

Integral Ecology

Integral Ecology:

Protecting Our Common Home

Edited by

Gerard Magill and Jordan Potter

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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 and was founded by members of the Congregation of the Holy Spirit: the Spiritans.¹ The current University President, Ken Gormley, continues to provide outstanding support for the conference, inspiring excellence as the series develops.

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 topic of the inaugural conference in Fall 2015 was *Climate Change* as an urgent concern regarding the Integrity of Creation.² The conference was preceded by the publication in May 2015 of the environmental encyclical of Pope Francis, *Laudato Si'—Praise Be To You*.³ 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."⁴ The call of Pope Francis for "a religious respect for the Integrity of Creation" is very similar to the focus of the Spiritan mission.⁵

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 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.

Pursuing this agenda, the second annual conference and its proceedings in this book focus on the topic of *Protecting our Common Home*. The book adopts this intriguing phrase, *Integral Ecology*, used by Pope Francis

as one of the chapter titles in his encyclical.⁶ As the title of this book, the phrase highlights the scope of this environmental undertaking. The conference title reflects an admonition of Pope Francis in *Laudato Si'* when he wrote: "The urgent challenge to *protect our common home* includes a concern to bring the whole human family together to seek a sustainable and integral development."⁷ The concept of Integral Ecology seeks to convey the indispensable inter-relation of topics, expertise, and specialties in the quest to protect the planet when threatened with environmental catastrophe. The subtitle of the encyclical of Pope Francis, *On Care for our Common Home*, functions as a leitmotif throughout the book. Although the inspiration for the topic comes from this religious leader, the analysis engages both secular and religious perspectives on crucial issues that threaten the ecology of our planet.

The presentations at this conference on Protecting Our Common Home 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 focus of the conference. The chapters have been organized into several interdisciplinary categories that relate together in an integral manner. Each section has been designed to present a wide variety of perspectives: environmental science, social science, religion and ethics, and advocacy.

The first section sets the *context* for the discussion on Protecting Our Common Home. This section provides an overview of the interdisciplinary arguments, indicating that there is an overlapping and cumulative sense of protecting our planet as an indispensable common good. The section on *environmental science* introduces a critical perspective on our common ecomorality and explores the significance of climate mitigation decisions. The section on *social science* explores how our ecological breakdown presents the possibility of a psycho-spiritual breakthrough; the section also discusses how a human ecological approach can enhance a much-needed sense of planetary compassion. The next section on *religion and ethics* sheds light on the relation among theology, science, and ecology, and explores the cosmic common good as a resource for interreligious ecological ethics. The subsequent section deals with *advocacy* from a global perspective, addressing traditional African environmental ethics and how the poor and Earth must be engaged together to protect our common home. The final section is the conclusion that presents Integral Ecology as an urgent ethical imperative.

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 presents a wonderful legacy. Also, the continuing support of Ken Gormley as our current University President 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 superb support staff, including a very gifted group of graduate students, to whom sincere gratitude is extended. The extraordinary grace and talent of the conference coordinator, Glory Smith, deserves to be recognized with high acclaim and heartfelt gratitude: this outstanding commitment, in addition to all of her other daily office duties, continues to be a labor of love that assures success and joy at each conference.

Notes

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

² See the conference proceedings, Gerard Magill, Kia Aramesh, eds., *The Urgency of Climate Change* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, 2016), Introduction," xi-xiv. Permission has been provided to reiterate in the Introduction of this book much of what was said in that Introduction.

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). Hereafter, this Papal Encyclical is referred to as, Pope Francis *LS*.

⁴ Pope Francis, *LS*, no. 3, 28, 93.

⁵ Pope Francis, *LS*, no. 130.

⁶ Pope Francis, *LS*, no. 124 (in chapter three), and chapter four.

⁷ Pope Francis, *LS*, no. 13 (emphasis added).

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Magill, G., K. Aramesh. 2016. *The Urgency of Climate Change*. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing.

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I.

CONTEXT

CHAPTER ONE

PIVOTAL PERSPECTIVES ON INTEGRAL ECOLOGY

GERARD MAGILL

Introduction

To consider the Integral Ecology of our planet 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. The first section introduces the context of the book and the subsequent sections present a wide variety of perspectives on environmental science, social science, religion and ethics, and advocacy.

Context

This opening chapter provides an overview of the interdisciplinary views on Integral Ecology that are discussed in the book (using the abstracts submitted by the various contributors). This overview is designed to assist readers to keep an eye on the big picture as they explore the various topics. The context of the book highlights the interdisciplinary character of each section. As the chapters develop there is an overlapping and cumulative sense of Integral Ecology belonging to all and meant for all (adopting a phrase from the Papal encyclical, *Laudato Si'*, §23).¹

This study enlightens what is meant by the *Integrity of Creation* as the over-arching theme of the annual conference proceedings—fostering the wholeness of creation from interdisciplinary and holistic perspectives. The book presents the proceedings of the 2nd annual endowed conference series, *Integral Ecology: Protecting Our Common Home*. The following

sections summarize pivotal perspectives on Integral Ecology as we seek to protect our common home.

Environmental Science

Within this general context, the contributions on environmental science consider two related topics. First, the relationship between science and religion elicits continuing debate. All too often this relationship is described in military terms—being at war or in conflict. Unfortunately, there are ample historical and present-day examples that generate such language. In contrast, in the Papal encyclical, *Laudato Si'*, Pope Francis offers connections that foster what can be referred to as our common ecomorality. These connections hold exciting promise for detente and collaboration as we take on the moral imperative to remediate our ravaged ecosystems and their inhabitants.

Second, climate mitigation decisions can shed light on ethical concerns regarding environmental science. The complex knowledge and various skills involved in quantitative climate mitigation decision methods is unprecedented. These decision methods reflect not only the complexity of our climate but also the challenge of reconciling physical science with accompanying implications for social, economic, and technological change. There are significant ethical implications that accrue from relying exclusively on quantitative climate mitigation decisions. That reliance emphasizes that quantitative methods are based upon economic and technological models that are purportedly devoid of altruism, empathy, and reverence for nature—a reverence that is implicit in effective mitigation solutions. There needs to be a measureable involvement of ethics in research and a cleaner separation of disciplines to avoid compromising highly confident basic science with otherwise irreducible uncertainties.

Social Science

Two fascinating Social Science perspectives can provide astute insight to understand the Integral Ecology of our planet. First, today's perilous ecological circumstances involve a profound crisis of consciousness and culture, one that requires interdisciplinary collaboration. The fascinating field of ecopsychology and transpersonal psychology can join with religious mystical traditions to foster mutual well-being for humankind and nature. It is important to consider these dynamically related points: how our ecological breakdown is calling forth a radical psycho-spiritual breakthrough; and how the shared Earth community's interdependent

functioning is an auspicious ally in this crucial transformative process. By adopting a contemplative-phenomenological-hermeneutical approach, an intriguing discussion can arise regarding nondual teachings of Pope Francis and other classic and contemporary Christian mystics.

Second, Social Science can enable us to avoid the danger of ignoring well-documented effects of climate change and its links to human behavior. The situation continues to become ever more urgent, and will remain so, until a more prosocial and systemic human-response approach is espoused. Such an approach can arise from translational research regarding human responses to anthropogenic climate change, synthesizing data and theories from relevant areas of the social and behavioral sciences. This endeavor advocates for a human ecological approach that emphasizes the need for moving beyond personal empathy and increasing compassion regarding climate change. In other words, the planet's sustainability may depend upon human transformations that embrace, evoke, and espouse human compassion on personal, interpersonal, and systemic levels.

Religion & Ethics

Another two inter-related features of Integral Ecology can be found in relating religion and ethics. First, the theological tapestry of *Laudato Si'* enlightens a renewed understanding not only of humanity but also of our particular responsibilities to protect creation. The concept of ecological conversion incorporates scientific understandings of ecology to show more clearly the present context of suffering and devastation of both the poor and the planet. This outlook inspires a manifesto of liberation that concentrates on the inner personal changes and the development of virtues that are needed to undertake a deep cultural revolution. Also, this outlook recognizes that an authentic humanity is marked by interconnectedness with God, each other, and the created world.

Second, an interreligious ecological ethics can be nurtured from the environmental encyclical of Pope Francis. In *Laudato Si'*, he develops a compelling moral vision grounded in the universal communion of creatures and the interconnectedness of humanity with the rest of the cosmos. In addition, he appeals to all religious traditions to dialogue among themselves for the sake of protecting our common home, the Earth. This stance can foster what can be called a cosmic common good, drawn especially from the Catholic tradition, as a potentially unifying category for stimulating interreligious ecological ethics. This moral vision can be placed in dialogue with Islam, Hinduism, Buddhism, and indigenous traditions. By doing so, there emerge further justifications for Pope

Francis' call to all humanity to protect our imperiled Earth. A critical facet of protecting the Earth is an appropriate moral vision that apprehends the Earth as our common home. Four themes of a Catholic moral vision can enlighten the cosmic common good: 1) perceiving a Creator; 2) God's presence in creation; 3) the interconnectedness of creatures; and 4) the universe is best understood as a communion of creatures. Parallels of these themes can be traced in the ecological moral vision of Islam, Hinduism, Buddhism, and Native Americans. As a result, the cosmic common good can become an interreligious common ground for protecting our imperiled Earth.

Advocacy

Finally, it can be helpful to consider practical aspects of advocacy that complement the theoretical discourse in the previous sections. Another two connected perspectives can shed light on advocacy regarding integral ecology. The first example deals with traditional African environmental ethics. The damage done to our Earth by industrial and agricultural activities are well known. These include ozone layer depletion, deforestation, and unjust exploitation and sharing of natural resources. Africa is often seen as the most vulnerable region regarding the effects of climate change. However, it should be recognized that the region has contributed to the problem of climatic change and environmental degradation, albeit in a restricted amount. The reason for the degradation of the environment includes a tendency to neglect traditional African environmental ethics that served the continent for generations. Interestingly, in *Laudato Si'* Pope Francis echoes core principles of traditional African environmental ethics, especially the cosmic common good, cosmic harmony, and respect for the Earth. These approaches can be harnessed together to forge a better and more global framework to foster the integral ecology and thereby safeguard our common home.

The second example of advocacy can be seen in the connection between the poor and the Earth crying out for protection that characterizes *Laudato Si'*. Pope Francis emphasizes that the poor, who constitute the majority of the planet's people, is the population that is mostly affected by the effects of environmental degradation. Advocacy is needed for an integral ecology to direct its focus upon impacting the poor. The poor and those living on the periphery are unfortunately the most affected by changes in the climate and environment, often suffering negative impacts more than others. They experience material, environmental, social, political, economic, religious, and other forms of deprivations. Yet, typically, their

voices are not heard in environmental debates. The approach to integral ecology that is advocated in *Laudato Si'* focuses on the poor; its holistic understanding of ecology highlights the impact on the poor. Because Spiritan missionaries experience the effects of the environment on the poor, a Spiritan response has been to develop a three-pronged interventional approach at the local, regional and global levels. This approach constitutes an inspiring form of practical advocacy.

Conclusion

To conclude, it is heartening to encounter the realism and optimism of Pope Francis in his environmental encyclical *Laudato Si'* that was published in 2015. The Pope recognized the enormous difficulties that we encounter, insisting that doomsday predictions can no longer be disdained and urging a frank analysis of the fact that the Earth as our common home is falling into serious disrepair. He warned that our unsustainable lifestyle today will precipitate catastrophes, being unambiguously critical of the human roots of the ecological crisis that threatens creation. The global environmental compromise that we encounter results from the ethical degradation of a consumerist mindset.

However, the Pope was also optimistic, delineating what he considers to be the necessary path to recover and safeguard the planet. He emphasized the need to avoid halfway measures that would only delay inevitable disaster. That is why he urged the development of an integral ecology that revolves around the notion of the common good, which for centuries has been a unifying principle of social ethics. Also, he insisted that we prevent invested economic interests trumping the common good. Above all, he argued that it is crucial to avoid separating the environmental crisis from the social crisis around the world. His vision is that we are dealing with one complex crisis that is both social and environmental. His optimistic vision for an integral ecology is very encouraging, belonging to all and meant for all, to protect our common home.²

Notes

¹ 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).

² The format of this chapter adopts the format and some of the analysis in the equivalent chapter in the proceedings of the 1st annual conference in this series.

See, Gerard Magill, Kiarash Aramesh, eds., *The Urgency of Climate Change* (Newcastle Upon Tyne, UK: Cambridge Scholars Publishers, 2016), chapter 1.

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II.

ENVIRONMENTAL SCIENCE

CHAPTER TWO

THE POPE AND THE RELIGIOUS NATURALIST: OUR COMMON ECOMORALITY

URSULA GOODENOUGH

Introduction

I am an evolutionary microbiologist who calls herself a non-theistic religious naturalist.¹ My core narrative is the naturalistic worldview, based on the discoveries of contemporary science. This narrative elicits in me three kinds of religious responses: 1) the interpretive (the philosophical/existential meanings of the worldview); 2) the spiritual (e.g. awe, gratitude, humility, reverence, and joy); and 3) the moral/ethical (e.g. responsibility, fairness, cooperation, and community), with a major focus on social justice and ecomorality.²

The theistic religious groundings of Pope Francis are very different from my groundings. Yet we share a common passion: love and care for the Earth. In this essay, I compare our earthly perspectives, and I conclude that our core understandings turn out to be deeply similar, whether approached from an informed theistic framework (the pope) or from the non-theistic framework of a religious naturalist (the author).

Laudato Si'

In his lyrical and pathbreaking 2015 encyclical, *Laudato Si': On Care for our Common Home*, Francis devotes most of the encyclical to two topics:

- The particular ways that the planet is now in distress (rapid warming, pollution, oceans, drinking water, etc.) and recommendations for their remediation. These aspects of *Laudato Si'* are masterfully considered by Tucker and Grim (2016).³

- A call, notably in Chapter 2, to heed these recommendations in the Christian context that God, as Creator of All, directs us to “tend and keep the garden” (*Genesis 2:15*).

I am also called to tend and keep the garden, but the call comes from my naturalist and existential understandings. Importantly, Francis makes clear that his encyclical is addressed to “all people of good will” and not just “believers,”⁴ and asserts that “whether believers or not, we are agreed today that the Earth is essentially a shared inheritance, whose fruits are meant to benefit everyone.”⁵

In preparing this essay, I have focused on those passages of *Laudato Si’* that are resonant with a religious naturalist orientation. In cases where they are expressed in God language, they continue to resonate at their core.

Finding the Naturalist Worldview in *Laudato Si’*

The worldview of the Christian religion is embedded in text and tradition, while the naturalist worldview is a work in progress, continuously deepening as discoveries are made about the nature and history of the cosmos, the planet, life, and the human. That said, Loyal Rue offers the broad outlines of our current worldview, which he calls “Everybody’s Story” (1999), as follows:

During the course of epic events, matter was distilled out of radiant energy, segregated into galaxies, collapsed into stars, fused into atoms, swirled into planets, spliced into molecules, captured into cells, mutated into species, compromised into thought, and cajoled into cultures. All of this (and much more) is what matter has done as systems upon systems of organization have emerged over thirteen billion years of creative natural history.⁶

I have presented an illustrated version of this story.⁷ Pope Francis lifts up this story on four occasions in his 40,000-word document:

- We have forgotten that we ourselves are dust of the Earth (cf. Gen 2:7); our very bodies are made up of her elements, we breathe her air and we receive life and refreshment from her waters.⁸
- Although change is part of the working of complex systems, the speed with which human activity has developed contrasts with the naturally slow pace of biological evolution.⁹

- Time and space are not independent of one another, and not even atoms or subatomic particles can be considered in isolation.... A good part of our genetic code is shared by many living beings.¹⁰
- Many people realize that we live and act on the basis of a reality which has previously been given to us, which precedes our existence and our abilities.¹¹

These passages, while minimalist, capture key features of naturalist understandings: that our universe is constituted of matter, time, and space, and that biological evolution occurs slowly over time and employs a common genetic code. My one correction would be that a good part of our genetic code is in fact shared by *all* living beings, meaning that we all share common ancestry with an original microorganism, a point that I expand upon in my videotaped presentation.

That said, I came away from reading *Laudato Si'* with the sense that Francis, who was trained as a chemist, has taken these naturalist understandings deeply into his mind and heart. They undergird and pulse through his writings. He gets it. The fact that he also holds additional beliefs that I don't share—beliefs about a Creator God and an afterlife¹²—is, to my mind, incidental to these shared perspectives.

The Emergence of Human Uniqueness

It is important at this juncture to point to an interface where the pope and I see things differently on the evolutionary axis. He writes:

- Human beings, even if we postulate a process of evolution, also possess a uniqueness which cannot be fully explained by the evolution of other open systems.¹³
- Our capacity to reason, to develop arguments, to be inventive, to interpret reality and to create art, along with other not yet discovered capacities, are signs of a uniqueness which transcends the spheres of physics and biology....¹⁴
- This is not to put all living beings on the same level nor to deprive human beings of their unique worth.¹⁵

Such assertions of an evolutionary discontinuity between humans and other organisms can be ascribed to the pope's Christian theology, to the need to reconcile evolution with the belief that humans are uniquely created in God's image.

But this notion—that human evolution has entailed discontinuities that separate us from other creatures—is readily encountered in secular contexts as well. As we witness human civilization, art, technology, and so on, it is pretty obvious that we are really, really different from other animals, let alone plants and microorganisms. Neuroscientist Terry Deacon offers a memorable quote on this axis: “Biologically we are just another ape. Mentally we’re a whole new phylum of organism.”¹⁶

It turns out, however, that it is not necessary to posit that the unique features of human mentality—much as they may impress us—transcend the spheres of physics and biology, nor that we therefore possess a unique worth, nor that this is necessarily the handiwork of a god. Instead, one can become familiar with the challenging and fascinating concept of *emergence*, Nature’s mode of creativity. Deacon and I do our best to explain emergence dynamics here,¹⁷ and Deacon has written a masterful 600-page book on the topic,¹⁸ but a few sentences can convey the core idea.

Basically, when atoms or molecules or cells interact, they usually impose constraints on one another such that their original properties are altered: they no longer have the same shape, or the same chemical properties, or the same functions as they do when they are not in such relationships. Water, for example, has a different shape and properties from its constituents, hydrogen and oxygen. In biology, the properties generated by relationships may give rise to novelties—what we call “something-else from nothing-but.” When an organism remembers how to set up such relationships via genetic coding, the outcome is the heritable persistence of novel traits that distinguish that organism from other organisms. Natural selection “sees” such emergent traits, and not their underlying nothing-buts, and if the traits are adaptive, they spread in the population and can come to define a new species.

During the ~6 million years of human evolution from our common ancestor with chimpanzees, novel interactions between neurons in the brain, some occurring during fetal development and others as a consequence of experience, have resulted in our possession of the emergent trait we call symbolic language, which, in turn, underlies our unique mental abilities and accomplishments. How this arises—which constraints are imposed where—is still far from understood, nor is its genetic underpinning, but both questions are the subject of intense research in numerous neuroscience labs.

And now the larger point. A second sequence of remembered constraints has given rise to the emergent hunting behavior of the hawk, with its keen vision and precise diving abilities. A third sequence has

given rise to the emergent ability of some flowers to open and close their petals at daybreak and sunset. A fourth sequence has given rise to the emergent response of a fat cell to the hormone insulin, opening up its membrane channels to take in glucose from the blood. Its emergence all the way down and all the way up, at every level, in every example of biological evolution, meaning that each species is by definition unique.

All of which is to say that the unique traits possessed by the human can be understood as mind-blowing examples of emergent properties. I write “can be understood” because, in the end, there is no way to disprove the one passage wherein Francis uses the term emergence: “The sheer novelty involved in the emergence of a [human] personal being within a material universe presupposes a direct action of God.”¹⁹ Of course, there is also no way to prove this presupposition. Claims based on theistic faith are not amenable to empirical test.

Importantly, Pope Francis couples his conviction that humans have evolved differently from other organisms with exhortations that we regard our special traits with humility, noting that “it would also be mistaken to view other living beings as mere objects subjected to arbitrary human domination”²⁰ and that the “unique worth” of the human entails “tremendous responsibility.”²¹

Interrelatedness and Interdependence

In *Laudato Si'*, Francis repeatedly lifts up two core understandings of the natural world: we are interrelated and we are interdependent. Considering these two concepts from the perspective of a scientist, our interrelatedness derives from ~3.5 billion years of biological evolution from a common ancestor, while our current interdependence derives from our current interactions in ecosystems. That is, evolutionary is a past-tense concept, while ecological is a present-tense concept. Considering the planet as it was, say, 100 million years ago, the existing species were also interrelated and they also occupied interdependent ecosystems, but both the organisms and the ecosystems were different. Most of those species are now extinct, their lineages having evolved into present-day forms, and the planet itself, molded by tectonics, climate, and recent human activity, offers present-day conditions within which ecosystems develop.

Francis blurs these distinctions at one point when he writes: “Because all creatures are connected, each must be cherished with love and respect, for all of us as living creatures are dependent on one another.”²² I would say that the offer of love and respect for all creatures would be laudable

even if we were not dependent on one another. But, of course, we very much are. I will first consider interrelatedness and then interdependence.

Interrelatedness/Interconnectedness

The naturalist considers interrelatedness as a genetic concept. Humans and yeast share ~30% of their genes despite a billion years of separate evolution. Most of these genes are responsible for generating emergent traits, like sugar metabolism, protein synthesis, and membrane transport, that are found in all present-day organisms. Versions of these “housekeeping” traits, in turn, were by definition also features of our deepest universal common ancestor.

While Francis acknowledges this level of relatedness in the passage cited above—“a good part of our genetic code is shared by ~~many~~ [all] living beings”²³—he usually invokes interrelatedness in the social/communal sense of relationship, frequently substituting the word interconnectedness:

- In this universe, shaped by open and intercommunicating systems, we can discern countless forms of relationship and participation.²⁴
- Nature cannot be regarded as something separate from ourselves or as a mere setting in which we live. We are part of nature, included in it and thus in constant interaction with it.²⁵
- Everything is related, and we human beings are united as brothers and sisters on a wonderful pilgrimage, woven together by the love God has for each of his creatures and which also unites us in fond affection with brother sun, sister moon, brother river and Mother Earth.²⁶
- It cannot be emphasized enough how everything is interconnected.... Just as the different aspects of the planet—physical, chemical and biological—are interrelated, so too living species are part of a network which we will never fully explore and understand.²⁷
- Give us the grace to feel profoundly joined to everything that is.²⁸
- It is proper to every living being to tend towards other things, so that throughout the universe we can find any number of constant and secretly interwoven relationships.²⁹
- [Ecological conversion] entails a loving awareness that we are not disconnected from the rest of creatures, but joined in a splendid universal communion.³⁰

These poetic evocations of interrelatedness echo the writings of cultural historian Thomas Berry,³¹ whose haunting phrases include:

- The universe is a communion of subjects rather than a collection of objects...Existence itself is derived from and sustained by this intimacy of each being with every other being in the universe.³²

While descriptions of interrelatedness using the language of DNA and genomes are music to the ears of those of us centered in science-based accounts, access to science-based contexts and understandings is often abetted by metaphor.³³ If a metaphor is valid—that is, if it carries some core truth about an understanding—then what’s important is whether it carries that core truth over to someone else. The metaphors of Francis and Berry are splendid examples of this principle.

Francis richly expands the interrelatedness theme to emphasize that we humans are also interrelated and that our responsibilities also extend to one another in an “integral ecology:”

- We have to realize that a true ecological approach always becomes a social approach; it must integrate questions of justice in debates on the environment, so as to hear both the cry of the Earth and the cry of the poor.³⁴
- We cannot presume to heal our relationship with nature and the environment without healing all fundamental human relationships.³⁵
- A sense of deep communion with the rest of nature cannot be real if our hearts lack tenderness, compassion and concern for our fellow human beings.... Concern for the environment thus needs to be joined to a sincere love for our fellow human beings and an unwavering commitment to resolving the problems of society.³⁶
- Genuine care for our own lives and our relationships with nature is inseparable from fraternity, justice and faithfulness to others.³⁷
- There can be no renewal of our relationship with nature without a renewal of humanity itself. There can be no ecology without an adequate anthropology.³⁸

This emphasis echoes the message in his earlier Apostolic Exhortation *Evangelii Gaudium* (2013), with its impassioned call for economic and political justice and attention to the poor, wherein he offers the scathing

question: “How is it not a news item when an elderly homeless person dies of exposure, but it is news when the stock market loses two points?”

The connection is brought home here:

- This is why the Earth herself, burdened and laid waste, is among the most abandoned and maltreated of our poor; she “groans in travail” (Rom 8:22).³⁹

Interdependence

As noted earlier, interrelatedness can be thought of as a past-tense concept, established during cosmic and global history, whereas the interdependence of organisms in an ecosystem is an ongoing and fluid process, and hence vulnerable to disruption.

The dynamics of ecosystems were beautifully captured 800 years ago in the passage from St. Francis of Assisi, “Mother Earth, who sustains and governs us, and who produces various fruit with colored flowers and herbs.”⁴⁰ St. Francis was unaware of—although he would doubtlessly have been thrilled to learn of—the astonishing complexity of ecosystems. Pope Francis understands this well:

The good functioning of ecosystems also requires fungi, algae, worms, insects, reptiles and an innumerable variety of microorganisms.⁴¹

Microorganisms. They rule. They always have. There are as many microorganisms in a spadeful of soil as there are humans on the planet, and a single drop of ocean water contains a million of them. At least half of the planet’s photosynthesis, and all of its nitrogen fixation, is carried out by microbes, generating the molecular building blocks for the complex carbohydrates, proteins, lipids, and DNA that undergird life’s processes. Microbes also break down these complex molecules (think of the fungi on a dead tree), generating new building blocks for new molecules in new organisms. And they form the base of the vast food chain that culminates in the plants and animals most familiar to us. Indeed, there are ten times more microbes in our own bodies than there are human cells, participating in sustaining many of our bodily functions. Were microbes to suddenly go extinct, life on the rest of the planet would grind to a halt in a matter of months.

But none of life would be possible without “Mother Earth” herself, providing the soils, the fresh water and oceans, and the climate necessary for life to proceed and, from the naturalist perspective, to originate from.

The call from Saint Francis—“Mother Earth sustains and governs us”—is a clarion call.

Pope Francis lifts up an eloquent description of our interdependence in the *Catechism*:

- God wills the interdependence of creatures. The sun and the moon, the cedar and the little flower, the eagle and the sparrow: the spectacle of their countless diversities and inequalities tells us that no creature is self-sufficient. Creatures exist only in dependence on each other, to complete each other, in the service of each other.⁴²

Ecomorality

Accompanying the pope’s extensive documentation of the ways that our common home has been compromised and degraded by human activity is a call that we put an end to such activity, that we adopt what some of us are calling an ecomorality.

Francis pulls no punches in calling out humans for their immoral treatment of the planet:

- This sister [Earth] now cries out to us because of the harm we have inflicted on her by our irresponsible use and abuse of the goods with which God has endowed her. We have come to see ourselves as her lords and masters, entitled to plunder her at will. The violence present in our hearts, wounded by sin, is also reflected in the symptoms of sickness evident in the soil, in the water, in the air and in all forms of life.⁴³
- All of this shows the urgent need for us to move forward in a bold cultural revolution.... Nobody is suggesting a return to the Stone Age, but we do need to slow down and look at reality in a different way, to appropriate the positive and sustainable progress which has been made, but also to recover the values and the great goals swept away by our unrestrained delusions of grandeur.⁴⁴

A core theme in Judeo/Christian ethics is to assume that humans are inherently prone to sin and that this is held in check by a desire to acquire the favor of God. While Francis does not dwell on this motivation, he offers such a sentiment here:

- The best way to restore men and women to their rightful place, putting an end to their claim to absolute dominion over the Earth, is to speak once more of the figure of a Father who creates and who alone owns