The Urgency of Climate Change

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Pivotal Perspectives

Edited by

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We dedicate this book to Duquesne University in tribute to the Endowed Annual Conference Series on the Integrity of Creation, initiated in 2015.

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INTRODUCTION

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In 2015, the President of Duquesne University in Pittsburgh in the United States (Charles J. Dougherty) commissioned an endowed annual academic conference series on the *Integrity of Creation* to celebrate the organization's Spiritan mission. The University is Catholic and was founded by members of the Congregation of the Holy Spirit: the Spiritans.[1] The topic of the inaugural conference held from September 30 to October 2, 2015 was Climate Change as an urgent concern regarding the Integrity of Creation. The conference occurred between two very significant global events. First, in May 2015, Pope Francis published an encyclical on the environment including a discussion of Climate Change, *Laudato Si'—Praise Be To You*.[2] The Pope invited "every person living on this planet," "all people of good will," "to enter into dialogue with all people about our common home" as "a shared inheritance."[3] It is worth noting that the call of Pope Francis for "a religious respect for the Integrity of Creation" is very similar to the focus of the Spiritan mission.[4] Second, in December 2015, 195 countries sent delegates to the United Nations to negotiate a landmark accord on Climate Change called the *Paris Agreement*, perhaps the most influential climate policy that has been achieved internationally.[5] The United Nations Secretary-General Ban Ki-moon has spoken extensively on this topic at multiple conferences over recent years.[6] His leadership facilitated the *Paris Agreement*, and on Friday April 22, 2016, leaders from 175 countries signed the landmark agreement on Climate Change, with most nations subsequently having to obtain formal approvals through their governments, though many had already done so.

The reason for selecting Climate Change as the inaugural topic in this endowed annual conference series was to acknowledge the dramatic significance that it has for the sustainability of our planet. As the series evolves, many other topics will be discussed to shed light on the *Integrity of Creation* from multiple perspectives. As we seek to protect our common home, as Pope Francis has emphasized, we must be attentive to the global water crisis, environmental concerns with air pollution, problems that arise

from toxicity in the land and ocean regarding food sources and biodiversity, and many other crises, not least of which is how to anticipate the movement of vast populations from coastal regions that may become permanently flooded.

This conference series is an interdisciplinary endeavor in the sense that presenters and participants from different disciplines are invited to engage each other in civil discourse on the conference topic. The conference has three goals: to provide a scholarly opportunity to engage with established and emerging research; to foster interdisciplinary discourse; and to enlighten public awareness and discussion on the selected issues.

The focus on Climate Change in this collection of conference proceedings presents an admirable standard for the scholarship and civil discourse that will enlighten many other topics in the years ahead. The presentations at this conference on Climate Change were selected in a peer reviewed manner for inclusion at the conference and in these published proceedings. The book chapters reflect the conference presentations and have been written to appeal to a general audience with rigorous scholarship, depicting the interdisciplinary manner in which Climate Change must be addressed. The chapters have been organized into several interdisciplinary categories that relate together in an integral manner. Each section has been designed to move from general to more specific points of view, with the discussion at the end of each section addressing various aspects related to the global impact of Climate Change. Also, at the conference there were several invited plenary speakers whose presentations are included in this collection and identified as such.

The chapters are organized together in an integrative manner in the sections of the book. The first section sets the *Context* for the discussion of Climate Change. This section provides an overview of the interdisciplinary arguments, indicating that there is an overlapping and cumulative sense of the climate as an indispensable common good. The Climate Change crisis presents a systemic threat to this pivotal common good. The next section focuses on *Science* to emphasize that empirical reality must guide any analysis of Climate Change. In this sense, Climate Change is not a matter of opinion or belief, though all too often we encounter voices suggesting that they do or do not believe in it. Because Climate Change is fundamentally a matter of reliable science, it is a matter of basic knowledge and comprehension. A crucial implication of the science of Climate Change is whether the climate is sustainable for the earth to flourish for millennia ahead. Hence, the next section deals with *Sustainability*. Together, the integration of the discussions on *Science* and *Sustainability* raises crucial ethical and religious issues that are discussed in the

subsequent sections. The section on *Ethics* deals with obligations to reverse the looming climate catastrophe and to establish global practices that can enable the planet to flourish. In turn, these ethical issues can be helpfully interpreted from various religious standpoints that are discussed in the next section on *Religion* to highlight how religious views can foster future accountability and stewardship. Finally, from this alignment of discourse in *Ethics* and *Religion* around the problems related to *Science* and *Sustainability* emerges the section on *Law*, which considers various ways to address Climate Change. Some of the items within the chapters have required copyright approvals; these are indicated in the relevant chapters.

A few words of acknowledgment are appropriate to recognize the contribution of many in planning the inaugural conference that has led to this collection of conference proceedings. Above all, the establishment of an endowment by President Charles J. Dougherty at Duquesne University to support this annual academic conference series is very much appreciated. Insofar as the conference series celebrates the Spiritan mission of the University, the Congregation's commitment to the University also is greatly appreciated. The meticulous work that generates a large academic conference cannot occur without a highly dedicated Conference Planning Committee and support staff, including a very gifted group of graduate students, to whom sincere gratitude is extended. In particular, the extraordinary grace and talent of the conference coordinator, Glory Smith, deserves to be recognized with high acclaim and heartfelt gratitude: this extraordinary commitment, in addition to all her other daily office duties, was a labor of love that assured such success and joy at the conference.

Notes

[1] See, http://www.duq.edu/about/mission-and-identity; also see, http://www.spiritans.org.

[2] Pope Francis, *Laudato Si'—Praise Be To You. Encyclical Letter of the Holy Father Francis on Care for Our Common Home* (Vatican City: Libreria Editrice Vaticana, 2015).

[3] Pope Francis, *Laudato Si'—Praise Be To You. Encyclical Letter of the Holy Father Francis on Care for Our Common Home* (Vatican City: Libreria Editrice Vaticana, 2015), no. 3, 28, 93.

[4] Pope Francis, *Laudato Si'—Praise Be To You. Encyclical Letter of the Holy Father Francis on Care for Our Common Home* (Vatican City: Libreria Editrice Vaticana, 2015), no. 130.

[5] See, http://unfccc.int/meetings/paris_nov_2015/meeting/8926.php; also see, http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm,

accessed December 31, 2015.
[6] See, http://www.un.org/sustainabledevelopment/ban-ki-moon-climate-change.

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I. CONTEXT

CHAPTER ONE

INTERDISCIPLINARY VIEWS ON CLIMATE CHANGE

GERARD MAGILL

Introduction

To consider Climate Change robustly requires a variety of disciplines that engage each other in an integrative way. The book has been organized to let the dialogue in these disciplines unfold in an overlapping manner, with points of view being enriched as they are explored from different angles. As mentioned in the Introduction, there are several main sections to bring coherence to the contributions. After a section that introduces the context of the book, the second and third sections engage with the rapport between science and sustainability to clarify the reality and urgency of Climate Change. The empirical issues that emerge from these sections lead to interpretations from ethical and religious standpoints in the fourth and fifth sections. The sixth section builds on these arguments to pursue a policy outlook on law to consider options that can effectively address Climate Change. Each section moves from a general to a more particular focus, concluding with a variety of global issues being addressed.

Context

The opening chapter provides an overview of the interdisciplinary views on Climate Change discussed in the book (based upon the abstracts submitted by the authors). This overview is designed to assist readers to keep an eye on the big picture as they explore specific topics. The context of the book is not just the interdisciplinary character of the various contributions. As the chapters develop, there is an overlapping and cumulative sense of the climate as an indispensable common good that belongs to all and is meant for all. The Climate Change crisis presents a systemic threat to this pivotal common good. Seeing the climate as a

common good can assume a cosmic meaning in terms of developing a cosmological ethic, as well as an ecological ethic. This enlightens what is meant by the *Integrity of Creation* as fostering the wholeness of creation from a much broader perspective. The conference at which the book's contributions were presented was the inaugural event in an annual endowed series with the general theme of the *Integrity of Creation*, providing the context not only for discussing Climate Change, but many other topics in the years ahead.

Science

Within this general context of perceiving climate as a common good, the section on science explores many aspects of the empirical reality that Climate Change causes: the economical and ethical opportunities that revolve around the complex areas of energy and the environment; the significance of the Gaia hypothesis to understand the climate crisis; and how climate and air quality are interconnected in the developing world. To discuss economic and ethical opportunities in energy and the environment requires that attention be given to a variety of inter-related topics if we are to wisely use our knowledge on energy and global warming. As we continue to engage energy companies that rely mostly on fossil fuels to provide our energy, we need to switch away from fossil fuels to avoid significant changes to the climate. Because the impact of Climate Change will only become more expensive as changes increase, we must develop a sustainable energy system that has many benefits in addition to reducing CO2 emissions. While this may appear daunting, there are many available resources and policies to make progress. If we fail to reduce global warming, the future is bleak with melting ice sheets flooding regions with vast populations or making it too hot for crops to grow outside in many regions of the world. However, if we grasp the current opportunity we can build a sustainable and economically sound energy system that passes to future generations a viable climate across the globe.

The continued increase in atmospheric carbon dioxide from anthropogenic sources provides an opportunity to evaluate global conditions in the context of the so-called Gaia Hypothesis presented by James Lovelock over forty years ago. He proposed that the Earth's climate was modulated over time through the interaction of biological ecosystems with both geologic and cosmologic forces. A major point was that increasing solar luminosity was offset over time with the removal of carbon dioxide from the atmosphere through biological processes (e.g., photosynthesis, biomass accumulation, and carbon burial). Predictions were made of how the

planetary system might respond to perturbations, be they biological (e.g., evolution of oxygenic photosynthesis), geologic (e.g., episodes of increased tectonism and volcanism), or cosmologic (e.g., major bolloid impact). Lovelock designed a simple model, called Daisy World, in which populations of white daisies and black daisies could affect the global surface temperature of a hypothetical world, in the face of increasing solar luminosity. A major criticism of the hypothesis was that there was no "control" planet on which the hypothesis could be tested. However, today we are conducting a so-called Gaian experiment with a different stressor, the continued increase in atmospheric carbon dioxide from anthropogenic sources. Atmospheric carbon dioxide levels have increased significantly just since the late 1970s (almost a third of the total increase) and there has been a concomitant increase in global temperature. Global weather instability (e.g., oscillations) can be predicted with increased extremes in temperature, both hot and cold, as we approach the failure point. Although ocean acidification is predicted to impact corals and carbonate precipitation, other biological processes (e.g., anaerobic respiration) will persist and enhance carbon burial. Following collapse, a new global homeostatic set point will be reached, with different weather patterns reflective of a new climate scheme.

Furthermore, cataclysmic outcomes where Climate Change and air quality are interconnected will have a detrimental impact especially on the developing world. Climate change and air quality are tied together because fossil fuel combustion drives carbon dioxide emissions and is strongly tied to aerosol pollution. Aerosols in turn kill millions and also represent one of the largest uncertainties in climate forcing. Without factoring in the social cost of pollution, it is difficult to argue that developing countries should forgo fossil carbon combustion as a pathway to energy intensification and development. However, the costs of pollution are enormous. For example, millions of people perish in China each year from air pollution, with an average of several years of life lost. It is imperative that the developed world should lead the development of policies that appropriately internalize these huge social costs.

Sustainability

Sustainability regarding the climate has to be considered from a global perspective. To begin the discussion, global sustainability indicators can help to address the crisis of Climate Change by considering three main areas. First, new Sustainable Development Goals were voted on at the United Nations in September 2015, each with measureable outcomes, to

create a more sustainable planet. This achievement resulted from a previous report in 1987 (*Our Common Future*, the Brundtland Report) indicating for the first time that globalization has caused our world significant trouble, such as widespread pollution, deforestation, ecosystem disruption, and social inequity. The 1987 report suggested that we had moved beyond an environmental approach to global sustainability. That report provided the definition of sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Second, the United Nations continues to focus on challenges to national sustainability planning and management in the developing world. There are two broad areas that limit the promoting of global sustainability: societal and bureaucratic. On the one hand, societal challenges can be connected with three areas of concern: the acceptance of sustainability that varies across countries; issues related to education in promoting sustainability; and finally the problems associated with war, conflict, corruption, and human rights abuses. On the other hand, bureaucratic challenges tend to deal with five main areas of concern: the structure of national governments; the evolution of institutions with their multiple varieties of bureaucracy; training regarding the implementation of global sustainability goals; the problems addressing basic data collection; and costs for sustainability goals where funding is not sufficient or available. Third, the role of the developed world needs to be considered within the context of the sustainable development indicators. These goals provide the opportunity for a global conversation about sustainability. While acknowledging the societal and bureaucratic limits that make these initiatives difficult, we must limit the massive impact of development with developed countries having most accountability for long-term global sustainability.

Just as sustainability has to be considered from a global perspective, we also need to consider operationalizing organizational sustainability. This can be done by examining perceptions of sustainability professionals (vice presidents and global sustainability leaders) as they engage stakeholders in operationalizing sustainability in large organizations. The issues of why and how sustainability are enabled within large, multinational corporations is considered in relation to interviews and exploratory research with a focus on grounded theory development. A cross-industry sample of 22 organizations recognized by multiple sources (Carbon Disclosure Project, Dow Jones Sustainability Index, Newsweek's Green rankings, GRI, and KLD) as top-performing firms provides context as to how sustainability is measured. Insight includes the role of supply chain collaboration, obstacles, and the interrelated connections to performance

through the evolution of Environmental Management Systems to contemporary and future Sustainable Operating Systems impacting multiple stakeholders, including the environment. The use of structured interviews, multiple coders, QSR Nvivo software, and synthesis of respondents' information provides a foundation for grounded theory development and an integrated approach to the integrity of creation enabled by sustainability focused performance measurement used within large organizations. Findings identify enablers of the continued evolution of the sustainability paradigm and predictions for the future for how businesses integrate the integrity of creation through global operations within a three-phased approach to measuring and managing performance. Through a better understanding of how these leading firms and professionals in this study operationalize sustainability, we can identify and explain the following: a grounded theory of sustainability within and across organizations involving why, how, and what they measure; the collaborative practices and barriers to working with global supply chains when leveraging sustainability for change management; the continued explosion of big data with hundreds of sustainability-performance metrics already in use across organizations; and a path to a future with Integrated Bottom Line (IBL), not single bottom line (financial), performance measurement.

In contrast to this highly technical approach to sustainability, we also need to build social and ecological resilience with regard to Climate Change, especially from the perspectives of disaster and public health from a global perspective. The number of natural disasters worldwide is increasing, in many cases being linked with Climate Change. War and other armed conflicts have consistently been connected with global disasters, as have migration and other development-related vulnerabilities. Over the past 20 years, the number of recorded disasters has doubled from around 200 to more than 400 per year. Climate Change, especially when coupled with under-development, environmental degradation, and urbanization, is becoming a critical driver of disaster risk. People in developing countries are already bearing the brunt of increasingly frequent and intense floods, storms, and droughts, and this burden is expected to increase over time. While poor people in poor countries are disproportionately affected by war and major disasters, the devastating legacy of disasters like Hurricane Katrina offers compelling evidence for the need for disaster preparedness and response. While disaster preparedness has become a key public health issue, it underscores the need for interdisciplinary considerations of assessment. Many are looking to social-ecological theories, interdisciplinary by nature, for solution-focused

strategies to build resilient communities that are better prepared for disaster. We need a model that aligns Climate Change, disaster, and public health concerns with a social-ecological perspective on response, community resilience, and survival.

Another crucial issue from a global perspective to address Climate Change is the need for developing energy infrastructure projects in the developing world. To mitigate Climate Change, it is vital to establish large scale alternate energy production as the foundation of economic growth. Establishing energy infrastructure projects in the developing world requires innovation and creativity. Crossing the chasm of building these projects also requires multiple components, including the following: maintaining existing social communities; bridging international financing standards with a financeable project structure; meeting the international standards of development banks for financing, environment, and anti-corruption; and working in countries where the interests of the existing elite are at cross purposes with economic growth for the people. Examples include the Jatropha Agriculture Biofuel project development and Waste to Energy Projects in the developing world, with the related challenges, innovations, and desired outcomes. The mitigation of Climate Change requires that we address the challenges of existing societal and business interests that often have vested interests in maintaining the status quo and also see a threat in changes from fossil fuel established enterprises and the growth of alternative energy.

The integration of discourse on science and sustainability raises crucial ethical questions about interventions needed to establish global practices that can enable the planet to flourish. These ethical concerns can be integrated with religious perspectives that engage with similar issues from related standpoints.

Ethics

One of the most daunting ethical challenges regarding Climate Change and the compromises it causes for the planet deals with the duties that we have regarding abundance in the developed world. We have an ethical obligation to talk about a critical issue, reflecting our duty to public speech as global citizens, and in particular we can offer a moral gesture of hospitality as a preliminary response to the crisis of Climate Change. We have a duty to speak in the public square, because living in society is a privilege directly contingent on our duties within society. These obligations arise from the brokenness of the world that we have the ability to repair through the obligation of ethics. The needs of the poor further

justify this duty, especially because our gestures are cumulative, creating a chain of action that contributes to the systemic order of the world. Hence, to do nothing with regard to Climate Change constitutes a moral act that supports existing carbon use and energy company policies. In this context, our abundance, with which Climate Change is closely related, creates special duties. We face moral failure insofar as our ordinary, casual acts lead to devastating events for which we are culpable. We have a collective responsibility to change the practices that have led to the intense consumption that defines our world. We are obliged to be just stewards of the world with a duty to care for the world. Faced with the ecological disaster of Climate Change that impacts us negatively in so many ways, such as on food production across large regions of the world, we should develop gestures of hospitality to strangers who will be faced with the collapse of their land. This involves a risky hospitality or uneasy welcome to strangers in an asymmetrical relationship in which our abundance is transformed into reconciliation and fraternity. By learning to risk hospitality we can create hope in the name of welcome, albeit in the midst of disaster and the terrible crisis of looming climate chaos. This risky hospitality can be inspired by the Scriptural texts, like the story of Joseph who reconciled with his failed and wayward brothers, sent by their father Jacob, to provide them with food during a long-lasting famine.

Faced with a looming climate emergency, we will need effective preparedness, including resource allocation plans in anticipation of the disasters that will arise, including disease outbreaks. In particular, healthcare organizations will need to prepare for an increase in outbreaks of infectious diseases that result from Climate Change. Studies have shown that the changing global climate has caused an increased risk for the spread of infectious diseases. Global warming has drastic effects on the life and maturation cycles of various host insects, creatures, and algae, as well as the incubation periods for various infectious viruses. Global climate changes are also predicted to greatly affect human living conditions, including the following: increased urbanization, a shift away from coastal living, increased homelessness as a result of severe weather storms, and increased susceptibility and immunosuppression as a result of UV radiation exposure. Human travel also increases the risk of spreading infectious diseases into non-endemic areas on a global scale. As a result of the increased risk for infectious disease outbreaks, healthcare facilities have a responsibility to plan for resource allocation as well as triage training in the event of an outbreak. As seen by the Ebola outbreak in 2014, training and preparedness for such outbreaks is essential for containing and managing the situation to protect the population's health.

From another healthcare perspective, more narrowly construed, Climate Change will have significant impact on genetic predictability precision. The hope for genetic technologies is so powerful because of the ability to develop models for predictions and preventions to sequences that lead to human vulnerabilities. These vulnerabilities (gene expression) change over a lifetime due to diet, toxins, physical activity, and stress. Specifically, genetic expression, penetrance, and dominance (phenotype) are highly sensitive to environmental forces. As a result of numerous interactions, including the environment, phenotypes are difficult to reliably and accurately predict. Climate change is affecting the accuracy of predicting phenotypes. For healthcare, the additional factor contributing to gene expression creates an ethical concern as it limits the accuracy of medical interventions. The limitation of accurate predicting is harmful to genetic research for therapeutic interventions. Genetic issues related to climate change are twofold, affecting current and future populations. Ethically, unpredictability inhibits the ability to obtain both authentic informed consent and safe and effective health care practices, along with inhibiting the promotion of population health. As a result, what is intended to benefit patients can unintentionally be harmful without awareness of the risks. Future concerns about the effects of Climate Change on genetics include potentially limited genetic diversity. These genetic changes can be manifest in health expressions, such as diseases and other vulnerabilities. With limited genetic diversity, humans will be more vulnerable to epidemics. Healthcare must be proactive to deal with the negative effects of Climate Change on sequences in genetics that can cause increased human vulnerabilities.

Another important issue for healthcare in the face of Climate Change will be to address justice and eco-social disability in the context of creation being a not-so-perfect world. Sam's Perfect World is an award-winning portrait by David Lenz of his son, Sam. It is a haunting picture of his son's strength and the landscape's looming power. The 25th anniversary of the Americans with Disabilities Act (ADA) was in 2015. Upon the acceptance of this Act, a new landscape opened to kids and adults in Sam's world: employment opportunities, transportation accessibility, public accommodations, the use of telecommunication, and protection from retaliation all became realities within Sam's reach. While the ADA opened a new world for Sam, things are not so perfect in this landscape. In 1990, the world ahead of Sam became accessible; what remains both inaccessible and problematic is the landscape that shaped Sam. Currently, the primary models for understanding disability are the medical model that understands disability as a physical impairment and

the social model of disability that comprehends the societal "disabling" of an individual through various structures and stereotypes. What both of these models fail to take into account are the toxic chemicals within our landscapes and cities that can promulgate disability accompanying Climate Change. Such consideration implies a new model—an eco-social model of disability—wherein disablement occurs through societal impact prior to birth rather than societal structures after birth. An eco-social model of disability can enlarge current models to include Climate Change and its effect on the human person. The meaning of the human person must be integrated with ecological relations. Sam is a child of this environment: these lulling hills, the verdant growth of the fields, and that splash of water at its center are the muscle and sinew, the cell and the systems of Sam's young body. Eco-social disability takes the landscape into account prior to birth, thereby expanding the social model of disability, which only takes into account the social landscape after birth, to the antecedent landscape that will be so detrimentally impacted by Climate Change.

Given these pervasive challenges that arise from Climate Change, we need to develop a model for the stewardship of creation that impacts ethics globally. The ethical and religious idea of the stewardship of creation posits that human beings should act as responsible caretakers of the world and its resources without exerting blind dominion. By drawing our attention to the human responsibilities towards creation, we must fight overconsumption that contributes so significantly to Climate Change. It is imperative to consider how this idea can be given more leverage in various fields of human activity, such as healthcare. Although the idea of stewardship has been applied in healthcare ethics, the application could be more encompassing, and the idea deserves more attention in bioethical discourses to emphasize the connectedness between individuals and creation. There is a need for a model in healthcare ethics through which the idea of stewardship can be broadly implemented. This model can be seen in the UNESCO *Universal Declaration on Bioethics and Human Rights* that incorporates the ideal of stewardship to support sustainable healthcare policies, including the protection of future generations and the environment. Connected with the ethical principles of responsibility, vulnerability, equality, and justice, the *Declaration's* focus on stewardship can provide a helpful model for addressing healthcare issues in the global context of Climate Change.

A more detailed analysis of this Declaration suggests a normative framework for discussing ethical aspects of Climate Change as an ethical endeavor at its core that inherently affects humanity and the globe.

Nations most culpable for greenhouse gasses typically experience fewer effects of Climate Change globally; whereas, nations most harmed typically contribute least to the problem. Vulnerable populations are especially in jeopardy, being the least protected from massive flooding, extensive droughts, land erosion over large regions, and risks of vector-borne disease. Another globally relevant health-related perspective is that increasing temperatures will negatively impact those who are sensitive to heat, such as those with cardiovascular or respiratory problems. The climate crisis obligates us as a global moral community to seriously address this impending disaster. We need to see Climate Change and global warming as eliciting an ethical mandate for the protection of humanity and the environment. UNESCO's global ethics framework can help to identify and examine Climate Change as a global ethical concern. Illustrations of the relevance of the UNESCO principles include dealing with human rights and dignity, treating populations fairly, the protection of future generations and the environment, and social responsibility and health, especially regarding access to adequate nutrition and water. In particular, the principles related to solidarity and cooperation urge us to coalesce around an effective global response to the climate crisis.

Religion

This sense of solidarity and cooperation in ethics overlaps with similar approaches in religion that can shed further light on Climate Change. To begin looking at the climate crisis from the perspective of religion, it can be helpful to consider the Orthodox view that helped to inspire the recent environmental encyclical of Pope Francis. Since the early 1990's, the current Ecumenical Patriarch of Constantinople, Bartholomew I, has raised awareness about environmental and climate issues through Orthodox theology. The Patriarch has developed a pro-environmental theology and activism pursuing three goals: bringing Orthodox Christianity to the conversation about how organized religion can play a constructive role in dealing with environmental destruction and Climate Change; establishing Orthodox Christianity as a credible and sophisticated voice in this dialogue; and most importantly, crafting a green apocalyptic theology that will initiate spiritual reform movements within Orthodox, Catholic, and Protestant denominations and change the horizon of ecumenical dialogue, energizing the drive for reuniting the main branches of Christianity. These points from Orthodox theology can help interpreters of Pope Francis' encyclical to make sense of his own goals and strategies in that document. Since becoming leader of the world's 1.2 billion

Catholics, Pope Francis has made no secret of his friendship with and admiration for Patriarch Bartholomew. Their meeting in November 2014 signaled a strong mutual desire to work together on finding common ground for reuniting the Eastern and Western Churches. Cooperation on environmental and Climate Change issues, particularly a mutual interest in green apocalyptic theology, is central to their shared ecumenical vision.

The impact of Pope Francis' environmental encyclical has had global reach, even though it reflects a robust Catholic ethical tradition that has developed over centuries. Hence, Catholic moral reflections about Climate Change ecology are especially apt. World leaders in religion, politics, economics, the military, and academia have concluded that Climate Change is the defining challenge of our age. As the greatest existential threat, it is the most formidable obstacle to sustainability and global justice, especially impacting impoverished peoples and future generations. To grasp the relevance of religion for this topic, it is helpful to highlight the three interrelated scientific phenomena of climate variability, global warming, and Climate Change, including the factor of carbon dioxide emissions from fossil fuel combustion, cement production, and deforestation. That alignment can shed light on two dramatic cases that currently suffer from the climate crisis: the status of Fiji and Florida, with the current and impending physical, social, economic, and psychological impacts of Climate Change on the respective local populations. As a result, basic ethical questions within the perspective of creation theology need to be addressed. The decision-making task becomes one in which moral and religious issues, and cultural, societal, political, and economic value systems, are deeply implicated. These are not only profoundly complex but they often elicit emotional, as well as reasoned, intellectual responses. To contextualize the framework for moral analysis and evaluation that enables critical moral reflections on Climate Change, it can be helpful to apply Catholic social teachings on human rights, human dignity, and Pope Francis' encyclical to the integrity of the environment.

Another theological resource to engage the climate crisis is the recent work of Hispanic theologians. They enable us to recover the aesthetical value of creation as a way to combat Climate Change and safeguard the integrity of creation. Alejandro Garcia-Rivera's theological cosmology is an example. He is a member of the Academy of Catholic Hispanic Theologians of the US, and he offers a unique aesthetic and religious vision on this topic. In addition, Roberto Goizueta's understanding of Fiesta is very enlightening, focusing on theological aesthetics as well as liberation and Latino/a theology. The works of these two scholars offer a unique contribution to the discussion about the implications of Climate

Change. Their insights enable us to foster practical wisdom about the role of aesthetical theology in restoring an integrative view of creation.

Despite the positive contributions that religious discourse provides on the climate crisis, there are nonetheless voices of evangelical skepticism and disbelief that lead to the denial of Climate Change. While Climate Change has emerged as a pressing concern among global leaders at the outset of the 21st century, doubts about both its importance and impact have persisted among segments of the evangelical Christian community. Evangelicals maintain higher levels of skepticism about the science of Climate Change compared to those of the general population. As such, an analysis of the evangelical sub-culture can provide a basis for uncovering the origins of evangelical skepticism so that greater understanding may be promoted among this social group. Through employing recent studies from sources such as the Yale Project on Climate Change Communication and the Pew Forum on Religion and Public Life, we can see the reasons behind evangelical doubts about the impact of human activity in relation to climate patterns. There are political, sociological, and theological factors that help to shed light on the reasons behind Climate Change disbelief among evangelicals. By highlighting these elements, advocacy groups may better understand the concerns they face in attempting to educate this segment of the American culture. Furthermore, attempts to educate through grassroots efforts and to have dialogue with the more skeptical segments of this religious community show how concerned evangelicals are about reaching out to fellow believers to help communicate the importance of taking care of our world by acknowledging the impact of human activity on the biosphere.

In addition to Catholic and Christian efforts to address Climate Change, it can be helpful to also consider an Islamic perspective on creation and environmental awareness through the metaphysics of Avicenna (İbn-İ Sina, 980-1037), one of the most significant thinkers and writers of the Islamic Golden Age. Avicenna's corpus includes writings on astronomy, alchemy, geography, geology, psychology, Islamic theology, logic, mathematics, physics, and poetry. But his most famous works are in philosophy and medicine, and his vision regarding ontology was unprecedented. The understanding of creation in Avicenna's metaphysics presents a vision for the integrity of creation that can enlighten environmental problems, such as Climate Change, in our time. Throughout history, there have been many different philosophical views about the environment. The fields of environmental ethics and philosophy often consider the root cause of problems to be human interaction with the environment. In an egocentric environmental view, humanity is the owner

and master of the universe. In an ecocentric view, humanity is a part of the universe and must live within the environment. In an anthropocentric view, humanity is seen as the central or most significant species on the planet. The theory of creation in Avicenna's metaphysics helps to enlighten the relation among these stances (egocentrism, ecocentrism, and anthropocentrism) in relation to the environment and the planet to shed light on how we might approach the crisis of Climate Change.

Having considered these general visions of religious discourse for Climate Change, two more specific topics related to religion can shed light on the climate crisis: the importance of rethinking the social response from the perspective of Catholic universities in the United States (reflecting their Catholic mission); and the responsibility of the Association of Catholic Religious in Uganda to develop an approach to natural environmental resources in Africa. On the social role of Catholic universities in response to the climate crisis, this unprecedented emergency can be seen to challenge their Catholic mission, specifically in the US, for two reasons: the US has the largest number of Catholic universities of any country in the world and the US is responsible for 2.5 times the greenhouse gases of any country in the world. Influenced by Vatican II's *Dogmatic Constitution on the Church*, the mission statements of Catholic universities in the US give weight not only to the pursuit of truth but also the promotion of justice. The latter is often seen as being realized through the education of students, not through directly challenging prevailing structures of evil and social agents that promote such structures. While Catholic universities have historically been concerned primarily with the pursuit of truth and the education of students, the University of Central America (UCA) in the latter part of the 20th century developed a model of a university (in the context of the great injustices of El Salvador) that emphasized the university as an agent of social outreach and social transformation. In light of the climate crisis, contemporary Catholic universities in the US should look to the UCA as a model for rethinking their place and importance in society in an effort to be true to their twofold missions of the search for truth and the promotion of justice. Secular universities can also draw upon the UCA as a model, albeit in a more limited way: because they play an important role in society and are large emitters of greenhouse gas emissions, they have ethical duties to reduce emissions and to leverage their power in society to create social and political change.

Another example of leadership that can be provided by Catholic organizations is the potential role for the Association of Catholic Religious in Uganda for natural environmental resources in Africa: without a

sustainable plan for using these resources, environmental degradation will worsen the climate crisis. The slogan often used to describe the scenic beauty of Uganda's natural environment is "Gifted by Nature." Uganda is home to Lake Victoria and four other lakes, not to mention the crater lakes. Of the 241,550 sq. km. surface area, 41,743 sq. km. are covered by water and swamps. Forest cover was around 14.95% in 2010. The country receives between 700-3,000 mm./year rainfall and has a temperature of 16°C-31°C. To protect Uganda's environmental resources, the government enacted the National Environment Act in 1995, right after the Rio de Janeiro Summit (1992). The Act provided for the formation of the National Management Environment Authority (NEMA) mandated with coordinating, monitoring, and supervising environmental activities. Today, there are fewer success stories, thereby necessitating new strategies. NEMA's State of the Environment Report of the year 2010 and recent dossiers on the subject cast a worrying trend on the sustainability of the country's natural environment resources. Uganda faces severe soil erosion, decline in soil fertility, deforestation, pollution, loss of biodiversity, and depletion of forest cover, fish, and water resources. These environmental problems have been evidenced by the recurring Bududa landslides, the near annihilation of wetlands in the Kampala Central Division, and encroachment on the Mabira tropical forest. New strategies for the sustainability of Uganda's natural environment resources are needed. Beyond NEMA, the Association of Religious in Uganda can engage these communities in the God-given mandate to steward these natural environmental resources, to protect and restore them. Protection of the natural environment requires being good stewards of this common good, involving a commitment to restorative justice. The Association of Religious in Uganda can apply the tradition of Catholic social ethics to foster the climate as a common good, especially addressing the negative impact upon it caused by environmental degradation.

Law

The empirical concerns that are raised in the previous sections on science and sustainability with regard to Climate Change, combined with the sections on ethical and religious interpretations about ways to address the problems associated with the climate crisis, call for policy endeavors regionally, nationally, and globally to bring the weight of law to support sustainable solutions.

There is a legal covenant to protect the earth's climate system for the future that leads to a vision described as Nature's Trust, invoking the

ancient public trust principle to promote an effective ecological culture. This is a different legal paradigm from the response of the US government under the statutory law (e.g., the Clean Air Act, the Clean Water Act, the Endangered Species Act and many others) that represents the failed technocratic paradigm or worldview at the root of our ecological crisis—if the approach of statutory law had worked, rather than providing support for the fossil fuel industry, we would not be facing the climate crisis today, and we would not have a technologically advanced society destroying itself. There are three branches of government in the US: the executive, the legislative, and the judicial (courts). The Nature's Trust paradigm turns to federal and state judges in the courts to safeguard the fundamental, constitutional rights of citizens by enacting injunctive relief to force the other branches of government to honor, not shirk, their duty. This is a legal response to the climate crisis. This response means approaching the courts to force action by using established law to prohibit harm—instead of creating harm through fracking, offshore drilling, mountaintop removal, strip mining, and many other forms of pollution made legal under environmental statutory law. The point here is not to reject environmental laws but to use their tools properly to accomplish rapid carbon reduction. Nature's Trust as a new legal paradigm focuses on the laws of nature that tell us what is killing the planet and develops a legal framework that is coherent with that reality. Furthermore, the tradition of the public trust reflects property law, not statutory law, insofar as it affirms community property rights in the natural resources that are essential for welfare and survival, including how we relate to all species and their ecosystems. The public trust situates law in the broader moral dialogue about the moral covenant we have with future generations to protect what can be called the Earth Endowment as a planetary trust asset with fiduciary obligation to protect our climate system.

We can adopt and apply environmental law to safeguard the planetary climate. This means that the US Environmental Protection Agency has considerable unfinished business to address. In 1987, the US Environmental Protection Agency (EPA) published its Unfinished Business report revealing that EPA experts (career managers and staff) had vastly different opinions on what should be high-risk priorities versus what the agency and public actually prioritized. This meant that the EPA spent most of its time and resources addressing issues the public viewed as problematic that agency experts did not. Oftentimes, the environmental problems that were high priority to the experts but low priority to the agency mission were emerging environmental issues, such as Climate Change. An organizational framework is needed to explain the difficulties for the EPA to practice