to changing conditions, and natural influences (e.g., changes in the sun and volcanic activity) (USEPA 2010). Putting these variables into computer models has yielded a "best estimate" range of a 3.2 to 7.2 °F (1.8-4.0 °C) increase in Earth's temperature by the end of the 21st century (USEPA 2010; IPCC 2007a, chap. 10). This increase will not be evenly distributed: land areas will warm more than oceans; high latitudes will warm more than low latitudes; warming is expected to occur during the winter months in northern North America and northcentral Asia; and, summer warming over continents may be accompanied by drier soils in many regions (NOAA 2007).[4] The USEPA issued this foreboding conclusion based on research collected by the IPCC: "The average rate of warming over each

4 See also USEPA 2010 and Meehle et al. 2007.

inhabited continent is very likely to be at least twice as large as the rate of warming experienced during the 20th century" (2010).

Even if emissions of greenhouse gases by human activities are kept constant at levels that were recorded at the beginning of this century, the effects will increase because, as already noted, the major gases already emitted remain in the atmosphere for decades to centuries. More greenhouse gas emissions at or above levels during the year 2000 would cause further warming and induce many changes in the global climate system during the 21st century that would "very likely" be larger than those observed during the 20th century (IPCC 2007e, 45). Among these changes are shrinking sea ice in the Arctic and Antarctic, hot extremes in temperature, heat waves and heavy precipitation in high latitudes, more intense tropical typhoons and hurricanes, and increased flooding of coastal regions (ibid.).[5]

Predictions beyond the 21st century are more dire when considering the effect on sea levels, even if greenhouse gas concentrations are stabilized, because adding more gases into the atmosphere already containing them in significant qualtities would cause the sea level to rise for centuries due to the time scales associated with climate processes and feedbacks (IPCC 2007e, 46; Mastrandrea and Schneider 2010, 21-23)). Prompted by the melting of glaciers and ice sheets on polar lands, the rising sea level would flood coastlines and inundate low-lying areas, the greatest effects of which will be in river deltas and low-lying islands (Pachauri 2007; Gleick 2010). Increasing atmospheric concentrations of greenhouse gases, especially carbon dioxide, will also further acidify the oceans (IPCC 2007e, 52; Turley 2010)).

The survival of some species will also be threatened. According to IPCC Chairperson Pachauri, approximately "20-30% of the species assessed in 2007 would be at increased risk of extinction if the global average temperature increase exceeds 1.5 to 2.5 °C," while an increase that exceeds about 3.5 °C suggests "significant extinctions" (40-70% of species assessed) around the planet (Pachauri 2008). Scientists anticipate accelerated adaptations by wild plants and species as they shift their ranges to inhabit areas with more tolerable temperatures, begin spring activities earlier, invade habitats of other species, and change genetically (Leemans 2010).

Closely related to species endangerment and extinction are risks to ecological systems (Leemans 2010; Turley 2010). The adaptive ability

5 See also NOAA 2007 and USEPA 2010.

of forests, grasslands, coastal wetlands, and other ecosystems to adapt to flooding, drought, wildfires, insect infestations, ocean acidification, and other disturbances caused by climate changes will be thwarted. Adaptation is particularly difficult when these disturbances are combined with other drivers of ecological degradation, including land use changes, pollution, and overexploitation of natural sources. Major changes in the structure and function of ecosystems are anticipated with predominantly negative consequences for biological diversity and for water, food supply, clean air, and other ecosystem goods (IPCC 2007e).

Effects on People, Especially Poor & Vulnerable

Adverse effects of global climate change on ecological systems also puts our species at risk. According to predictive models developed by scientists, human-forced climate change will have "serious effects on the sustainability of several ecosystems and the services they provide to human society (Pachauri 2007). One of the major effects anticipated is a decrease in the availability of potable water in the mid-latitudes and semi-arid areas of the planet. While an increase in water availability is anticipated in the moist tropics and at high latitudes, people in the Hindu-Kush, Himilayan, and Andes mountain ranges where more than one-sixth of the world's population currently lives will experience difficulty in obtaining the water they need as will people in the Mediterranean Basin, western United States, southern Africa, northeastern Brazil and other semi-arid areas. In already poverty-stricken Africa, between 75 and 250 million people will be exposed to increased water stresses by the year 2020, including limited access to potable water (ibid.; Gleick 2010).

Food scarcity will also be exacerbated in many areas by the year 2020 due to a decline in crop productivity caused by changes in the global climate. Effects on crop productivity is particularly problematic in seasonally dry and tropical regions where it is projected to decrease with small local temperature increases of 1-2 °C). Yields from rainfed agriculture in some African countries could be reduced by up to 50 percent. While initial slight increases in crop productivity are projected at mid to high latitudes where the local average temperature rises from 1 to 3 °C, productivity is expected to decrease subsequently (IPCC 2007e). The same pattern of an initial increase in crop productivity followed by a decrease is anticipated globally (ibid.).

Millions of people are projected to experience yearly floods due to sea level rise by the year 2080 than people experience today. Particularly vulnerable are megadeltas of Asia whose major cities, including Shanghi, Dhaka, and Kolkata, cities on the coast, and cities in river flood plains whose industries and businesses are closely linked with climate-sensitive resources (Pachauri 2008; IPCC 2007e). Small islands off the coasts of Asia and Africa are especially vulnerable. Within these at-risk areas, poor communities will be most affected (IPCC 2007e; 2007b) because their sensitivity to the adverse effects of climate change is exacerbated by their poverty, food scarcity, malnutrition, and inaccessibility to other necessities of life. Adding to their impoverished circumstances, the poor are especially vulnerable to debilitating trends in economic globalization, regional conflicts, and diseases, including HIV/AIDS (Pachauri 2007).

The health of future people is also at risk as the global climate changes. Malnutrition, deaths, diarrhoeal and other diseases, injuries due to extreme weather events, and increased frequency of cardio-respiratory diseases due to higher concentrations of ground-level ozone in urban areas are included in these projections (IPCC 2007e).[6] While residents in temperate areas may benefit initially by fewer deaths from cold exposure and combinations of other factors (IPCC 2007e), any benefits will be outweighed by the negative health effects of rising temperatures, especially in developing countries (ibid.; 2007b). Poor people are most vulnerable to adverse health effects caused by forced climate change, and education, health care programs, and public health initiatives are crucial for shaping healthy populations to prevent more adverse effects (IPCC 2007e; 2007b).

When accepting the 2007 Nobel Peace Prize on behalf of the Intergovernmental Panel on Climate Change, Chairman Rajendra Pachauri underscored the equity implications of climate change and how they will affect some of the poorest and most vulnerable communities of the world:

> One of the most significant aspects of the impacts of climate change, which has unfortunately not received adequate attention from scholars in the social sciences, relates to the equity implications of changes that are occurring and are likely to occur in the future. In general, the impacts of climate change on some of the poorest and the most vulnerable communities in the world could

6 See IPCC 2007a and 2007b for in-depth discussions of these risks.

> prove extremely unsettling. And, given the inadequacy of capacity, economic strength, and institutional capabilities characterizing some of these communities, they would remain extremely vulnerable to the impacts of climate change and may, therefore, actually see a decline in their economic condition, with a loss of livelihoods and opportunities to maintain even subsistence levels of existence (Pachauri 2007).

He also called attention to the potential conflicts resulting from human-forced climate change and lamented the IPCC's failure to provide directions for mitigating them. He expressed concern about conflicts that may arise when access to clean water, food availability, stable health conditions, ecosystem resources, and secure settlements are disrupted by changes in the climate. A major potential source of conflict that he identified is the migration and movement of people from one area to another. Though usually temporary and often from rural to urban areas in response to floods, famine and warfare, the migration and movement of people from climate change impacts may become highly problematic for them, for the people of the regions to which they are relocating, and for efforts to establish a peaceful global society. To address these potential threats, Pachauri urged conducting an "in-depth analysis of risks to security among the most vulnerable sectors and communities impacted by climate change across the globe" (ibid.).

EFFORTS, HOPES, AND ERRORS

Though climate scientists have been collecting and measuring data for several decades that point to an increase in the global temperature and, more recently, to the ongoing effects on people, other species, ecosystems, and the biosphere, and though they have developed increasingly sophisticated models for predicting the likelihood of future effects that are ominous even at a low range of certainty, little has been accomplished at national and international levels of decision-making to mitigate human-forced climate change. The United States government has been especially remiss by failing to pass comprehensive legislation aimed at addressing the climate crisis, though anticipation was high during the first two years of the Obama Administration when the House of Representatives and the U.S. Senate were controlled by Democrats who campaigned on platforms committed to mitigating this crisis. Little hope lingers for effective climate legislation during the 2011-2013 congressional year. Meanwhile, the U.S. has retained

the dubious distinction of emitting the largest amount of greenhouse gases per capita (Netherlands Environmental Assessment Agency 2007; Knickerbocker 2007). This is not surprising given our nation's highly industrialized economy that thrives on energy generated primarily with non-renewable sources and uses energy less efficiently than possible.

Internationally, efforts to address climate change have been officially ongoing since 1988 when, as already noted, the United Nations collaborated with the National Oceanic and Atmospheric Administration (NOAA) to establish the IPCC that they charged with collecting, assessing, and drawing conclusions from peer-reviewed reports to serve as basis for informed decision-making. Another milestone occurred in 1992 when the UN established the Framework Convention on Climate Change (UNFCCC) through which environmental ministers of UN countries that signified their desire to participate as Parties of the Framework Convention[7] would meet to discuss and take joint action on climate-related issues. At their third meeting (Conference of the Parties–COP 3) held in Kyoto, Japan in 1997, the ministers developed and signed on behalf of their nations a protocol that committed them to reducing greenhouse gas emissions to 1990 levels by 2012 through methods each nation determined (UNFCCC 1997).[8] The United States was among the first signatories of the Kyoto Protocol, but neither President Bill Clinton nor President George Bush submitted it to the U.S. Senate for ratification, ostensibly because elected officials feared jeopardizing the economic well-being of the U.S if attempts were made to meet Kyoto emission targets. Detailed rules for implementing the Protocol were adopted at COP 7 in Marrakesh (UNFCCC 2001), nearly two hundred nations have ratified and/or accepted Kyoto Protocol goals, but the extent to which they will be met has yet to be ascertained.

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7 The signatory Parties of the Convention number 194–193 nations and one regional economic integration organization; see list of parties, dates signed, ratified, and effective at http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php.

8 The Kyoto Protocol placed a heavier burden on industrially developed nations under the international law principle of "common but differentiated responsibilities" and specified three market-based mechanisms through which to meet their emission targets in cost-effective ways: emissions trading, clean development, and joint implementation.

Despite high hopes for COP 15 held in Copenhagen in 2009, involvement of many non-government agencies and youth groups (in which a former outstanding environmental ethics student of mine participated), a stimulating pre-conference featuring the latest climate science, and eager anticipation that the top leaders of the world's nations would meet on the last day to bind their nations in a rigorous plan to address the climate crisis, little progress was made over the two weeks of the summit. The international media, UNFCCC web site, and my reliable student reported extensively on friction between developing and developed nations, and the social communication network was alive with minute-to-minute accounts of the proceedings, encounters, and disappointments. Representatives of developing nations balked at highly industrialized nations' pressuring them to curtail their emissions of greenhouse gases without offering adequate financial and technical assistance to facilitate their opting for cleaner coal technology, energy efficient strategies, and ability to tap renewable energy sources. Developing and developed nations also strongly disagreed over means of monitoring, verifying, and reporting reductions in emissions of greenhouse gases. Shortly before COP 15 was scheduled to end in failure, the heads of state arrived and endeavored to broker a positive outcome from the bleak scenario, and an "accord" was drafted by the United States, China, India, Brazil, and South Africa. The accord was vigorously debated by opponents and proponents, recognized (not adopted), and eventually signed by representatives of nations who committed to reporting by January 31their individual plans for reducing greenhouse gas emissions. The twelve provisions of the Copenhagen Accord began with the following commitment:

> We underline that climate change is one of the greatest challenges of our time. We emphasise our strong political will to urgently combat climate change in accordance with the principle of common but differentiated responsibilities and respective capabilities. To achieve the ultimate objective of the Convention to stabilize greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, we shall, recognizing the scientific view that the increase in global temperature should be below 2 degrees Celsius, on the basis of equity and in the context of sustainable development, enhance our long-term cooperative action to combat climate change. We recognize the critical impacts of climate change and the potential impacts of

> response measures on countries particularly vulnerable to its adverse effects and stress the need to establish a comprehensive adaptation programme including international support (UNFCCC 2009, #1).

Though reported in the media as a failure,[9] the nations signing the Copenhagen Accord recognized for the first time the need to stay below a 2 °C increase in the global temperature, the possibility that this increase may be too high, and the need for a reassessment in 2015 to consider "strengthening the long-term goal" from 2 °C to 1.5 °C (UNFCCC 2009, #12). Among other articles in this accord was a commitment by the developed nations to provide "adequate, predictable and sustainable" financial and technological support to developing nations so they can reduce their emissions. The signatories also committed to establish a "Copenhagen Green Climate Fund" through which the developed countries will be able to secure funding from public and private sources to finance "meaningful mitigation actions" by "the most vulnerable developing countries, such as the least developed countries, small island developing States and Africa" (ibid. #8-10). By January 31, 138 nations had signed the Copenhagen Accord, some plans to reduce emissions had been submitted and appended to it, and others were at various stages of completion. Because signing this accord was voluntary instead of binding as some COP 15 ministers and many watchers had hoped, the first chairperson of the UNFCCC described the accord outcome as a "shock" that he hope will stimulate serious discussion about what nations are willing to do to mitigate human-forced climate change (Cutajar 2010).

As I write this introduction, COP 16 has just ended in Cancun, Mexico where 192 nations were represented. Apparently the environmental ministers had not been sufficiently shocked by COP 15. An overarching and binding agreement to slash emissions of greenhouse gases was not struck, and disagreements between developing and developed nations that stymied the ministers' progress in Copenhagen

9 After emerging from 13 hours of talks with other world leaders and reaching agreement on the principles of the accord, President Obama was quoted widely in the media as stating that the progress made was "meaningful" but "not enough." British Prime Minister Gordon Brown viewed the accord as a "vital first step we are taking towards a green and low carbon future for the world." He also stated: "I know what we really need is a legally binding treaty as quickly as possible" (Vidal et al. 2009).

also stymied the 2010 proceedings—the amount of emissions that need to be cut and how much the developed nations would contribute to developing nations' mitigation and adaptation efforts (e.g., Rothbard and Rucker 2010). Especially contentious was a proposal to extend the Kyoto Protocol commitment period beyond 2012 by which most developed nations committed to cut their greenhouse gas emissions or to inaugurate a new commitment period that might attract nations like the United States that had not ratified the Kyoto Protocol (Buckley and Wynn 2010). After extending the conference another day so the delegates could try to produce a positive outcome, the ministers approved[10] "urgent action" to cap the global temperature rise to no more than 2 °C/3.6 °F over pre-industrial levels while asking for a study on strengthening the commitment to a lower degree rise, creating the "Green Climate Fund" for which they would aim to raise $100 billion by 2020 for aiding developing countries' efforts to mitigate and adapt to climate change, and initiating several measures aimed at protecting tropical forests and sharing new clean energy technologies (UNFCCC 2010c). However, they put off until COP 17 a decision on extending the Kyoto Protocol period or inaugurating another new legally-binding protocol (Vidal and Goldenberg 2010; DeSousa 2010).

Plaguing deliberations at Copenhagen and Cancun were questions about the believability of climate scientists' research that surfaced before COP 15 officially began and carried over into COP 16. The tenor at Copenhagen was marred considerably by the disclosure of e-mails from a climate research laboratory at the University of East Anglia suggesting that some scientists were attempting to suppress findings by other climatologists that did not agree with their own. Following this disclosure was subsequent evidence of improprieties reflected in the 2007 IPCC reports pertaining to the rate at which the Himilayan glaciers are melting and direct connections made between catastrophic events and human-forced climate change (e.g., Leake 2010). After investigating the Himilaya glacier issue reported in a paragraph of the 978-page Working Group II report and a companion reference in the Synthesis Report, the IPCC Chairman, vice-chairs, and co-chairs of the report expressed their "regrets" for the "poorly substantiated" conclusions that resulted from improperly following "well-established standards of evidence" and "poor application of IPCC procedures" when preparing those sections of the report (IPCC 2010b). The

10 COP 16 *approval* is significant when compared with COP 15 *recognition*.

IPCC proceeded to establish guidelines for using scientific literature in its reports, addressing errors in previous assessment reports, and treating uncertainties consistently (IPPC 2010c).

Collection and assessment of peer-reviewed research are underway for the next IPCC report, and we can only hope that lessons learned from 2007 are reflected in it so the bases for decision-making by the nations are well grounded in facts, methods for assessing them and identifying ranges of certitude about present and future effects are instituted and carefully used, and options for addressing these effects are well substantiated. Every climate scientist and every climate research institution should be able to benefit in some way from errors that have been committed and from allegations levied by climate change skeptics (e.g., MacRae 2010; Holland 2007)[11] who may help purge the process from errors and improve methodology in assessing research findings. Theologians who feel compelled to address the climate crisis will also benefit through verifiable scientific findings and interpretations thereof upon which to reflect in meaningful ways. We rely upon scientists to provide the facts and realize that we need a heavy dose of the virtue of fortitude to face and act on them.

Nevertheless, despite the few but significant improprieties discovered in the IPCC's 2007 reports and the points made by skeptics who argue against attributing any aspect of the warming planet to human causes, the consensus of the scientific community persists: the temperature of Earth is increasing; human activities that spew greenhouse gases into the atmosphere are forcing the temperature rise; and, adverse effects are experienced now and projected for the future at various levels of certainty. Scientists have banded together to issue statements about this consensus (e.g., "Open Letter" 2010; American Institute of Biological Sciences 2009) so decision-makers accept the fact that human activities are forcing the temperature of our planet to rise, adverse effects are occurring now and projected to continue in the future, and changes in how we are functioning must be made now to mitigate these adversities.

In the meantime, industrialized countries continue to spew excessive greenhouse gases into the atmosphere while China, Malaysia, and other countries that are developing industrial economies are emitting

11 Other skeptics and points they are making are accessible from the Australian Climate Science Coalition site at http://www.climatescienceinternational.org/.

increasing amounts. China is leading the way as the largest emitter overall, while the U.S. remains the largest emitter per capita (Netherlands Environmental Assessment Agency 2007; Knickerbocker 2007). As the latest IPCC report indicates, all countries with portfolios of greenhouse gas emissions have options for reducing them. These options include energy conservation and energy efficiency improvement, the use of more renewable energy sources, recovery and abatement of methane and nitrous oxide emissions of various sources, sequestration of carbon in forests and soils, and carbon capture and storage (2007c). However, developing nations need help in tapping their options, and the Green Climate Fund outlined in the Copenhagen Accord and established by the Cancun Accord is surfacing as a vital vehicle to helping them help themselves. Hopefully, their efforts will have the effect of slowing the rate at which Earth's temperature increases.

CATHOLIC ACTION

As indicated in texts by the U.S. Catholic bishops and popes John Paul II and Benedict XVI, the Church magisterium is cognizant of climate science and concerned about human activities that are forcing the temperature of Earth to increase. Their teachings are covered at length in two essays of this anthology. One by Connie Lasher and Msgr. Charles Murphy explores the Christian humanism of popes John Paul II and Benedict XVI and its significance for addressing human-forced climate change. In the second pertinent essay, I explore the Catholic social teachings of popes from Leo XIII and successor popes on the principles of subsidiarity, solidarity, and preferential option for the poor. References are made to papal texts and pastoral statements by bishops in other essays of this anthology, thereby demonstrating our engagement with magisterial teachings.

Action is not limited to these teachings, however. During the pontificates of John Paul II and Benedict XVI, Vatican City has become progressively "green" through conservation efforts that include recycling, using photovoltaic cells on buildings to produce electricity, and hosting a scientific conference to discuss global warming (Pullella 2007a). At a conference organized by the Vatican's Council for Justice and Peace, Bishop Bernd Uhl of Freiburg told the scientists, environment ministers, and leaders of various religions from twenty countries who had gathered in Vatican City: "Climate change is one of the signs of the times affecting the Catholic Church as a global organization.

The Catholic Church must take a stand on this present-day and urgent question" (Pullella 2007a).

Efforts have been initiated at national and diocesan levels to study the climate change issue, to advocate activities aimed at mitigating human-forced change, and to lobby for appropriate legislation with special attention to minimizing the suffering of poor and vulnerable people who will be most severely affected by climate change. Having issued *Global Climate Change: A Plea for Dialogue, Prudence, and the Common Good* in 2001, the text of which appears below, the U.S. Catholic Conference of Bishops (USCCB) through its Environmental Justice Program has been assisting these efforts. A major national initiative by the USCCB in partnership with Catholic Relief Services and other organizations is the Catholic Coalition on Climate Change which encourages "a more thoughtful dialogue about ways the Catholic community can respond to climate change" and "invites Catholics to participate in a new initiative offering a distinctively Catholic perspective on global climate change" (USCCB and CRS 2010). The impressive array of Catholic organizations involved with the U.S. Catholic bishops and Catholic Relief Services in the Coalition[12] (CCCC 2010) should inspire hope for action aimed at mitigating the effects of human-forced climate change. Among the thoughtful activities of the Coalition are the Catholic Climate Covenant's encouraging the faithful to take the St. Francis Pledge to pray and reflect on the duty to care for God's Creation and protect the poor and vulnerable; to learn about and educate others on the causes and moral dimensions of climate change; to assess how we as individuals and in our families, parishes, and other social and economic affiliations contribute to climate change by our energy use, consumption, and wastefulness; to change our choices and behaviors by reducing the ways in which we contribute to climate change; and, to advocate for Catholic principles and priorities in climate change discussions and decisions, especially as they impact those who are poor and vulnerable (CCCC 2010). Through its web site, the Coalition shares inspiring stories about actions other people are taking and gives practical, timely tips for minimizing each person's

12 The National Council of Catholic Women, the Catholic Health Association of the U.S., Catholic Charities USA, the National Catholic Rural Life Conference, the Association of Catholic Colleges and Universities, the Franciscan Action Network, Carmelite NGO, the Leadership Conference of Women Religious, and the Conference of Major Superiors of Men.

impact on the climate in daily activities. One of the Coalition's most recent projects is training Catholic Climate Ambassadors—leaders from across the nation who become immersed in climate science and Catholic teaching on caring for God's creation and the poor and who offer presentations to parishes, schools, diocesan ministry professionals, and others on the Church's teachings.

As a participating organization in the Catholic Climate Change Coalition, Catholic Relief Services (CRS) is helping "to strengthen the ability of the most vulnerable communities in the developing world to respond to and prepare for the effects of climate change" by providing education and training to people in poor communities on ways to reduce their vulnerability to the effects of climate change in the areas in which they live (USCCB and CRS 2010). CRS recognizes that people who live in poverty "contribute least to climate change but they are likely to suffer its worst consequences" (e.g., increasingly limited access to water, reduced crop yields, and more widespread disease) with few resources with which to adapt and respond, thereby making their lives more difficult and increasing their suffering (ibid.).

Thus, the teaching authority of the Church and Catholic organizations are busily engaged in efforts to address climate change at many levels of endeavor. Theologians can help, as the U.S. Catholic bishops urged in 1991, by using our skills to identify, explain, and demonstrate various theological perspectives from which to think about the human person in relation to one another and to other species, ecological systems, and the biosphere of our planet that are imperiled now and will be imperiled into the future by our climate disruptive activities.

RESPONDING THEOLOGIANS

In this anthology, we share what we have found and reflected upon that we think is helpful toward addressing the climate crisis. Our first three essays explore promising themes in the Bible. *Suzanne Franck* focuses on Wisdom literature that conveys belief in God's dynamic presence as wisdom that permeates the world, establishes an interrelationship among humans and other creatures that constitute the world, heightens that relationship by becoming incarnate as Jesus Christ, and requires that we intrinsically value the world as a reflection of God. Challenging us to live wisely in the world today in ways that avoid forcing an increase in the global temperature, she suggests several approaches including reflection on the sacramental character

of the world from the perspective of the Incarnation to motivate us to live wisely, accepting the overwhelming evidence that our climate-disruptive activities are jeopardizing the opportunity for people in the future to experience God's presence in the world, and engaging conscientiously in the ongoing story of creation as co-creators with God who assure that future generations will be able to live in a world that is charged with the grandeur of God. *Ann Marie Kidder* demonstrates a new hermeneutical approach used by biblical scholars to read Romans 8 and pertinent parts of other letters written by St. Paul and his followers for their theological significance today. Finding in these texts an intricate interplay and shared destiny of creation and covenant in the scheme of salvation through Christ, she points to Paul's understanding that God's glory is manifested first in humans and second in God's creation. Humans are distinguished by knowing our connection with other living and non-living creatures and knowing that they suffer when we sin and rejoice when we are redeemed. Applying this motif to the climate crisis, Kidder explains that we can experience the groaning of Earth in tandum with the Spirit of Christ working within us to have compassion for other species, the land, the air, and the waters whose role as "cheerleaders" of our salvation is jeopardized by our climate-forcing actions. *Vincent Pizzuto* explores the Christ hymn in Colossians 1 from an ecological-hermeneutical lens to understand the significance of the Pauline author's depiction of humans in relation to other creatures, and he finds a soteriology in which humans are created with the world and saved with the world through the presence and power of Christ who permeates and heads the cosmic body. While all creatures are interconnected through Christ in this scheme of creation and redemption, Pizzuto explains, and all are members of Christ's cosmic body who together reflect God's presence in the world, human creatures are most reflective of Christ's headship through our self-reflective consciousness and moral agency that requires us to act justly in relation to others with whom we constitute the cosmos. Harming Earth by forcing changes in the global climate constitutes harming the body to which we belong, and we are morally responsible for attending to the wounds we are inflicting.

The next four essays draw primarily upon the work of two revered theologians in the Catholic tradition—St. Bonaventure of Bagnoregio (1217-1274) and St. Thomas Aquinas (1224/5-1274). Focusing on Bonaventure's trinitarian theology with special attention to

his Christology, *Dawn Nothwehr* emphasizes his hope-filled vision of the intimately related and interconnected reality of God, the divine-human Christ, and the world in which humans are called to serve as its guardians and co-creators with God. Bonaventure knew long ago that the faithful need to recognize this reality within which we live, acknowledge our creaturely status as loved and sustained by God, and act in ways that show our respect for the interconnections and interdependence of all creatures. Answering the question "How shall we live?" from the perspective of Bonaventure's Christology, Nothwehr urges us to develop the virtue of humility so we can realize that God desires a relationship not only with us but also with the entire world, to develop the virtue of poverty by releasing ourselves from our arrogance and consumerism, and to develop the virtue of obedience by living lovingly within the world that our loving God has held in dynamic existence for nearly 14 billion years. *Daniel Scheid* finds in Aquinas' theology of creation a "robust" understanding of the common good that unites God, the universe, and humanity in a holistic paradigm that is helpful for addressing the climate crisis. From Aquinas's tripartite understanding that the whole universe surpasses in excellence any individual creature, the most valuable feature of the universe is the orderly functioning of its constituents, and the entire universe best glorifies God, Scheid urges respect for the goodness of Earth, cooperation with the other constituents of Earth for our mutual sustainability, humility about our place in the world in relation to the contributions that other species, ecological systems, and the biosphere make to the planetary common good, and upholding the life and dignity of human persons who have the unique capacity to love one another. *William French* draws upon Aristotle's ethic of the "fitting response" and Thomas Aquinas' understanding of self-mastering human acts, vincible and invincible ignorance, and the virtue of prudence to stress the need for knowing the full range of internal and external costs incurred when human actions disrupt the global climate. Failing to include external costs of production and use imposed on others or future generations thwart an individual's or a society's ability to know the full impact of their actions and to make decisions about mitigating their effects. Arguing that these "hidden" costs need to be internalized through green taxation schemes and tax shifting policies, French points to the educational and consciousness-raising benefits they can provide by helping us recognize the nature and ramifications of our

actions. *William George* brings his continuing interest in international law to the question of how to respond theologically to the climate crisis in cogent and constructive ways. Stressing the need for theologians to be as informed as possible about international law principles and institutions that deal with climate issues, he draws upon Aquinas and one of his intellectual heirs in the 20th century, Bernard Lonergan, to explore two interrelated points of convergence between Catholic theology and international law that can open theologians to reflection—a method they share and virtues they affirm (e.g., justice, charity, and prudence). George explores in depth Aquinas' systematic treatment of the moral virtue of prudence and applies each component to pertinent aspects of international law for addressing the climate crisis. Though foresight provides the most direct link between prudence and intergenerational justice in theology and international law, other aspects of prudence work in tandem with foresight, including memory, understanding, docility, shrewdness, reason, circumspection, and caution. He recognizes with Aquinas how little humans can accomplish in addressing the climate crisis apart from God's grace.

In the next group of essays, the works of the scientist-mystic Teilhard de Chardin (1881-1955), theologians Karl Rahner (1904-1984), Bernard Lonergan (1904-1984), and Hans Urs von Balthasar (1905-1988), and the self-styled "geologian" Thomas Berry (1914-2009) are explored. Having immersed himself in Teilhard's writings for many years, *Robert Faricy* reflects on the value-supportive world view of the paleontologist and mystic who integrated evolutionary biology and Christian theology to produce an understanding that God is continuously creating the world of many, suffusing it with the divine presence heightened by the Incarnation, and influencing its convergence from a multiplicity to its fulfillment and unification in Christ. Humans have emerged out of this process with the capacity to be responsible participants who should feel motivated to mitigate human-forced climate change. *Richard Kropf* has devoted decades to studying Teilhard and focuses his essay on the confluence of the Club of Rome/MIT study on limits to growth and Teilhard's analysis of human evolutionary development and the final transformation of the material energies of the universe into "Ultra-humanity." Particularly problematic to reaching this culmination, Kropf notes, is the human population increase that is stretching planetary resources and forcing us to make some major choices today about the fate of our species. Most poignant in Kroft's

analysis is his pointing to Teilhard's thinking late in his life that God might have a greater purpose for the universe than one planet or one species. Aiming to clarify the kind of dialogue needed for theologians to address the climate crisis, *Denis Edwards* draws from Karl Rahner's theology five interpretive principles grounded in the belief that the world is the place where we encounter God and five interpretive principles from a scientifically informed ecological consciousness grounded in the reality that our actions are forcing changes in the global climate. Both "sides" need to be heard for a fruitful dialogue, Edwards insists, challenges they make to one another recognized, and critical questions they raise for one another answered to yield helpful outcomes. *Richard Liddy* presents three levels of Bernard Lonergan's heuristic framework for analyzing questions that arise when addressing the climate crisis: the basic world view of emergent probability that surfaces from an analysis of contemporary scientific findings; a fundamental analysis of human biases against recognizing how we "ought" to act from what "is"; and, an illustration for answering questions about God as the absolute intelligence and basis for human intelligence when faced with lack of human intelligence and absurdities that are driving an increase in Earth's temperature. Lonergan's analysis of the dynamics of redemption and conversion through God's grace is also helpful, Liddy explains, for bringing about change of our minds and in our hearts about how we are functioning within our planet. *Anthony Sciglitano* finds in "deep ecology" a suitable dialogue partner for Balthasar who also critiques viewing other species exclusively as instruments for human use, recommends contemplation of the environment, and believes it should inspire responses of wonder, reverence, and joy. Though finding these convergences, Sciglitano points to challenges Balthasar makes to deep ecology's antipathy for divine transcendence and low esteem for human moral responsibility. Balthasar contributes a theological perspective to a serious difficulty within secular ecological thought generally and deep ecology in particular, Sciglitano argues, and he names and explains Balthasar's "doxological ecology" which supports a communal practice rooted in contemplation that respects Earth in all its diversity as having an intrinsic value and needing human care. Finally, *Peter Ellard* outlines key aspects of the groundwork Thomas Berry provides for "a dark green Catholic theology" that stresses the history of the unfolding of the universe and the reality of marvels that we encounter through our senses, fail to recognize, and destroy. With Berry, Ellard

endorses thinking about the universe as "a community of subjects, not a collection of objects," the need to reinvent the human within the context of this community, and engagement in "the great work" of developing an intimate relationship with Earth and its constituents as subjects instead of merely objects for human use. Ellard also endorses Berry's suggestion that we need to put problematic aspects of the Bible, doctrines, and ideas within the Catholic theological tradition "on the shelf" for a while until we are knowledgeable about the universe story from which our species emerged, transform our destructive and instrumental attitude toward our planetary home, and acknowledge the human place within her.

Our next two essays emerge variously from feminist theology. *Colleen Mary Carpenter* finds highly problematic our failure to recognize the world as revelatory of God's goodness and God's presence. Concerned that this sacramental sense of God in and through the world is threatened by the damage we are inflicting on Earth through our climate-forcing actions, she draws upon two different options that have surfaced in the recently revived field of pneumatology to imagine how we can think about God's presence in the midst of climate change. One option proposed by Mark Wallace is to understand the Holy Spirit as wounded, traumatized, and in agony over ecological degradation, while the other proffered by Elizabeth Johnson understands the Holy Spirit as a vivifying presence that gives us hope in the midst of the destruction and death we have unleashed on the world. Carpenter examines these options critically, opts for aspects of both, and urges embracing them imaginatively in liturgies with the hope of moving beyond the climate-disruptive and planet-destructive behaviors that have become "normal" in our lives. A pioneer in the development and understanding of feminist theology, *Anne Clifford* turns to another kind of experience in a particularly vulnerable part of the world—sub-Sahara Africa—where biologist and Nobel laureate Wangari Maathai has led disempowered and subordinated women to become proficient in growing and planting thousands of trees that are indigenous to the region but were almost decimated by European colonizers. Clifford explains Matthai's concern about and efforts to mitigate the negative effects the colonial patriarchal order had on the natural environment and women, identifies convergences in Maathai's eco-feminist perspective and Catholic social teaching on the climate crisis, and points

to the hope the Green Belt Movement has given to women for their improved status in Kenyan society and a more life-sustaining climate.

In the final group are essays and documents dedicated to Catholic social teaching. *Connie Lasher* and *Msgr. Charles Murphy* analyze the Christian humanism that surfaces from the theology-environment dialogue in which popes John Paul II was engaged and Benedict XVI is currently engaged, finding features that are both noteworthy and promising for confronting the climate crisis. Among these features is an understanding of the world as God's "gift" to all humans and our species' distinct capacity among creatures to accept this gift by contemplating the world through which the mystery of God as the source of all reality is revealed, by respecting the integrity of the world as a common heritage of humans now and in the future, and by acting together with a sense of shared responsibly for the natural environment. My essay provides an overview of three Catholic social teaching principles: solidarity as an understanding that all people should be engaged in seeking their common good; subsidiarity as an method for making decisions beginning at the most local level; and opting to give preference to the poor in decision-making as demonstrated in the life and teachings of Jesus Christ. Though these principles can help guide our efforts to address the climate crisis in the interests of humans, I propose expanding solidarity to include all species and systems that constitute our planet—Earth solidarity, reconfiguring subsidiarity to conform to biological regions in which humans function with other species and abiota—bioregional subsidiarity, and including future people, species and ecological systems among the poor for whom we must show preference when making decisions about mitigating and adapting to climate change. The next entry is *Global Climate Change: A Plea for Dialogue, Prudence, and the Common Good* that was issued by the U.S. Catholic bishops in 2001 and is introduced here by *Jane Russell* who underscores the attention the bishops give to the virtue of prudence for confronting the climate crisis. Closing this anthology is Pope Benedict XVI's 2010 World Day of Peace Message, *If You Want to Cultivate Peace, Protect Creation*, a document he issued twenty years after the first papal statement dedicated to the human-Earth relationship. We are grateful for permission to include these magisterial documents in *Confronting the Climate Crisis: Catholic Theological Perspectives*.

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