

# Resilience in Ecology and Health



# Resilience in Ecology and Health

Edited by

Gerard Magill and James Benedict

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



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# INTRODUCTION

## GERARD MAGILL

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, being founded by members of the Congregation of the Holy Spirit, the Spiritans.<sup>1</sup> The current University President, Ken Gormley, continues to provide outstanding support for the conference, inspiring excellence as the series develops.

This conference series addresses emerging concerns and pivotal problems about our planet's environment and ecology, including this study, *Resilience in Ecology and Health*. Each conference 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 selected 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.

In Fall 2015, the topic of the inaugural conference was *Climate Change* as an urgent concern regarding the Integrity of Creation.<sup>2</sup> Before the conference occurred, there was the publication in May 2015 of the environmental encyclical of Pope Francis, *Laudato Si': Praise Be To You. On Care for Our Common Home*.<sup>3</sup> (As this book goes to press, Pope Francis is about to promulgate a new Apostolic Exhortation called *Laudate Deum*. Subsequent books in this series will discuss its significance for global climate, sustainability and resilience.) The insights of *Laudato Si'* continue to enlighten the discussion in this chapter. 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."<sup>4</sup> The call of Pope Francis to foster a "respect for the Integrity of Creation" is very similar to the focus of the Spiritan mission.<sup>5</sup> The second annual conference and its proceedings focused on the topic of *Integral Ecology: Protecting our Common Home*,<sup>6</sup> the conference title being inspired by a chapter in the encyclical of Pope Francis.<sup>7</sup> The third annual conference and its proceedings

focused on the topic of *The Global Water Crisis*,<sup>8</sup> again inspired by the encyclical of Pope Francis.<sup>9</sup> The fourth annual conference and its proceedings focused on the topic, *The Global Sustainability Challenge*, reflecting the recognition of the Earth Charter by Pope Francis in his encyclical.<sup>10</sup> The fifth annual conference and its proceedings focused on the topic, *Toward a Healthy Planet*.<sup>11</sup> The sixth annual conference and its proceedings focused on the topic, *Strands of Sustainability*.<sup>12</sup> The seventh annual conference and its proceedings in this volume discuss *Resilience in Ecology and Health*,<sup>13</sup> connecting sustainability with resilience, ecology, climate, health and related issues.

As this conference series evolves, many other topics will be discussed to shed light on the *Integrity of Creation* from multiple perspectives. To safeguard our planet, we must be attentive to ecological and 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. These topics all highlight the basic problem of global sustainability and resilience.

The presentations at the conferences result from a peer-reviewed process 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 focus of the discussions. The chapters are organized into several disciplines and categories that relate together in an integral manner. Each section is designed to present a variety of perspectives regarding resilience. The organization of chapters adopts this layout: resilience and ecology, resilience and health, resilience and biotechnology, and generational challenges regarding ecology and the environment.

The first section focuses on resilience and ecology to explain that sustainability and resilience in higher education depend on inclusivity, to present a Hegelian reflection on rewilding, and to explain the significance of ecological resilience for the future of humanity. The next section focuses on resilience and health to engage a variety of perspectives: assessing practical ethical challenges for resilience in healthcare in multicultural societies; considering the resilient tension between autonomy/rights and population/common good; highlighting the resilience of justice in public health in dealing with a pandemic; articulating the resilience of the principle of double effect reasoning in healthcare; exploring resilience in the diagnosis and treatment of psychiatric conditions; discussing how substance abuse treatment and resilience can decrease recidivism among incarcerated patients; and exploring the resilience of clinical spiritual care in a pluralistic

care environment. The subsequent section focuses on resilience and biotechnology to address these emerging perspectives: ecological perspectives in a biotechnological age; the hermeneutics of nudging to enlighten the resilient reciprocity between transhumanism and nudging; resilience in embryo intervention to resolve serious genetic disease; resilience in genetic testing in the pursuit of sustainable healthcare; the resilient use of hyperspectral imaging in the research of cancer imaging; and the resilient use of photoacoustic flow cytometry for analyzing *Pseudomonas Aeruginosa* with bacteriophage tags. Finally, there is a section on generational challenges on resilience where undergraduate students present pivotal concerns around two sets of topics. The first set of topics deals with ecology and climate, discussing the following: the papal encyclical *Laudato Si'* and the ecology of creation; mitigation and adaptation regarding climate change through a just transition; anxiety and climate change; democracy's impact on climate change; climate change and democracy more generally. The second set of topics deals with the environment and conservation, discussing the following: technical progress and society; animal experimentation and the environment; agricultural pesticides and marine wildlife; primary causes and impacts of coral bleaching and future conservation outlooks; and recent California wildfires. The book's brief conclusion considers the ethical imperative to foster the reciprocity between resilience, ecology, and health within the general context of the climate challenge.

A few words of acknowledgment are appropriate to recognize the contribution of many in planning the annual conference series 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 presents a lovely legacy. Also, there is sincere appreciation for the continuing support of Ken Gormley as our current University President and for the ongoing support of the Spiritan Congregation that sponsors the University. The editors are very grateful for the advice and oversight of a highly dedicated Conference Planning Committee, an outstanding University librarian, Ted Bergfelt, and a superb support staff, including a very gifted group of international graduate students who provide outstanding support for the annual conference that leads to our published proceedings. Finally, we extend heartfelt gratitude to Ercan Avci, Ph.D., the conference coordinator. His detailed planning assured a seamless scholarly event with its multitude of posters and presentations and his meticulous formatting of the chapters in this work facilitated a timely submission of the manuscript to the publisher.

## Notes

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

<sup>2</sup> See the conference proceedings, Gerard Magill, Kia Aramesh, eds., *The Urgency of Climate Change* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, 2017), Introduction, xi-xiv. Permission has been provided to reiterate in the Introduction of this book materials from the Introduction to the first book in this series, *The Urgency of Climate Change*.

<sup>3</sup> 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).

<sup>4</sup> Pope Francis, *Laudato Si'*, no. 3, 28, 93.

<sup>5</sup> Pope Francis, *Laudato Si'*, no. 130.

<sup>6</sup> See the conference proceedings, Gerard Magill, Jordan Potter, eds., *Integral Ecology: Protecting Our Common Home* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, 2018).

<sup>7</sup> Pope Francis, *Laudato Si'*, no. 124 (in chapter three), and chapter four.

<sup>8</sup> See the conference proceedings, Gerard Magill, James Benedict, eds., *Cascading Challenges in the Global Water Crisis* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, 2019).

<sup>9</sup> Pope Francis, *Laudato Si'*, chapter 1, section II, "The Issue of Water," no. 27-31.

<sup>10</sup> See the conference proceedings, Gerard Magill, James Benedict, eds., *The Global Sustainability Challenges* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, 2020). Also, see, Pope Francis, *Laudato Si'*, no. 207, refers to the *Earth Charter* for a sustainable, global society that emphasizes justice and peace (The Hague, 29 June 2000, at <https://earthcharter.org/discover/what-is-the-earth-charter>).

<sup>11</sup> See the conference proceedings, Gerard Magill, James Benedict, eds., *Toward a Healthy Planet* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, 2021).

<sup>12</sup> See the conference proceedings, Magill, Gerard, James Benedict, eds., *Strands of Sustainability* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, 2023).

<sup>13</sup> See the conference proceedings, Magill, Gerard, James Benedict, eds., *Resilience, Ecology and Health* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, forthcoming).

## Literature

Earth Charter. 2000. The Hague. At, <https://earthcharter.org/discover/what-is-the-earth-charter>.

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

- Magill, Gerard, James Benedict, eds., forthcoming. *Resilience, Ecology and Health*. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing.
- Magill, Gerard, James Benedict, eds. 2023. *Strands of Sustainability*. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing.
- Magill, Gerard, James Benedict, eds. 2021. *Toward a Healthy Planet*. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing.
- Magill, Gerard, James Benedict, eds. 2020. *The Global Sustainability Challenge*. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing.
- Magill, Gerard, James Benedict, eds. 2019. *Cascading Challenges in the Global Water Crisis*. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing.
- Magill, Gerard, Jordan Potter, eds. 2018. *Integral Ecology: Protecting Our Common Home*. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing.
- Magill, Gerard, Kia Aramesh, eds. 2017. *The Urgency of Climate Change*. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing.





## CHAPTER ONE

# PIVOTAL PERSPECTIVES REGARDING RESILIENCE IN ECOLOGY AND HEALTH

GERARD MAGILL

### **Introduction**

This book continues a series of works that address the urgency of the Sustainable Development Goals adopted by the United Nations Development Programme in 2015,<sup>1</sup> such as slashing carbon dioxide emissions to net-zero if we are to prevent the average global temperature from increasing beyond 1.5 celsius above preindustrial levels.<sup>2</sup>

This book presents the proceedings of the 7<sup>th</sup> annual endowed conference on the Integrity of Creation, fostering the wholeness of creation from interdisciplinary perspectives. This 7<sup>th</sup> annual conference selected the topic, *Climate Resilience: Collaboration, Adaptation, and Action*. The perspectives in the study represent a variety of disciplines that engage each other in an integrative way. The chapters have been organized to let the dialogue unfold in an overlapping manner, with points of view developing from different angles.<sup>3</sup> The sections below summarize crucial standpoints as we seek to protect our common home. As mentioned in the book's Introduction, there are several sections to bring coherence to the contributions. Discourse on resilience can inspire engagement from many fields, including ecology and health, hence the title of the book, *Resilience in Ecology and Health*. The first section engages resilience and ecology, the second section addresses resilience and health, the third section discusses resilience and biotechnology, and the fourth section considers generational challenges, including ecology and climate as well as the environment and conservation. This opening chapter introduces many pivotal perspectives that appear throughout the book (using the abstracts submitted by the various contributors).<sup>4</sup> This overview is designed to assist readers in keeping an eye on the big picture as they explore the various topics. As the chapters develop, there is a cumulative sense of building resilience to advance the integrity of creation

as a function of the common good, belonging to all and meant for all (adopting a phrase from the Papal encyclical, *Laudato Si'*).<sup>5</sup> What follows is a brief review of the chapters in each of the main sections of the book.

## Resilience and Ecology

This first section of the book engages resilience and ecology to engage several fascinating topics. The first topic examines how the future of resilience and sustainability in higher education depends on inclusivity. Institutions of higher education can become more resilient in the face of climate change and contribute positively to a sustainable future. Here, resilience and sustainability foster a field of study and practice to create a relationship with the Earth within the limits of the planet's ecological systems that benefits all living beings. We need change in our institutional structures and current relationship with one another and the planet, developing a framework of truth, courage, and inclusivity.

The second topic presents a philosophical analysis by offering a Hegelian reflection on rewilding. This occurs by a detailed analysis of part of the last chapter "Absolute Knowing" in Hegel's *Phenomenology of Spirit*. This involves an attitude that can be called "Speculative Moral Receptivity," which is a moment in the becoming of Hegel's "Preserving Idea." Crucially, this Idea engages biodiversity. This interpretation is unorthodox: it involves moving beyond anthropocentrism, presenting the culmination of Hegel's phenomenology as a dialectical becoming that develops from receptivity to preservation, via biodiversity. This fascinating stance is consistent with current scientific efforts to rewild, as a kind of dialectical thinking that is itself a rewilding. The discussion gives intriguing examples of scientific, rewilding views of the earth Hegel would endorse today.

The third topic then advances the focus to consider ecological resilience as crucial for the future of humanity, specifically considering climate change as a critical issue in bioethics discourse because of its serious threat to humanity and creation. The fundamental causes of climate change include population growth, urbanization, and industrialization as co-dependent variables that lead to global warming. Because climate change leads to the alteration of ecosystem functioning, it exerts a negative effect on plants, animals, and human beings. To mitigate the effects of climate change, we need to alter fundamental assumption towards creation and to develop skills to improve climate resiliency via collaboration, adaptation, and strategic action.

## **Resilience and Health**

This section of the book considers several pivotal perspectives regarding the reciprocity between resilience and health. The first topic examines resilience in healthcare to assessing practical and ethical challenges in multicultural societies. Ethical and practical challenges in multicultural societies prompt crucial risks to the sustainability of healthcare services and require exploring specific resolutions for governing these challenges. However, the prevalence of cultural and religious diversity and its impact on healthcare services lead to practical problems, such as language barriers, and can complicate distinct ethical standpoints. It is important to underline the primary practical and ethical challenges in multicultural societies and to make suggestions on how to alleviate these challenges. Cultural and religious diversity cause both practical and ethical difficulties, and practical challenges inevitably trigger ethical problems. There is a need to strengthen cultural competence, providing patients with language assistance services, and educating healthcare professionals to reduce practical problems. Regarding ethical issues, it is crucial to emphasize similarities rather than unduly stress differences among different cultures and religions. Additionally, it is necessary to support enhancing universal agreements on common ethical problems and to avoid absolute positions on ethical issues to manage different arguments and facilitate the sustainability of healthcare services.

The second topic presents the resilient tension between emphases on autonomy/rights and population/common good. Healthcare electronic data is everywhere—on computers, phones, tablets, and virtually any device that can access the internet. Patient electronic health records, medication information, genetic testing results, and so many more are out there. What is being done with all this information, and did patients consent to its use in public health interests? It is crucial to address whether it is ethically justifiable for big data banks to use personal health information without consent for public health surveillance. The answer to this question requires a deeper look at the tension between personal autonomy/human rights and population health/common good. These concepts need to be applied in the real world by describing big data, what it is, and how it can help healthcare, in addition to its ethical considerations and limitations. It is critical to understand data usage and to provide an explanation of the ethical basis for public health surveillance, including the hazards and obligations related to the issue of personal privacy vs public health surveillance.

The third topic further explores the public health perspective by considering the resilience of justice in public health when encountering a pandemic. Public health, being critical for global health, concerns the entire

population rather than an individual. Hence, a focus on public health calls for a collective effort to maintain general well-being. The main concern of public health is prevention. When a health crisis occurs, public health authorities step forward to help mitigate the problem. Since ethics is required in general health issues, the critical priority of ethics in public health includes three general perspectives. Generally, the rapport between health and ethics needs to be recognized. More specifically, the principle of justice is indispensable for the work of public health. And practically, the principle of justice in public health is especially significant during a pandemic, such as Covid-19.

The fourth topic explains how a broad ethical approach is needed for resilience in health by explaining the complexities involved in double effect reasoning in healthcare. Written on the human heart is the desire to do good and to avoid evil. This desire is a primary consideration while making complicated decisions in healthcare. Circumstances can arise requiring an action that results in both a good and bad result. An overview of the history of this ethical principle is provided to consider practical applications that can foster resilience in health.

The fifth topic further explores practical aspect of resilience in health by examining the diagnosis and treatment of psychiatric conditions. As research has continued to develop, enhanced treatment methods have been used for patients with psychiatric conditions. The current status of psychiatric care can be reviewed through categories of diagnostic techniques and treatments. Diagnostic procedures include specialized physical examinations, lab tests, and psychiatric evaluations. Treatment methods include psychosocial methods, which include psychotherapy, art and music therapy, and psychoeducation, or medication interventions such as antipsychotics, benzodiazepines, and antidepressants. Though the diagnostic and treatment methods have progressed and served as a foundation for psychiatric care, the current methods lead to gaps in long-term care that must be further addressed in research.

The sixth topic continues this practical focus on resilience and health by explaining how substance abuse treatment and resilience can decrease recidivism among incarcerated patients. More than half of all prisoners meet the diagnostic criteria for drug abuse or dependence. For example, a national survey of New Mexico's jails by the Bureau of Justice Statistics showed that 70% of inmates met criteria for substance abuse, as opposed to the 9% of the United States general population. Since the beginning of data collection in 2001, no manner of death has increased more than drug overdoses and alcohol intoxication. Treatment of substance abuse disorders

and fostering of resilience together lead to a decrease in crime rates and recidivism.

The seventh topic continues the practical focus on resilience and health by considering the significance of clinical spiritual care in a pluralistic health care environment. There are numerous codes of professional ethics for different health care related fields; clinical chaplains, as a progressively professionalizing field, have likewise created and continue to develop professional ethics expectation to foster ethics resilience in the field. A crucial contribution deals with a popular approach in ethics theory (called Principlism) that focuses on the four widely acknowledged primary ethical principles of autonomy, nonmaleficence, beneficence, and justice. The discussion explains how clinical chaplain care engages these primary ethical principles in four arenas: the patient's autonomy and the chaplain's faith, nonmaleficence and proselytization, beneficence and clinical chaplain care, and finally, justice and patients of other faiths.

## **Resilience and Biotechnology**

The next section of the book engages several emerging perspectives on resilience regarding biotechnology. The first topic examines ecological resilience in a biotechnological era regarding xenotransplantation. Researchers for a long time have utilized animals to find appropriate medical interventions for human suffering. Hence, an ethical assessment is needed regarding the use of animals employed in xenotransplantation. Ecological resilience focuses on interventions that enhance both nature's and humanity's benefits, adopting the approach of common morality as a principal source of moral justification. When humans utilize other species for their ends, such as via xenotransplantation, ecological resilience requires caution when balancing risks and benefits in such endeavors.

The second topic adopts a futuristic stance to focus on the resilient reciprocity between transhumanism and nudging in order to clarify the significance of nudges in these biotechnological processes. The discussion considers pivotal issues regarding of integrating technology into human existence. Transhumanism is a movement that is presented as the avenue to overcome our physical and mental limits. It is firmly rooted in Enlightenment humanism that supplanted religious dogma with human reason. Transhumanism presents new opportunities to merge technology with our biology. The movement benefits from using nudge theory. Nudge theory seeks to assist people in making better decisions by using choice architecture. Issues arise when the assumptions about nudging someone

toward an outcome are questioned, such as what is the ideal body that we are nudging people toward.

The third topic deals with breakthroughs regarding resilience in embryo intervention to resolve serious genetic disease. Embryo gene intervention has been debated for many years. The discussion here highlights the pivotal distinction between somatic and germline gene therapy to consider a variety of practical issues including preimplantation genetic testing, ex vivo gene therapy, and gene therapy with emphasis on SCID and spinal muscular atrophy.

The fourth topic continues the focus on genetics to consider resilience in genetic testing. Preimplantation genetic diagnosis (PGD) involves testing embryos for genetic variations and predisposition to disease. This fast developing technology can help humanity eradicate disease while reckoning with just how far society is willing to go regarding embryo science. For example, may PGD be permitted to enable parents to choose the sex of their offspring? Perhaps even more controversially, PGD allows prospective parents to choose to purposely give their potential children genes for disabilities like deafness or dwarfism. An ethical rationalization for genetic testing can benefit from adopting four standard principles in bioethics (autonomy, nonmaleficence, beneficence, and justice) as well as the philosophical ideas of utilitarianism and deontology. Because genetic testing can enhance the futures of individuals and humanity, it is crucial for a resilient approach to health care.

The fifth topic engages another very practical focus in biomedical engineering to consider resilience in research on cancer imaging. Medical imaging began with the discovery of X-rays in 1895 by German Professor of physics, Wilhelm Rontgen. Over the years, many different imaging modalities have been introduced into the medical field to diagnose diseases and make progress in the medical industry. Scientists try to push the boundaries of medicine as far as possible to ensure current and future generations are privileged with the best technology. Each modality, from CT scans to multispectral and fluorescence imaging have been engineered to address a specific issue. Each modality uses different technological advances and methods to see into the human body allowing us to create images to address issues within human anatomy correctly and accurately. More specifically, hyperspectral imaging can be especially helpful for cancer imaging. A sound bioethical analysis is indispensable for the adoption of hyperspectral imaging in the medical field of cancer research.

The sixth topic continues this science focus on biomedical engineering to consider the resilient use of photoacoustic flow cytometry for analyzing *Pseudomonas Aeruginosa* with bacteriophage tags. The number of daily

bacterial infections is climbing, and the CDC explains that this is due to the antibiotic-resistant threat. Hence, it is important to find a faster way of bacterial identification. It currently takes 1-4 days for a medical lab to get a successful culture diagnosis to identify bacterial infection. Photoacoustic flow cytometry can be used as an alternative method resulting in swift identification within an hour. This research may provide evidence of a more resilient method to identify bacteria in the medical setting.

## Generational Challenges

This section of the book considers generational challenges that students encounter. These challenges are organized into two over-lapping areas: generational challenges on ecology and climate and generational challenges on the environment and conservation.

On the generational challenges on ecology and climate there are five perspectives. First, there is a fascinating philosophical account of resilience in the ecology of creation. In 2015 Pope Francis wrote his Encyclical Letter *Laudato Si* on the environment. He outlines a Christian view of the natural world as created and sustained by God for our use and preservation for our lives and the lives of all creatures. Following the inspiration of St. Francis of Assisi, the Pope warns against the narrowing of our engagement with the natural world only to our anthropocentric interests. He attributes many environmental harms specific to this widespread attitude.

Second, the approach of Pope Francis is applied to resilience in climate change to discuss mitigation and adaptation through a just transition. Climate change is the largest threat to humanity, but it doesn't impact everyone equally. It is often socioeconomically sensitive populations who suffer the most; for example, Native Americans and the urban poor are directly affected by rising temperatures while being the least likely to contribute to climate change. In combating climate change, it is imperative that adaptation and resilience policies serve to mitigate the historic inequities already present in society. Doing so can benefit from the application of the philosophy of justice as fairness.

Third, the need for resilience regarding climate inevitable causes anxiety. In psychological studies, results have shown an increase in anxiety levels connected to the current climate change crisis. Environmental dangers, including overpopulation, limited resources, destruction of ecosystems, and a variety of natural disasters, are contributing to changes in the mental health field. There are different types of anxiety responses and treatment options for individuals experiencing symptoms of climate change-induced anxiety. Climate change is a global issue that affects every

living being. To better address this anxious response, fostering resilience can be helpful.

Fourth, another perspective on climate is the resilient impact of democracy on climate change. For democracy to be a successful mitigation tool for climate change, it has to follow a course of action, adaptation, and collaboration in order to be successful. The word democracy means “rule by the people” and therefore people are the reason why democracy can focus itself on climate change. Because people are the heart of democracy, change cannot happen fully without their consent. It is essential that resilient democracy is a factor towards making a difference in the mitigation efforts against climate change.

Fifth, when considering climate change and resilient democracy, it is crucial to foster the willingness of governments for both short term and long-term solutions to help the environment.

On the generational challenges on the environment and conservation there are another five perspectives. First, it is necessary to appreciate the negative impact of technical progress on the resilience of society. Two things can be noted about modern society: industrialization has negatively affected the natural environment and that many citizens point to feelings of loneliness and isolation. As society has progressed into a more industrial state, communities and individuals increasingly became separated from their environment. As society distanced itself from the environment, the environment was seen as a mere “resource” to be used for capitalistic and industrial means. By separating the environment from society, individuals and communities lost their natural connection to the environmental world. Likewise, as the environment and nature were alienated and commodified, communities suffered alienation as more traditional means of socialization became weaker. Further, as industrial societies grew, the individual became more and more isolated, leading the individual to be seen as a commodity. Ultimately, individuals became objectified for capitalistic exploitation and consumerism, further isolating us from each other, their communities, and the environment.

Second, another critical way to foster a resilient environment is to address the ethical problem of animal experimentation. Many organizations and people such as People for the Ethical Treatment of Animals are against testing animals for any means, such as cosmetic, industrial, or medicinal. Peter Singer is a well-known philosopher who does not support animal experimentation. Singer explains three main arguments to defend his views in his article “Animal Liberation.” Other than the harm done to animals, the process of animal experimentation has negative effects on the environment, such as human health and the amount of waste being produced. Since animal



experimentation has proven to be so harmful, researchers are examining alternative methods that will benefit animals, humans, and our environment.

Third, resilience in the environment also requires being attentive to agricultural pesticides and marine wildlife. The pesticides and nutrients used in agricultural farming are running into our major bodies of water, allowing for the depletion of oxygen, and the harming and killing of marine wildlife. This directly affects our oceans and other water sources, but also the wildlife that resides within them and the different forms of life that may use them as a resource, including humans. A philosophical lens can aid in guiding our beliefs about what is right and wrong when it comes to looking at the environment, especially when analyzing what is causing damage to it, including water sources and their wildlife counterparts.

Fourth, resilience in the environment includes critical consideration of the causes and impacts of coral bleaching. The issue of mass coral bleaching has threatened coral reefs in every region for the past 10 decades. These events occur when the algae endosymbionts of coral are lost, resulting in a rapid paling of color. Studies indicate factors of climate change, such as increased temperatures and variations in precipitation, as the causes of coral bleaching events. Other human-driven components such as reckless diving practices and pollution runoff play a role in coral bleaching. This decline in coral health, directly and indirectly, affects a variety of organisms and ecosystems due to the importance of coral within aquatic communities. Coral reefs provide habitats, shelter, and spawning grounds for marine life, as well as protection of coasts from storms, waves, and floods. We rely upon reefs for food, resources, and income from recreational activities. Due to our extensive significance, we must reduce destruction by conducting research and implementing stricter laws.

Fifth, an increasingly problematic challenge to a resilient environment is the increasing range of wildfires, as evidenced so prominently in California. The climate in California has always been fire-prone, with low levels of rainfall and high heat in the summertime that dries out vegetation. Often, all that is needed is a spark to turn the dry brush on the ground into fuel. California continues to experience dramatic wildfire seasons, with records being broken regularly regarding both number and size of the fires. While these conditions are not new to the area, the fires are worsening every season. The increasing severity of the fires can in part be attributed to the changing global climate, but also to the history of fire suppression in the area. There were some unique features of the 2020 season, such as the new records it set, and the COVID-19 pandemic that may have effects on future seasons.

## Conclusion

In the concluding chapter, the analysis identifies some features of resilience in ecology and health (different from those discussed in the book's chapters) that have emerged with prominence in recent literature. This discussion emphasizes the ongoing ethical imperative to foster ecology and health in order to build a more resilient world.

## Notes

<sup>1</sup> See, United Nations Development Programme, *Sustainable Development Goals* (2015), at, <https://www.undp.org/content/undp/en/home/sustainable-development-goals.html>.

<sup>2</sup> International Energy Agency, *Net Zero by 2050* (May 2021), <https://www.iea.org/reports/net-zero-by-2050>.

<sup>3</sup> The organization of this chapter adopts the same approach as previous books in this annual series of conference proceedings.

<sup>4</sup> This discussion reflects the chapters in this book that constitute proceedings of the conference on *Climate Resilience: Collaboration, Adaptation, and Action* in Spring 2022.

<sup>5</sup> 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), §23.

## Literature

International Energy Agency, *Net Zero by 2050*. At, <https://www.iea.org/reports/net-zero-by-2050>.

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

United Nations. 2019. *Climate Change*, at <https://unfccc.int/event/cop-25>.

United Nations Development Programme. 2015. *Sustainable Development Goals*. At, <https://www.undp.org/content/undp/en/home/sustainable-development-goals.html>.

# **I. RESILIENCE AND ECOLOGY**

CHAPTER TWO

THE FUTURE OF SUSTAINABILITY  
AND RESILIENCE IN HIGHER EDUCATION  
DEPENDS ON INCLUSIVITY

MEGHAN CHAPPLE

**Introduction**

This chapter is intended to support the Spiritan mission of Duquesne University celebrated at the Integrity of Creation Conference. Both the presentation and chapter are based on my professional experience in creating change for sustainability.

Through academics and practice, Catholic institutions of higher education can become more resilient in the face of climate change and contribute positively to a sustainable future. I define sustainability as a field of study and practice to create a relationship with the Earth within the limits of the planet's ecological systems that benefits all living beings. To make the change towards a more sustainable university, we need change in our institutional structures and current relationship with one another and the planet. Here I share my approach to making change for sustainability in higher education with institutions and individuals. I reference how we have applied an approach I developed during my time in the Office of Sustainability at Georgetown, a Jesuit university. Based on two decades of work in the professional field of sustainability, I believe the resilience of our universities and colleges and the future of sustainability in higher education can be realized through a framework of truth, courage, and inclusivity.

## **A Framework of Truth, Courage, and Inclusivity for Making Change for Sustainability**

### **Truth**

To make effective changes in higher education for a sustainable future, we must be willing to face both the scientific and social truth of the situation in the world and at our institutions. Only by acknowledging the situation with an understanding of the planetary limits, the social impacts, and economic models, can we begin to understand the current system and look to new paradigms and new solutions.

Globally society is facing daunting challenges as pertains to our relationship with the Earth. Taking into account research-driven, evidence-based facts, we see that the choices we have been making as a global human society toward unlimited economic growth have negative consequences related to levels of consumption, biodiversity loss, and disproportionate negative impacts on marginalized human populations.

Fortunately, we have many options and choices to address these challenges. For example, there exists a personal will by consumers in the global community to change their habits for the better. Another promising insight is that the more justice informed and inclusive our solution development processes are, the more effective they can be.

Actions that curb global warming to 1.5°C will significantly reduce damages. Long-term costs to manage losses will escalate if we do not take action today. Given the urgency of the issues, swift action is necessary to mitigate the worst potential outcomes. We can use the hard truths and the hopeful truths to inform how and when we want to make a change.

Here are some basic facts about the current situation in the world:

- Consumption—The richest 1% of the global population emits two times more carbon emissions than the poorest 50%.<sup>1</sup>
- Biodiversity—Extinction rates are tens to hundreds of times higher than they have been in the last 10 million years.<sup>2</sup>
- Racial Disparities—In the United States Black and African Americans and Latinos are 30 to 50 percent more likely than whites to work or live in areas with the highest projected increases in climate-related joblessness, illness, and death.<sup>3</sup>
- Personal Will—Fifty percent of global consumers are willing to change purchasing habits to help reduce environmental impact.<sup>4</sup>

- Inclusivity—When women participate equally with men, climate policy interventions are more effective.<sup>5</sup>
- Time Sensitivity—We need to reduce climate emissions by 45% by 2030 to stay below catastrophic levels of a 1.5°C increase in the average global temperature.<sup>6</sup>

When we face these truths, we can choose to see that we are all part of a system. The good news is we are interconnected and can find levers for change in the system. With more than a thousand Catholic institutions of higher education globally,<sup>7</sup> the potential role of this sector in addressing the sustainability of human and ecological life on our planet Earth is noteworthy. Catholic colleges and universities provide education to future leaders on sustainability, contribute knowledge and insight from faculty researchers, and play critical roles as anchor institutions in local and global communities that practice what we teach and preach about sustainability. And as declared by Pope Francis in referencing Pope John Paul II in the *Laudato Si'* encyclical on climate change, Catholic institutions have a responsibility to improve their impact on the sustainability of the Earth.<sup>8</sup>

## Courage

An important tool for making change is the courage to process the emotional aspect of this work both in terms of facing the truth of our current situation and in terms of collectively developing and envisioning an alternative future.

In facing the truth of the situation, we see that we have created a world where wildfires and extreme weather are becoming the norm, sea levels are rising and eroding coastlines, land is becoming devastatingly arid for agriculture, oceans are swamped with plastic waste, species are going extinct at astronomical rates, disease and famine are spreading due to ecological disruption, and climate migration is stressing governments and economies. Climate anxiety is a researched and documented phenomenon. In *Generation Dread* Britt Wray states that we are experiencing an existential crisis and people are enduring sadness, stress, and fear about the future of the planet.<sup>9</sup>

You may want to dismiss or ignore any unpleasant feelings you have about the state of our planet that we call home. Ironically, these feelings may be your best tool for making change in yourself and in the system of which you are a part.

Imagining a better future can seem pointless. Identifying scalable solutions can be daunting. Building support for global fixes can feel