

COSMOLOGICAL COMMITMENT IN A TIME OF PLANETARY CRISIS:
VALUES FOR A VIBRANT EARTH

by

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A Dissertation Submitted to the Faculty of
the California Institute of Integral Studies
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy in Philosophy and Religion
with a concentration in Philosophy, Cosmology, and Consciousness

California Institute of Integral Studies

San Francisco, CA

2015

CERTIFICATE OF APPROVAL

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ABSTRACT

Religious and spiritual leadership, aligned with the cosmos-building processes of the universe, can be a key element in the human community becoming a vibrant part of the whole Earth community.

This dissertation builds on the works of Pierre Teilhard de Chardin (2003), Thomas Berry (1988, 1999), and Brian Swimme (Swimme & Berry, 1992) that suggest human alignment with the cosmos-building (cosmogenetic) principles of identity, differentiation, and communion is crucial for the next stage in the development of the human. It examines our ecological, social, and spiritual crises in light of these principles, and describes how the principles are revealed in the natural world.

It focuses on the role of religious leaders as carriers of this message, guiding the human community to a cosmology which integrates these principles. It proposes that religious vows influenced by cosmogenesis would demonstrate the relationships the human community needs to embody in order to become a vibrant part of the whole Earth community.

ACKNOWLEDGEMENTS AND DEDICATION

I wish to thank my religious community, the Sisters of St Joseph of Carondelet, Los Angeles Province, for their support over these many years. I am also grateful for the interest and encouragement of my friends, family, and the Sisters of Earth who continue to inspire me. I am most grateful to my lineage – Pierre Teilhard de Chardin, Thomas Berry, and Brian Swimme – for pursuing a line of thought with heart in an environment at times hostile to it.

I dedicate this work to my father, John Thomas Nash, who asked me when I was young if I would write a book for him. It gave me courage.

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CHAPTER 1: INTRODUCTION

In 1992, the Union of Concerned Scientists (UCS) issued the *1992 World Scientists Warning to Humanity*, a warning that the human community is on a collision course with the natural world. They reminded us that the planet's resources are limited, as is its ability to sustain continual assault. The UCS called for various groups within the world community, including the world's religious leaders, to help with the development of a new ethic that would "motivate a great movement, convincing reluctant leaders and reluctant governments and reluctant peoples themselves to effect the needed changes" ("Developed Nations," para. 4). Since then many others have echoed this call to the world's religious leaders, yet the UCS appeal remains even more relevant today.

When the UCS (1992) warns of the collision course humanity is on and encourages us to live within the limits of finite planetary resources, they are challenging some fundamental operational beliefs of the United States: that there are no limits on what is available to us and that growth is the key measure of system health. It is becoming clear that these assumptions are not sustainable, and that the way that our dominant world culture understands the nature of the human and our role in and relationship with the rest of the natural world today is inadequate.¹ Our inadequate and dysfunctional understandings are even seen to be the root of our destructive and exploitive behavior.

¹ By dominant world culture I mean the United States in its historical role of political, military, and cultural dominance among the countries of the world. When I use *us*, *we*, and *our* in this dissertation I am positioning myself as a member of United States society, reflecting from within its culture.

Of the groups the UCS (1992) mentions, religious leaders seem the logical group to take responsibility for developing an ethic that challenges current practices. Not only do religions develop ethical systems, they also form and inform the cosmologies of their members. They address the larger questions that humans have about their origins, including the nature of the human, and the nature of human's relationship with each other, the universe, and the divine. The cosmology of a group describes the role humans are to play and its codes of ethical behavior rest on how they answer these larger questions.

One of the reasons I strongly agree with the UCS's (1992) call for the involvement of religious leaders is that beliefs such as human superiority over other species and the separation of the sacred from the profane and the human from nature are supported by religious beliefs. When we understand the religious roots of the worldview this warning confronts, we can see that the UCS's inclusion of religious leaders in their call is not just an attempt to be inclusive. Rather, they are calling those who usually influence the formation of deeply held beliefs to take responsibility for this area of the problem.

At least since the 1960s large numbers of people in the United States have been actively searching for personal coherence and authenticity, showing heightened interest in non-dualistic spiritual traditions, the desire for a simpler lifestyle, and a closer connection to nature. Traditional religions have responded critically to this hunger and sometimes with condemnation, claiming that these "new age" movements, as they term them, are anything from misguided to demonic. What they might not understand is that the enduring need that underlies

this hunger will only increase as the gap between what we know and the way we live continues to widen. Is it possible to change our relationships to and behavior with the rest of the natural world in a way that enriches rather than challenges our deepest spiritual intuitions? If, as the authors of *God's Century* claim, religion is experiencing a resurgence of influence around the planet (Toft, Philpot, & Shah, 2011, p. 9), it is logical to ask what guidance religious leaders will give that can address this lack of coherence and meaning, that will help us understand our dysfunctional relationship with a sacred Earth, and that will motivate us toward becoming a functional part of one sacred Earth community.

Agents of Transformation

I believe that there is a group ready to take on this role: vowed religious women and men who have been influenced by the work of Teilhard de Chardin (2003), Berry (1988, 1999), and Swimme (Swimme & Berry, 1992). Many of their congregations have already made significant changes in the stewardship of their lands. Some congregations of Catholic vowed women religious are already moving toward greater coherence, authenticity, and ecological awareness and responsibility (Taylor, 2007, p. 1).

The conversion and renewal to which women religious are calling themselves could represent a model for all of us, and a challenge to other religious leaders as well as all people. By aligning themselves with the cosmos-building processes of the universe, religious and spiritual leaders can influence the spiritual beliefs and worldview of their congregations and be an element in the transition of the human community to a vibrant part of the whole Earth community.

As people continue to experience what Joel Barker (1986) calls *paradigm squeeze*, when new information challenges the old paradigm but there is not yet a new paradigm large enough to encompass it, what we are learning about the universe will increasingly conflict with old religious ideas. If humans are to address this squeeze, I believe there is no better way than by aligning with the cosmos-building principles of identity, difference, and communion, which Swimme and Berry (1992) suggest are crucial to the human community becoming a healthy functioning part of the Earth community (p. 68). But we need models who can translate the principles into behaviors that demonstrate new relationships to material and spiritual dimensions of reality.

In 1997, I was present when my order's highest governing body asked all of its members to hold discussions around two questions: "Is the experience of our commitment through the vows of poverty, chastity, and obedience life-giving for mission, or is it in need of re-wording or re-imaging?" and "What are the implications of our commitment for the people of God?" (Carondelet, 1997, p. 10). The questions themselves suggest a movement away from considering vows an act of private devotion to understanding their implementation as actions with a real, practical effect on others.

It led me to ask: What difference does our commitment make to the people we serve as well as to an environment under assault? Do our commitment and the living of it have a ministerial value? How are the lives of others improved by the fact that we have made these solemn, public promises? Interpreting our vows in this broader sense suggests an important connection between the central tenet of

religious life, our role as religious and spiritual leaders, and actions to heal a world in crisis.

As a consequence of the questions addressed to our congregation, I will approach the role of religious and spiritual leaders in these times of crises from the perspective of one particular group of religious leaders, namely vowed women religious in the United States. They are a sample group, an example of how the alignment with the cosmos-building process of the universe can transform personal and group behavior and provide leadership toward a new ethic.

I have a number of assumptions. First, I believe that the vowed commitment of women religious should make a difference in their interaction with the rest of the natural world, since the substance of the vows deals at the very minimum with material stuff (poverty) and with other humans (celibacy).

Second, I believe that the basic commitment as religious is to the sacred as it is manifest in this world, wherever it is found.² That translates for me into applying the term *people of God* to the entire natural world, even though in the Catholic tradition it only refers to members of the Catholic Church.

A third assumption is that, therefore, the entire Earth community, both its thriving and its threats, are an appropriate focus of religious ministry because creation is the result of one sacred, ongoing act forming one sacred community. The ministries of vowed religious women and men need to directly contribute to building that one sacred Earth community.

² When I use the word *religious* as a noun, I am referring to vowed women or men religious.

And fourth, I agree with the perspective of Diarmuid O’Murchu (1991) that vowed religious are part of the shamanic tradition, witnessing to the values that everyone needs to embody in order to evolve (p. 37). In other words, the vows should not represent unreachable ideals but rather model values and practices essential to a sustainable future in a sacred universe.

These assumptions have their roots in a tradition within my congregation that expects that the needs of the world and its problems have a strong claim on our hearts. Our history as Sisters of St. Joseph has been to “divide the city into quadrants” and address the different problems in each section.³ As a result, the members of our congregation have become skilled at pioneering responses that meet unmet needs—but predominantly local needs with local solutions. Because today’s problems are also global, they challenge the skill we have developed to address local needs and trigger frustration and overwhelm. We recognize that in today’s world, local solutions are not enough. The problems are planetary and tangled in a multidimensional dynamic web of motivations and worldviews. They do require local solutions, but within the framework of a new global consciousness.

I have been asked a number of times to speak to groups about religious vows and the new creation story. In working with these women I have been challenged to explore the thinking that is the focus of this dissertation. There is a

³ “Divide the city” was an early directive of the Sisters of St. Joseph to look at the problems of an area piece by piece and focus their ministries on addressing them.

deep hunger on the part of these women to live out of a worldview that formally challenges the hold of our dominant culture and clearly models ways to live in right relationship with the material and spiritual realms of the universe as we are beginning to understand it. They feel called to live as responsible members of the Earth community, within a sacred universe, and with a commitment to do whatever is personally necessary to accomplish this. As they seriously consider the implications of their commitment for the members of the whole Earth community, they recognize that a growing awareness of a sacred universe challenges the traditional view that assumed the material world is profane and a distraction from the divine. By responding to the call of groups like the UCS (1992) and others for a new ethic (norms of relating and behaving), and the challenge of particular religious communities, like the 1997 Act of Chapter of the Carondelet Congregation that our vows make a difference, this particular group can become agents of transformation toward a more cosmogenetic relationship with a disenchanted, devalued, and damaged environment and with a human community in crisis. They can provide a powerful witness to the steps needed for the human community to become a healthy functioning part of the Earth community.

Methodology

My concern with this dissertation is to make a difference in the part of the world in which I live, the United States, which will hopefully positively affect other parts of the global society affected by its dominance.

For that reason I borrow some of the insights of critical theory, which is designed to have a therapeutic role in a particular society (Synman, 1993, p. 171). Its basic scheme provides a helpful framework for discussing three interlocking theories: a theory of the roots of our interlocking crises, a theory of right relationship between humans and Earth, and a theory of changed behavior.

Chapter Two discusses the first theory: that our environmental, social, and spiritual crises are related to a deficient understanding and practice of the cosmogenetic principles. I will analyze each area of crisis as exhibiting the opposite of the cosmos-building principles. Human behavior, which is at the root of our crises, is characterized by, first, separation (from nature, our own and the nature within which we are embedded, as well as from each other); second, fear of difference and efforts toward the homogenization of culture and lifestyle; and third, violation of the integrity of people and entities, their autonomy and right to self-determination. Although these three themes have multiple manifestations and corollaries, analysis of their effects will ground our thinking in the application of universal laws and help us see the connections between the crises.

Chapter Three examines an alternative consciousness based on the cosmogenetic principles for its ability to support a way of life that helps the human community become a functioning part of the Earth community. I will describe the potential in the principles of identity, differentiation, and communion in their physical manifestations to provide an alternative and superior self-understanding of the human within the Earth community. Examples of how the

universe demonstrates identity, differentiation, and communion gives us clues for correcting human behavior in light of cosmic laws.

Chapter Four outlines my argument that religious and spiritual leadership is necessary if we are to implement new behaviors related to the cosmogenetic principles.

Chapter Five discusses what the changed behavior would look like, focused around a new understanding of religious vows. I will explain (a) how contemporary Catholic religious vows are embedded in attitudes of separateness and deficient understandings of differentiation and identity, (b) how these attitudes and assumptions affect the ability of contemporary vowed religious to provide spiritual leadership in today's crises, and (c) the potential of religious vows based on the cosmogenetic principles to witness to behaviors necessary for a vibrant Earth community to adopt.

My treatment of the vow of poverty describes how transformation of meaning and practice of the vow to include all material reality has the potential to provide the larger society with a model of how to live in right relationship with all material things other than ourselves.

Addressing the transformation of the vow of obedience, I include our relationships with all things of a non-material nature as a way of opening to the broader communication of Spirit in our lives. If I were following the form of the traditional vows, I would address celibacy next in order. However, I will suggest that developing the skills to enter into transformed conversations with the material and non-material dimensions of reality might require more than one spiritual

discipline. I will explore how the cosmogenetic principles suggest that a variety of religious and spiritual disciplines might be more effective to prepare a specific individual to align with cosmic laws and be a sustaining part of the order of the universe.

Chapter Six suggests how the modeling of transformed behaviors by religious and spiritual leaders can contribute to realigning the human community in its relationship with the rest of the Earth community.

The Parameters of This Dissertation

The scope of this dissertation is limited to the United States as the locus for the dominant world culture and the changes that it needs to make if we are to have a chance at resolving the planetary-scale eco-social-spiritual crises. Its conclusions refer only to the role of religious and spiritual leaders in the United States as one group of potential agents of transformation for this society. The changes suggested for the vows of religious are meant to challenge the false thinking specific to United States society, even as they support the desire for wholeness and holiness for which people originally made vows, and for which religious vows were initially intended.

Intellectually, this dissertation rests on understanding the cosmogenetic principles (a) as values held by wise human communities since ancient times and as expanded and more deeply explained by contemporary science; (b) as principles and practices which are necessary for the reinvention of the human as a viable species within the Earth community; and (c) as providing practical wisdom for redressing centuries of exploitation of the Earth community.

I am purposely limiting my claims to religious and spiritual leaders and not to religions as institutions. I believe that the transformations must begin with persons desiring to fulfill their role of spiritual guidance in society. Any doctrinal changes which might come from the intellectual and spiritual shifts of its religious leaders must be led by them in such a way as to honor the best of their traditions while opening to the ongoing revelations of a sacred universe.

CHAPTER 2: THEORIES OF THE CRISES AND OF AN INADEQUATE WORLDVIEW

Our historical moment is one of crisis on a planetary scale, including crises in all major Gaian systems and the wider Earth community (L. R. Brown, 2009, pp. 3–75).⁴ These crises are the consequences of the decisions we, in the United States, have made and are making about the way we live. And those decisions are rooted in what we believe about ourselves as a human species, about our planet, and about how we got here. This chapter will review the consensus of many scientists and theoreticians about the crises themselves and pose an analysis of the beliefs, conscious and unconscious, that influence the current reality. While the data itself relates to the crises worldwide, my analysis focuses on the values and attitudes of the people and institutions in the United States as the culture that most influences these worldwide outcomes.

The Ecological Crisis

Our ecological crisis can be understood by looking at four large categories of evidence suggested by Jared Diamond (2005): the loss of some natural resources, reaching the ceilings or limits of other resources, destructive practices, and population issues (p. 486). Although these categories do not cover every one of the problems we are facing, they indicate the scope of the challenge and provide the foundational data on which we can theorize the relationship between our beliefs and the current reality.

⁴ By Gaian systems I mean those hydrological, atmospheric, biotic, and geologic systems that are responsible for the self-regulation and evolution of planet Earth. The phrase “Earth community” emphasizes the way Gaian systems form an intimate “great family of the earth” (Berry, 1988, p. xiv).

First, under loss of natural resources, experts note the loss of natural habitat due to destruction or conversion to human-made habitat, over-harvesting of wild foods, desertification, loss of biodiversity and species extinction, and soil damage (Diamond, 2005, pp. 486–496).

Second, we are reaching ceilings on conventionally available energy, freshwater, and photosynthetic capacity (Diamond, 2005, pp. 490–491).⁵ There are increasing demands for energy for food production, the automobile and airline industries, as well as for the metabolism of cities (L. R. Brown, 2009, pp. 25–40). There is increasing disparity between water consumption and sustainable supplies of water as aquifers are depleted and water is diverted to cities (L. R. Brown, 2009, p. 56). Scientists also estimate that humans use or co-opt “about 40% of the present net primary production [of photosynthesis] in terrestrial ecosystems . . . each year” (Vitousek, Ehrlich, Ehrlich, & Matson, 1986, p. 372).

Third, we have increased the amount of harmful substances in our environment either by generating them or by moving them around resulting in catastrophic climate change and mass extinctions of species. Our industrial processes, particularly our mining and extraction practices, release toxic chemicals into streams, ground water, oceans, and atmosphere at unhealthy levels. A consensus of scientists agrees that increased levels of greenhouse gases in the atmosphere are the primary drivers of global climate change (IPCC Core Writing Team, 2014, p. 5). We have also introduced alien species into ecosystems, killing native flora and fauna, and changing the balance of the systems.

⁵ Photosynthetic capacity is “plant growth per acre, [which is fixed by the availability of sunlight] temperature and rainfall” (Diamond, 2005, p. 491).

Fourth, the exponential growth in human population encroaches on shrinking natural habitat and depletes food sources needed by other species. This growth occurs despite the fact that we have reached the limits of available energy, freshwater, and photosynthetic capacity. In sub-Saharan Africa, uncontrolled increase in human numbers has led to the dependence on hunting wildlife (bushmeat), endangering biodiversity and depleting numbers of already endangered species in an area not able to otherwise meet people's protein needs (Fa, Currie, & Meeuwig, 2003).

A consensus of scientists agrees that these critical issues pose long term threats to the stability of the planet as a whole (L. R. Brown, 2009, p. xi; Lovelock, 2006, p. 6; Speth, 2008, p. 39). The intense levels of stress that our actions place on the planet cannot be sustained, and predictions suggest that, as these systems breakdown further, catastrophic changes will affect the ability of Earth to maintain the balance of interlocking systems critical to life as we know it (Lovelock, 2006, pp. 6–7; Margulis & Sagan, 1986, pp. 265–269).

The Social Crisis

What is the state of our social health—the physical, mental, and emotional state of the human community living within this endangered situation?

First, the ecological realities noted above are having measurable effects on the well-being of the human communities which depend on them. Worldwide, there has been an increase in conflicts over basic resources of cropland, grazing land and fresh water, and an increase in the number of environmental refugees (L. R. Brown, 2009, pp. 54, 65). In some cases the social reality exacerbates

environmental decline: where humans have no other choice, they denude local forests for firewood causing streams to dry up and flooding to increase, and, as mentioned above, hunt already endangered species for their own survival.

Second, we continue to experience a widening gap in income, education, and health care services between rich and poor. Increasing numbers have difficulty satisfying the most fundamental human needs which can be listed as subsistence, protection, affection, understanding, participation, leisure, creation, identity, and freedom (Max-Neef, 2012). Strong arguments have been made connecting these inequities with the terrorism which some have chosen as a means to fight back (Churchill, 2003, pp. 5–37).

Third, there is a breakdown of social institutions that stabilize societies, and “rising poverty and unemployment, inequity, violent crime, broken families, and environmental deterioration are contributing to a growing fear of what the future might hold” (Korten, 2006, p. 5).

Fourth, there are a growing number of failing and failed states, that is, nations which are in a downward spiral due to loss of central government, or lack of government legitimacy, growing disparity of wealth distribution, deteriorating physical infrastructure, flight of foreign investors, breakdown of law and order, and the related loss of personal security (L. R. Brown, 2009, pp. 117–119). As Jared Diamond (2005) notes, “Countries that are environmentally stressed, overpopulated, or both” (p. 516) tend to be the ones with desperate, undernourished, hopeless populations who become violent and whose governments collapse.

Fifth, according to indicators comparing social well-being with Gross Domestic Product (GDP), general social well-being in many countries has declined or remained the same despite the increase or even doubling of their GDP (Speth, 2008, pp. 129–134). The state of Maryland is one example. On graphs of their Genuine Progress Indicator categories, while economic indicators have grown, social indicators have remained generally flat, and environmental indicators have fallen. Their social indicators measure such things as time available for leisure and volunteer work, the value placed on housework and higher education, and the cost of crime, family changes, commuting, and motor vehicle crashes—all of which either indicate or effect people’s general sense of well-being (The State of Maryland, 2015).

Finally, the scale of these crises, whether known consciously or unconsciously, weighs heavily on our psyche and leaves people feeling paralyzed. Not only are these distressing realities confronting us, but the very ground beneath us is shifting. We are in transition between eras culturally, economically, and politically with all the discomfort that such a paradigm change brings (Korten, 2006, p. 22). Most people know, whether they want to admit it or not, that the way we have been living is not sustainable and the solutions will demand a lot of change from us. Some resist, others are impatient and insistent, and most are confused and disoriented. Such is the state of our social crisis.

The Dominant Culture’s Inadequate Worldview

These crises are arguably the result of living out inaccurate beliefs about ourselves and the universe we live in. These inaccurate beliefs contribute to a spiritual crisis, regardless of religious affiliation. There are many theories about which beliefs are the key problem, including basic dualism, patriarchy, anthropocentrism, androcentrism, and separation from nature. Instead of reviewing this field, rich though it is, I will focus on the clusters of beliefs that violate the conditions under which the universe itself forms sustainable structures—the cosmogenetic principles of communion, differentiation, and autopoiesis/identity (Swimme & Berry, 1992, p. 71).⁶ I suggest that violation of these principles is a fruitful standard of analysis since they are the conditions by which the universe has evolved and sustains itself.

Understanding them brings what others theorize as the problem into clearer focus. The principles also provide a fruitful approach to understanding how our daily behavior fosters these crises, and how we can undertake practical behavior changes to lead us out of the situation. The focus of this chapter is to explain how serious it is to violate one or more of the conditions and how these violations are implicated in the crises facing us.

An iceberg model shows one theory of the relationship between the current reality, our lifestyle choices, the psychological and motivational rewards we receive from living this way, and our core beliefs (Travis & Ryan, 1988, p. xix). Although the authors of this model apply it to the health of an individual, it

⁶ They are called principles in that science cannot prove them as facts but does find them to be reasonable explanations of deeper processes underlying what we can observe. These particular principles name the conditions that are present when the universe is building stable structures.

works as well for the state of the planet and the effect of the United States as a dominant culture. It is the United States' core beliefs, both known and unexamined, which influence our lifestyle, and ultimately result in the state of the planet and human society. So, it is important that we examine the core beliefs and focus our efforts at transformation there (see figure 1).

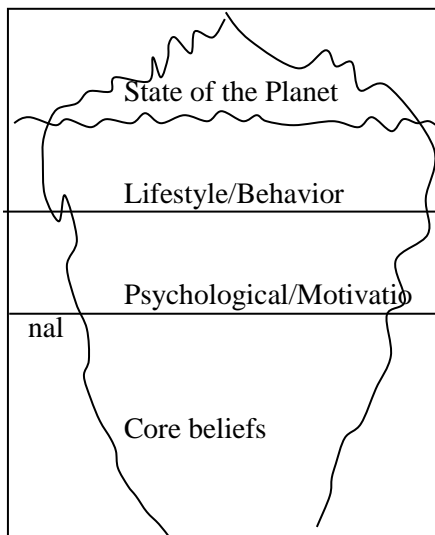


Figure 1. Relationship of core beliefs to the current reality. Author's image.

Various critical theories focus on different problematic realities and propose different liberating ideas. For example, Marxist analysis names the problem as the coercion of the workers by the capitalistic system and the liberating value as freedom and self-determination. For feminists, the problem is “that the relationship between the sexes is one of inequality or oppression” (Macey, 2000, p. 122), their solution, roughly, gender equality; for most ecofeminists, the patriarchal domination and oppression of women and nature is the root cause of our destruction of the natural world, so the solutions are, again roughly, the liberation of both and respect for the Other in its particular situation

(Warren, 2000, p. 36). For deep ecologists, anthropocentrism is the problem; the solution is respect for interrelatedness of everything. However, I contend that none of these theories offer critiques and alternatives as all-encompassing as what is suggested by the developing paradigm of Swimme and Berry (1992), which is centered on the cosmos-building conditions described by principles of communion, differentiation, and identity.

Although I will spell out these three principles in greater depth in Chapter Three, they can be understood in this way: identity describes the fact that the energy of the universe is centered in entities-in-communion, that is, entities with a discrete identity, interior coherence, and psychic presence, and ability to establish, organize, and maintain themselves through purposeful interaction with their environment. Communion names the fact that this energy operates most naturally and effectively when there is a state of dynamic communion among entities, that is, where there is interdependence and inseparability, diversity, order, and a variety of relationships among them. Union itself differentiates (Teilhard de Chardin, 2003, p. 186). This communion, through ongoing time-development, is matched by on-going differentiation of matter in structure, dynamics, and function on all levels of interdependence.

The clusters of destructive core beliefs on which I focus violate these cosmos-building conditions. The most destructive beliefs are, first, that the universe is composed of entities that are separate from, essentially unrelated to, and independent of each other. The second destructive belief is that diversity is redundant, and standardization and uniformity are acceptable and even preferable

for their manageability. The third belief is that humans are superior in value to all other entities. The consequences of these destructive beliefs are that humans tend to consider everything in isolation, to combine and order everything into manageable resources, and to make over things to better accommodate humans.

The Destructive Belief of Separation

Most of the examples of the ecological crisis listed in the previous section can be related in some way to an assumption that the stuff of creation is made of radically separate and independent things, like the parts of a machine, and to a general lack of appreciation for the fact that we exist within a dynamic, complex, interacting planetary system. The problems of loss of natural resources, reaching the ceilings of other resources, doing harmful things to our planet, and population issues are all the consequences of an irrational belief that this finite, limited planet can count on limitless replenishment of energy and parts. Even though we have reached ceilings on available energy, freshwater, and photosynthetic capacity, we operate as if we can still waste what we have and get more. Belief in unlimited growth, the assumptions that waste, consumption, and loss of energy are “natural,” and that a certain planetary stasis will keep us from running out of things are all based on the false belief that things can operate independently of the finite system in which we are embedded.

The fact that we flood our environment with harmful things, either by generating them or by moving them around, shows a lack of understanding on our part of the feedback loops of our planetary system. The practices of dumping industrial waste in streams, rivers, and oceans, our mining and extraction

processes, the release toxic chemicals into streams, ground water, oceans, and atmosphere ignore the limitations of a practically closed system. Likewise, our inability or unwillingness to limit the growth of the human population stresses the resources of the planet, and together with human domination, redirects more and more of the resources to the human population. All of these are examples of not attending to the consequence of our actions on the others in the system which we all share.

Second, as a corollary of belief in human separation from and superiority to the rest of the natural world, we give ourselves license to use everything that is not human for our benefit: “the environment” and lesser beings (including inferior humans) are only a useful backdrop and support for the activities of those deemed superior. Because we do not see everything related within a system of interdependence, we do not wonder about the consequences of our actions for others within the system. We do not consider the effects of our lifestyle on the quality of air, water, and soil. We do not connect our energy choices to loss of biodiversity, habitat, or the amount of CO₂ in the atmosphere. Nor do we believe that poverty, repressive governments, and violence in other areas of the world could be traced to our addiction to cheap oil, or our love of bargain clothing, toys, and electronics. Without seeing the connections, we need feel no responsibility, nor make any efforts to change our course.

Third, belief in separation has allowed us to ignore obvious connections between the decline of social wellbeing and the decline of the ecosystem within which people are embedded. However, the foregoing data on our social crisis, the

breakdown of social institutions, and on failed and failing nations, makes it difficult to continue to believe that the crises are separate. In addition, we are beginning to notice that the consequences of situations of scarcity, conflict, and social stress are not be confined to the stressed and failing nation states themselves but spill over into neighboring countries and trade partners. The financial collapse in Asia in 1998 was followed by financial crises in Russia and Brazil, and ended up affecting U.S. agricultural markets because finances and markets are globalized. Neither diseases nor pollution can be confined by national boundaries. As Jared Diamond (2005) points out, “Societies today are so interconnected that the risk we face is of a worldwide decline” (p. 519).

Fourth, this cluster of beliefs related to separateness—superiority of humans, humans as ultimate authority, and general adversarial attitude toward “nature”—fosters in humans an unrealistic sense of agency relative to more than we can actually influence. Belief in separation supports the view of the universe as a machine which just needs to keep running in its current manifestation. This, in turn, can encourage an unconscious assumption that things should remain the same—that shorelines will not erode, that the soil will continue to produce at certain levels, and that the atmosphere will maintain an optimum ratio of oxygen to carbon dioxide. When things then do change we can find ourselves either in denial or involved in elaborate efforts toward control. And it cuts us off from the energy, healing, and wisdom which flow through the whole Earth community.

Although this belief in separateness goes against what we know about systems and what keeps them healthy, Americans are slow to let systems

knowledge change the infrastructure that has made the United States dominant in the world of nations. A complete turn to a systems worldview would not only force us as humans to take a more proper place as one of many species of the Earth community, but would require the United States to relinquish its position of primacy. It is an extremely threatening thought and I cannot imagine that it will happen voluntarily.

The Destructive Belief in Sameness or De-Differentiation

A second area of inadequacy in this dominant worldview is an ignorance or devaluation of the importance of the process of on-going differentiation and the diversity which results from it. Ecologically speaking, human practices of overfishing, over-harvesting, over-hunting, soil damage, and the conversion of wild habitat to human use are drastically reducing the vast diversity of species necessary for optimum functioning of our planetary systems.

Second, on the social front, we are often confounded when faced with the differences of others: we feel uncomfortable; we see threat in diversity rather than value. We seem to assume that our interactions are helped by minimizing and erasing differences. The crises of environmental and economic refuges and our increasingly globalized economy make clear how Berry's (1988) challenge has been playing out.

Europe and the United States are dealing with absorbing, or not, the stressfully large numbers of environmental and economic refuges. In this challenging economic environment, the foreigner or stranger becomes the scapegoat for conditions of unemployment and under-employment, decrease in

government aid, increased taxes, and similar societal issues. As numbers of foreigners increase, countries such as France, Switzerland, and Germany feel the pressure of welcoming not only the foreigners but their culture. In 1999, Swiss voters banned the construction of minarets, labeling them “as symbols of rising Muslim political power that could one day transform Switzerland into an Islamic nation” (Higgins, 1999, para. 6). In 2013, local residents in Germany with a mentality of “the boat-is-full” attacked asylum centers and hijacked town hall-style meetings on the issue of converting abandoned buildings for asylum seekers (Grieshaber, 2013, para. 3). The issue becomes how much can and should the host country change, and where should it draw the line. The basic question is this, as in other situations where the identities of peoples collide, how much difference can we take?

Third, while economic globalization does recognize global interconnectedness, the operation of legislative treaties regulating global economic exchange, for example the World Trade Organization (WTO) and the General Agreement on Tariffs and Trade (GATT), make it clear that the integrity of cultures and national sovereignty are secondary to capitalizing on marketing potential (Barber, 1992). The treaties legalize some values over and at the expense of others—namely maximizing trade at the expense of environmental sustainability, biodiversity, consumer and worker safety, public health, freedom of labor, human rights, and national autonomy (Global Exchange, 2011). In attempting to make every place ready for products of the global market, unique differences, whether of a nation or a strain of corn, are sacrificed.

Another consequence of our globalized market is the homogenizing of societies. Not only does the dominant United States culture export product, it also exports the marketing psychology used to sell the American way of life. When American film and media play in densely populated, poorer countries like India and China, they increase the desire for those products that most stress the worldwide system, such as cars and an opulent lifestyle, putting additional pressure on the scarce resources of these countries, and contributing to social unrest among those increasingly cut off from access to opulence, let alone the basics of life (Norberg-Hodge, 1996). Local value systems and cultures are eroded by this American hegemony. While breeding a worldwide, unsustainable monoculture, the United States is spreading a diseased way of life and an unsustainable worldview as if it were desirable—to a planet that cannot afford it (Barber, 1992).

Third, devaluing the on-going, life-sustaining differentiation processes of the universe is at the root of practices which destroy or convert natural habitat to human-made habitat and over-harvest wild foods, and which allow us to watch the progress of the current mass extinction without alarm. We have known about the vulnerability of monocrops since the Irish Potato Famine (1845–1849), yet industrialized farming uses the same practices when they monocrop, a practice which damages soil ecology by depleting or reducing soil nutrients, increases the need for purchased fertilizers and insecticides, produces crops vulnerable to disease and infestation, and increases dependence on fossil fuels and expensive equipment (Stewart, 2013).

Fourth, overvaluation of sameness within the frame of assumed superiority sanctions actions which support the comfort and efficiency of the dominant world culture and devalue the needs of other cultures. We universalize, assuming that the people of other countries want the same things we do, even though other cultures may hold different values, like the good of the whole over that of the individual which so characterizes our United States consumer culture. Building a strong and resilient Earth community is impossible when the dominant players refuse to acknowledge the authority of the other voices.

The United States, whether consciously or unconsciously, exports U.S. lifestyles and values along with products, international corporate practices, and intergovernmental policies, resulting in a type of modern colonialism. Such by-products eat away at cultural and national differences, upsetting any fragile, dynamic equilibrium that may have developed within ecosystems or among societies. We seem not to value cultural diversity for the rich and satisfying interchange it brings among nations. We threaten our own survival by diminishing planetary diversity and threatening the gifts such variety provides to the health of social and ecological systems.

The Destructive Belief in Superiority and Inferiority

A third area where we exhibit an inadequacy in our thinking is the belief that the human is superior and more important than other entities or systems, and that the identity of every person, entity, or system that is judged inferior can, and maybe should, be changed to accommodate our needs. It is a colonial attitude which treats its own perspective as universal, leading to the violation of the

integrity of people and things, particularly their autonomy and right to self-determination. We have a sense that we live “in a radically unsatisfactory world” (Berry, 1999, p. 103) that is not our home and that we must change if it is to suit our needs. When humans seek to “tame” the wilderness, or “bend” nature to their will by changing living beings at the level of their DNA, we endanger the unique way that energy is manifested in that being or system. Indiscriminate use of our creativity, combined with ignorance of the dynamics of systems, and a preference for de-differentiation, violates the identity of people and organisms and disrupts the integral functioning of systems themselves.

One significant challenge to respecting the identity of entities and systems has to do with our curiosity and creativity. Humans are not just tool makers but fixers and builders. We change our environment to suit us, like the beaver. Our curiosity leads us to wonder what could be, and our creativity sparks us to make the new happen, sometimes without taking into account whether a change should be made. We do not always use our knowledge wisely.

When we chemically enhance soil with fertilizers and pesticides we not only change its identity, but we disrupt its function within the system. We remove it from a cycle that provides regeneration naturally and make the soil dependent on human intervention. Indeed, pumping soil full of fertilizer is like putting it on steroids, taking the ecosystem further away from functioning as a healthy, regenerative system.

When we genetically modify or genetically engineer (GE) an organism we change its original capacity to fit within its system, disrupting the system itself in

addition to violating the identity of the organism. An example of the complex consequences of genetic engineering is the cross pollination that occurs between GE crops and heritage strains. The identity of corn, wheat, and soy as wind pollinators was evidently ignored by grantors of the GE patents and so the system of interdependence between neighboring fields has led to crop contamination, threats to organic crops, and loss of biodiversity (Godoy, 2010).

A second consequence of GE crops is the proliferation of laws protecting intellectual property rights. By patenting slightly different strains of food crops, corporations are able to obtain exclusive rights to that product and all else it touches. Monsanto was able to spin the situation where their GE crops contaminated neighboring crops into an issue of identity theft (Admin, 2013). And they are not the only ones: indigenous communities have fought the patenting of their native foods—taro in Hawaii (Organic Consumers Association, 2006), wild rice in Minnesota, and rice in India (Shiva, 2000, pp. 85–86). In 2007, Native Hawaiians were able to persuade the University of Hawaii to undo the patents it had been granted over three varieties of taro (Ostrander, 2006).

Native American activist Winona LaDuke (2005) explains how *manoomin*, the wild rice which has long been the centerpiece of the Anishinaabeg community's sustenance (p. 168), has been patented by Ken Foster and Dan Hua Zahn of Norcal Wild Rice in California (p. 177). Sales of this domesticated "wild" rice, now introduced to the national market, has cut into the exports on which the Anishinaabeg tribe depends. As one of the few revenue-generating

exports of the tribe, competition for the wild rice market affects their tribal survival and their identity in significant ways.

Third, disrespect for the identity and limitations of the elements of earth air, and water has led to their misuse and contamination, and to the collapse of their life giving potential. For example, systems of water and air have the ability to cleanse themselves if we do not push them beyond what they can naturally absorb. However, we continue to dump industrial and societal waste into streams, lakes, and oceans, and not control the amount of agricultural runoff. As a result, an increasing number of streams, lakes, and sections of the ocean can no longer support aquatic life: the Mississippi River has been declared dead north of Minneapolis, because it can only support malformed and genetically defective species; the section of the Gulf of Mexico into which the Mississippi drains has a dead zone larger than the state of Connecticut (National Oceanic and Atmospheric Administration, 2013).

With regard to air, while there is growing acceptance of the idea of climate change, there is still debate in the United States about whether it is a consequence of human actions, thus delaying radical corrective actions. Disregard for the nature of air—the way it moves, carries whatever is deposited in it, and is the key piece in a complex system of weather—has caught us unprepared for the multilevel consequences of our industrial society on planetary weather patterns. It is hard to shake an illogical belief that the atmosphere has unlimited capacity to accept airborne pollutants.

Fourth, the issue of identity is central to the refugee crises: how much should either group—host or immigrant—change their way of being to accommodate the new circumstances? In most cases we see pressure for the immigrant to learn the language and fit in as soon as possible. Host peoples are uncomfortable with any hint that the foreigners are going to set up a little outpost of their former country. After all, the thinking goes, they had to leave their homeland because it was somehow inadequate, and the only solution will be the adoption of the values and practices of this superior, stable country.

Lastly, the idea of “progress” seems to assume that some “collateral damage” is to be expected in the pursuit of growth and development. This assumption devalues whoever or whatever cannot be assigned a monetary value and results in practices like auto makers projecting certain lawsuit expenses from injuries or deaths before a car is recalled for its life-threatening design flaws. It is an attitude that some people or whole groups of peoples can be dispensed with without any significant loss. Although it is commonly used to indicate people in a wasteful society, the phrase “throw-away people” has also been used by members of our congregation in Peru to explain how the people they work with understand their relationship with the United States: they are disposable, they do not matter. Because they have no value to us, they have no value.

The destructive belief that humans are superior and all else inferior affects a wide range of issues that challenge the inherent value of all non-human entities. When we couple this belief with an illogical belief in the infallibility of human creativity and the pressure to grow at all costs, we have a recipe for disaster for

the planet. The ability to genetically engineer in general has fostered the belief that nothing has a fixed identity and that human intelligence and creativity are the ultimate definers of what shall be. Thomas Berry (1999) claims that the central distorted belief of our time is the radical separation of humans from the natural world and the granting of all rights to the human. Although this is first a violation of the principle of communion, it is further a violation of identity in that the identity of all other than the dominant group is without value and therefore rights (p. 4).

Correcting the distorted belief in human superiority may be the central challenge of our times. It challenges our confidence in the unlimited potential of the human, and demands we acknowledge the wisdom of the creative process that has evolved entities which fit in their environments. Lack of respect for the unique identity of other entities will lead to fewer differences upon which stable, healthy systems depend. It may be that because the identity of an entity is hidden—predominantly intuited and unmeasurable—and only vaguely revealed by external appearances, that this principle will remain dismissible in the same way as a materialistic society dismisses the non-material, inner world. If so, we as a society will take much longer to acknowledge the intrinsic value of the rest of the natural world, let alone protect its unique existence. Nevertheless, devaluing the internal character which guides the distinctive development of every entity is a serious planetary danger and needs to be addressed.

An Unstable Foundation

The destructive consciousness at the root of these crises can be related, in various ways, to violating the conditions necessary to build stable structures within the universe, conditions represented by the principles of identity, differentiation, and communion. This consciousness virtually insures that the systems built on them will collapse because they are unstable by their very nature.

There is a further issue: not only are these three beliefs—in separation, de-differentiation, and the superiority of the human—central to the current operating system of our dominant culture and at the root of the majority of our crises, but they are unconscious, implicit assumptions very deeply held. They have taken on the aura of religiously held beliefs that are true simply because one believes them. Attempts to label these as false beliefs or put alternatives into practice are met with gut reactions similar to the violation of a taboo. These rigid, irrational, and sometimes violent responses are an indication of a spiritual imbalance and a crisis in our understanding ourselves in the world.

The Spiritual Crisis

The suggestion that we are also in a spiritual crisis, and that it is the root problem of our ecological and social crises, is much more difficult to document. In a secular, materialistic society where non-measurables such as feelings and values are dismissed as subjective, it is not surprising that there would be little data on what constitutes a spiritual crisis and how it could be assessed.

I am guided by the work of Roberto Assagioli (1989) on spiritual emergency to form a working definition of a spiritual crisis. Assagioli explains

that a spiritual emergency can occur when a person is forced to move from operating on the belief that reality consists only of what can be seen and touched to admitting that there is another reality which she or he may be experiencing as disappointment, or a sense that something is missing, and a questioning of the purpose of life, suffering, or life's inequities (p. 32). In other words, having to admit that what is impacting a person's life are things belonging to a realm which she or he may have previously denied or ignored—the spiritual realm—can lead to a certain type of spiritual crisis. Forced by circumstances into the realm of spirit—the non-material, intuitive, imaginative, and emotional realm—can be disorienting and disruptive even as it makes a person available for the psychic interconnectedness of which Teilhard de Chardin (2003) spoke.

Lack of Understanding of an Inner Realm

So, first, we might look at the disorientation and confusion caused by the fact that we have inherited a world view that separates the outer, objective, measurable realm from the inner, subjective, unmeasurable realm. Using Assagioli's (1989) distinction, a society would be in a spiritual crisis when it finds itself forced to admit that, despite its best efforts to satisfy the material needs of its people, there is growing dissatisfaction, restlessness, violence, and inequity; and a growing fear of catastrophe if the society continues on its present course (Speth, 2008, pp. 126–146). A society is in spiritual crisis when it discovers that it does not have the tools to think through some of its most pressing issues, that it is culturally disoriented (Berry, 1999, p. 73), or when it does not know how to

resolve conflicts between competing interests, like the planet's need for clean air and water, and the business sector's desire to show profit.

Stanislav and Christina Grof (1989) suggest that living without a sense of the spiritual reveals itself on the individual level as “an impoverished, unhappy, and unfulfilling way of life,” and that on the collective level it “might be a significant factor in the current dangerous global crisis that threatens the survival of humanity and of all life on this planet” (p. xiii). This, then, can be seen as the first evidence of a spiritual crisis on the level of the dominant culture: the solutions to our social crisis are in the realm of values alternative to the dominant culture—like communion, reciprocity, and respect—so a society that values power, prestige, and profit can have little insight to offer to such a crisis.

An Inadequate Worldview

The second factor in our spiritual crisis is even more foundational: the dominant expression of western civilization lacks tools adequate to explain our reality and guide us to live well within it. “The deepest crises experienced by any society are those moments of change when the story becomes inadequate for meeting the survival demands of a present situation” (Berry, 1988, p. xi). We are in such a time because the images of the human, the universe, and the divine out of which we have been operating since the Enlightenment at least are the very ideas which are fueling our cancerous interactions with the planet.

With regard to an image of ourselves as humans, Al Gore (1992) points out that we are operating on mistaken understandings about who we are, why we are here, and how we are related to the world (p. 216). We have already noted our

pathological beliefs that the role of humans is to improve on and redesign those parts of the universe which we find undesirable or inadequate to our needs. We hear ourselves addressed and think of ourselves as consumers rather than citizens, that is, as those who use and consume creation, rather than as decision makers and authors of our own lives. Here in the United States we mistakenly prize individualism and independence even at the expense of the sense of belonging and community that we desire. We believe that our superiority to the world around us gives us license to use it for our benefit, to change, exploit, or dominate as we will.

Gregory Bateson (2000) finds our image of the divine to be a central issue in our distorted worldview. He claims we have set God outside of and against creation, and then modeled ourselves on this image of God, assuming that we, too, are separate from the world (p. 468). David Korten (2006) also faults our image of the divine, claiming that a monarchical image is at the root of the dominator relationships of Empire (pp. 257–258). Modeling ourselves on a God who is separate and superior, humans have become focused on what we can control and quantify—the material and measurable. The values which guide political and economic decisions become profitability, expediency, and usefulness for a materialist agenda, values which are implicated in the current crises of life systems, climate change, species extinction, and issues in bioethics. There seem to be no inadequate ethical frameworks to address these and other aspects of the crises (Tucker & Grim, 1993, p. 12). Profitability, expediency, and usefulness for

a materialist agenda do not help us halt the destruction caused by runaway profitability, expediency, and materialism.

A third aspect of this separation and emphasis on things which we can control is that we avoid appeal to more immeasurable values such as compassion and sharing in public discourse, values which are foundational for community and which place limits on individual actions, in favor of values such as order, uniformity, and efficiency. Within this dominant worldview, “the Promethean impulse kicks aside cultural and ecological constraints, assuring us that if we *can* do something, we *should* do it” (Spretnak, 1991, p. 11). We do not measure, nor do we consider, personal, social, or ecological well-being or levels of satisfaction. We fail to acknowledge that prosperity is not paralleled by happiness. When researchers do begin to look for and measure well-being, they tend to discover an almost inverse proportion: the more prosperity, the less happiness, and “the growth of important social pathologies” (Speth, 2008, pp. 128–129).

Implicit in the forgoing descriptions of the relation between the human and the divine is an image of the universe which has no inherent value. Within our worldview, the material world has a schizophrenic identity. The matter of the world is valued as less important than the intellect, meaning the intellect of humans, and material things are valued primarily for their usefulness to us. Yet, in contrast, matter is valued over what is immeasurable and subjective. Following on the radical separation of sacred and secular, the world becomes easy to objectify and use. Even if it is not quite profane, the world is not sacred.

Embeddedness of Religious Institutions

The third factor in our spiritual crisis is the fact that the world's major religions, generally responsible for developing and passing on a worldview, have been slow to integrate the insights of contemporary science. As conservative institutions, churches are invested in preserving and passing on their specific understandings of the divine, the human, and the universe, and become solidified in these understandings. While many religious groups are reaching for coherence between worship of the sacred and ecological involvement, a crisis of vision persists insofar as the thinking of spiritual leaders and members is still embedded in the dominant modern Western worldview, which values the independence and superiority of the human and its separation from the rest of the natural world. To the extent that we can identify and privilege the findings of contemporary science that support the cosmogenetic principles, we can begin to distinguish between what is essential to our various religious traditions and values that are more a heritage of our specific culture.

Although mainstream churches in the United States are beginning to accept an image of the human as a part of the Earth community, many continue to champion the superiority of the human within that community, and the existence of a special human-divine relationship not shared with other creatures. Ideas of radical interconnectedness and the interdependence of all of creation threaten foundational beliefs in God as outside of creation, which Bateson (2000) sees as so problematic, in the human as uniquely privileged within creation, and in the universe as for the benefit of the human. Doctrines which emphasize personal

salvation or which reject this world in favor of some future heaven undermine efforts to think of the wellbeing of this Earth community here and now. Dualism is firmly embedded in these religious beliefs despite ages of mystical witness to the nature of the spiritual realm being one of communion. Catherine Keller (2008) sums up the consequences of such dualism:

When theology portrays our life in this world as a mere pilgrimage to heaven, a mere means to a supernatural end, it tends to dissolve our responsibility for our corner of the material creation. The gross effect is that of an amoral relativism regarding the creation itself. (p. 6)

Psychological Desensitization

A fourth factor of our spiritual crisis is evidenced by the callousness we have developed around the information on our multilevel crises. Taken together the statistics of our ecological and social crises paint a distressing picture and it seems that there should be more of an outcry. However, these crises are seldom understood by the general public as interconnected and interdependent. When they are connected, we find them quickly refuted by the think tanks of those interested in maintaining the status quo. Without adequate spiritual guidance, we cannot distinguish between messages and have hardened our hearts to uncomfortable information, rather than letting these distressing pictures move and transform us.

In addition, we seem to have become accepting of a certain level of distressful information about the realities others face. The impersonal phrase *collateral damage*, which has crept into common usage, signifies that a certain level of loss is acceptable in violent conflicts, even if this means the suffering and death of innocent people and ecosystems. Desensitization to violence and

destruction which allows us to ignore the increasing level of social and ecological crises is a sign of a spiritual crisis.

Transitioning to Liberating Values and Behaviors

As Tucker and Grim (2000) point out, addressing the moral and spiritual aspects of this crisis “will require broader philosophical and religious understandings of ourselves as creatures of nature, embedded in life cycles and dependent on ecosystems” (p. xvi). We are in the midst of a paradigm squeeze, where the things we believed about ourselves as a species and our place in the world are no longer large enough to fit our changing knowledge, experience, and situation.

The broader philosophical and religious understandings to which Tucker and Grim (2000) refer will be profoundly unsettling as we attempt to transition from intellectual conviction to effective action in the world. Integrating the implications of our radical interconnectedness will require us to redefine the human as a primarily interconnected part of the Earth community and only secondarily as special. It challenges us to face the fact that the Earth is not the backdrop of our human drama, but that we are embedded within it and influence its functioning, as the dominant species and culture, by every action we take. To free ourselves from an inappropriate sense of entitlement to control and manage everything, which is not only a sign of hubris but an unrealistic demand on us, will help us to become right-sized in relation to the rest of the natural world. This distorted sense of the human has fostered a pathological situation akin to children who inappropriately take on adult responsibilities from parents who abdicate

them. The result can be a distorted sense of self, unrealistic expectations of the self and others, and a disconnection between the self and reality.

Not only are we in communion on a physical level, we are also interdependent on a psychic level. The loss of species, of the healthy functioning of ecosystems, and of beautiful wild places has an emotional and psychological effect on us. We feel discouraged and powerless over destructive forces, and cut off from the restorative qualities of wild nature.

We can no longer afford to accept radical separation as an appropriate operating principle, whether between sacred and secular, spirit and matter, or the human and other-than-human. We must return to a sense of mystery surrounding our daily lives, of being intimately connected with things larger and more enduring than ourselves within which we are an important part. We need to adopt a stance of humility that respects ongoing differentiation of modes of being as a primary value. We can no longer afford to consider that we live within a planet that can be endlessly, and without consequences, modified to meet our needs and wants. We must learn that all beings have their own guidance system which governs not only their becoming but their relationship within the whole of the created universe. Aligning ourselves with the basic functioning of the universe, the cosmogenetic principles of identity, differentiation, and communion (Berry, 1988, p. 44), is crucial for the next stage in the development of human society as an integral part of a whole Earth community, and to our potential to ultimately realize a vibrant Earth community.

This is a spiritual task before it is an ecological or a social one, a task of spiritual emergence into a new level of awareness and behavior within a sacred community (Grof & Grof, 1989, p. ix). To understand the way the universe itself evolves when the conditions of identity, differentiation, and communion are met, we now look to insights of contemporary science from biology, ecology, and systems theory. My intention is to let this understanding lead us into a new and liberating mode of consciousness.

CHAPTER 3: COSMOGENESIS AS ALTERNATIVE CONSCIOUSNESS

There is an old saying that states, “When all else fails try following directions.” It applies to the parent who is baffled by an “easy-to-assemble” child’s toy, or the assembler whose cabinet doesn’t look quite like the picture. When all else fails, check with those who designed the item and who therefore know how to achieve the promised results. That’s where we are today as a species—at that point in the human experiment when we need to check with the Earth itself about how it achieved and maintains a thriving planet, and how we might thrive by living within its parameters.

Chapter Two established three categories of destructive attitudes and behaviors at the root of our interconnected planetary crises. The first destructive attitude is a belief in radical separateness, un-relatedness, and independence of humans from everything else in the community of existence. The belief that we are separate from the rest of the Earth community is perhaps exemplified most famously in Descartes’ definition of human nature in terms of thinking substance. Believing that we are separate from and independent of each other, the natural world, and our own bodies produces an attitude that sees everything outside the individual self as available for use or exploitation. The second category is the devaluing or fear of difference. Believing that difference has no value or is somehow dangerous leads to the homogenization of culture and lifestyle, eradicating cultural and biological diversity, as well as resistance to change. The third category of destructive thinking and acting values the uniqueness of the human over the rest of the natural world, and what we might say is the American

way of being human over any other culture. I claim that the dire state of the Earth community is a reflection of the degree to which these attitudes and behaviors are out of alignment with the basic operating instructions of the planet, and indeed the cosmos as a whole. What is needed is a new form of consciousness that recognizes the conditions under which Earth has achieved its fertility and continues to evolve—conditions of communion, differentiation, and identity in all human behavior, conditions which describe the ways in which Earth has achieved its fertility and continues to evolve. “Following the directions” in this instance means aligning our behavior with the sustainable and productive conditions characteristic of a vibrant Earth community.

It is important to note that although these concepts are familiar to us, the conditions they describe are neither automatic nor common in contemporary life. For example, we are familiar with the idea of identity as that which names an individual entity, its characteristics, and its qualities, generally because we like to name and distinguish things, one from another, but that does not mean we recognize the integrity of things and respect their gifts and limitations.

Likewise with differentiation; while we recognize the multitudes of things in the universe, we do not always admit to, let alone provide, the conditions they need to continue to differentiate. Rather than provide situations where entities may stimulate one another into ongoing development, we tend to isolate things or clump them in collections with no connections to each other, stagnating any chance of change.

It is the same with communion: while the fact that all things in the universe are interrelated is becoming more common knowledge, things in the world that humans construct usually do not have any relationship to each other except proximity. We understand the concept of communion intellectually, but operate out of conviction that things are basically isolated. For communion to be a dynamic force of evolution, it requires a diversity of entities negotiating interdependence.

Historically and culturally speaking, these principles of identity, differentiation, and communion have been known and valued by the human community for centuries, although their integral relationship may not have been perceived or emphasized. In the characteristics they attribute to the moral ideal of Maat, ancient Egyptians revealed a sophisticated appreciation of communion but little understanding of the role of identity or differentiation: “Maat is an interrelated order of rightness which requires and is the result of right relations with and right behavior towards the Divine, nature, and other humans” (Karenga, 2006, p. 10). The individual being is only understood as being or “person-in-relationship” (Karenga, 2006, p. 257). So, too, indigenous peoples today situate their lives within the unity of the whole Earth community, using the phrase “all my relations” to invite all forms of life to their ceremonies (DeLoria, 2003, p. 84) and to acknowledge their individual importance to the Earth community as a whole. Indigenous practice seems to appreciate the value of differentiation without actually calling it out. Finally, the Romantic movement, with its emphasis on feelings, intuition, and imagination, can be seen as an attempt to

honor the interdependence of identities—observer and observed—and to achieve emotional communion with the world around us. I believe that these and other examples are easy to find because the cosmogenetic principles are intuitive to human nature and to the human community. It remains for us in our time to emphasize and embody the principles of identity, differentiation, and communion in ways that allow them to actualize their mutually-enhancing potential.

Pierre Teilhard de Chardin (2003) noted that plurality, unity, and energy were the three aspects of matter which characterize evolutionary change (p. 12). By *plurality* he meant that the universe expresses itself in a multiplicity of forms in a process of ongoing differentiation. By *unity* he indicated the interrelatedness and interdependence of everything in the universe. What Teilhard de Chardin called *energy* referred to the identity of each entity, guiding its unfolding and making all interrelatedness possible. Thomas Berry and Brian Swimme (1992) have reiterated that whenever the universe is building stable structures or forms, these characteristics of differentiation, communion, and identity are present (p. 67).

Various disciplines in contemporary science support the insights of Teilhard de Chardin (2003) and Berry and Swimme (1992). The importance of the integrity of the identity of every entity can be found in disciplines from systems theory to biology and ecology. The importance of differentiation for the healthy functioning of systems is reinforced in both ecology and systems theory. And every contemporary scientific discipline seems to be increasing our

understanding of how things in the universe are connected, develop together, and affect the whole by their actions.

This chapter will examine how identity, differentiation, and communion appear in the natural world, and how they intertwine. Using the insights of ecology and systems theory, I will explore the way interrelated systems work, the place that diversity and ongoing differentiation have within systems, and the significance of the identity of each entity within its dynamic and interdependent relationships. I will establish that a worldview based on adherence to these principles would be a healthy alternative to the way humans currently operate.

Although the characteristics I will describe are well-known, my goal in drawing a fuller picture of how these principles interact is to demonstrate their essential co-functioning in well-organized, sustainable systems. By drawing into the forefront conditions that we, as a culture, may take for granted or unknowingly repress, and by becoming familiar with their most usual manifestations, we can begin consciously to reproduce the “energies deep in the structure of reality itself” (Berry, 1988, p. 48) in order to address the intersecting crises described in Chapter Two.

The Cosmological Principle of Identity

The Energy of the Universe Centers in the Interior of Things

Teilhard de Chardin (2003) observed that energy is an interior aspect of matter that, together with differentiation and communion, characterizes evolutionary change. The key feature of this interior dimension is its capacity for action and interaction and the foundation of its *psychic presence* and *identity* (p.

13). This interior is the source of its dynamism, unique presentation, and *spontaneity*. When in communion, this energetic aspect of matter establishes, organizes, and maintains an entity through purposeful interaction with its environment. After a brief overview of how humans have approached their intuition and ideas about the within of things, I will examine the ways this inner dimension is manifested in the natural world.

Philosophers have struggled for centuries with how to speak about the interior of things. The Greeks framed their discussions in terms of the essence and accidents of things. Classical essentialisms point to “the real, true essence of things, the invariable and fixed properties which define the ‘whatness’ of a given entity” (Fuss, 1989, p. xi), a concept which seems to foster stereotypes and deny agency. So, how do we speak of the interior of things in a way that combines both what is stable and what is “in a state of genesis” (Teilhard de Chardin, 2003, p. 18)?

The insights of Teilhard de Chardin (2003) on the interior of things differ from the essentialist, and even postmodernist and feminist approaches, by focusing on the agency of matter. He explains that the interior of things is “a capacity for action, or more exactly, for interaction” (p. 13). The interior of matter is where the universe manifests unique concentrations of energy to be and to relate, the capacity for combinations of greater and greater complexity, and the potential to maintain webs of interdependence with the energy of the whole.

In *The Universe Story*, Swimme and Berry (1992) reinforce this focus on the agency of things, adopting the term autopoiesis (self-creation), and

highlighting the capacity of the interior for spontaneity, self-manifestation, and self-articulation (p. 75)—each word emphasizing the ability of an entity to initiate action which further defines its self. They point out the unifying nature of this interior which is “integral with but distinct from the entire range of physical components” (p. 75), and hint that it is the interior of things which holds together an integral universe (p. 76).

Of all the words for this cosmogenetic principle used by Teilhard de Chardin (2003) and Berry and Swimme (1992), I have chosen to use the word *identity*, a word most often used with regard to humans to refer to who someone is and to the characteristics which distinguish that human from others. Similarly, when used with regard to entities that are in communion with their neighbors, identity points to what makes that being what it is and to the unique characteristics which are proper to it. Because a person is seen as one who acts, I believe identity works most effectively to name this ability to self-organize, to enter into spontaneous collaborations, and to develop new manifestations of energy-filled matter.

Identity is the more that we acknowledge when we speak of the whole being greater than the sum of its parts. We might think of the problem of knowing the unseen interior, the non-material or spiritual aspects of matter, as similar to the uncertainty principle in physics. Just as we cannot simultaneously measure both the position and the momentum of a photon because the choice of measurement cancels out the ability to measure one or the other, we cannot examine both the material and psychic dimensions of matter at the same time. To

measure matter's physical dimensions we use one set of tools. But in order to know its non-material dimension, its identity, we need to experience it as a psychic presence, psyche to psyche. Although we can note, from the outside, some characteristics of this interior, we must accept from the outset that our own mysterious interior dimension will be tracking our reflections and achieving the deeper understanding.

Identity Assumes Coherence

While identity is primarily interior and non-measurable, there are measurable components which make an entity recognizable as a single entity. The identity of anything can be measured for coherence, or internal agreement of the components within its make-up.⁷ For example, subatomic particles are organized by their specific mass, position, properties, and abilities into specific types of particles. A quark has a particular mass and spin, as well as electric charge and color charge. The particular way each particle organizes its internal elements and processes makes it understandable as a specific identity.

The identity of a star is organized around the elements of its composition (hydrogen which burns to form helium which burns to form carbon, etc.), its dynamics (burning, giving off light, fusing, expanding, and contracting), and its limits or thresholds (size or pressure). As long as there is fuel to burn, the star holds together. When it no longer has anything to burn, and a certain temperature

⁷ Contemporary physics uses the word *coherence* to designate a specific quantum effect which is not universal. The ability of a subatomic particle to cohere or become entangled with another particle created at the same time is a special quality of these particles and cannot be applied to other levels of existence. So far, quantum physics has not found quantum effects applicable on any other levels. Although there is some speculation that quantum entanglement may be involved in photosynthesis, researchers have not been able to measure this and the hypothesis remains speculative only.

and pressure are reached, the star explodes into another identity, that of a supernova (Silk, 2001, pp. 285–286).

The identity of an ecosystem is recognized by the coherence of the complex of interacting units within specific environments. The multiple components of an ecosystem include its climate, soil, and moisture, as well as the plants, insects, and animals which dictate its dynamics, its capabilities, and its limitations. Ecosystem health is determined by its ability for ongoing development within its limitations, and its ability to return to dynamic equilibrium after outside disturbances or perturbations (Westra, 1998, p. 8). Although ecosystems can vary in size and composition, they are distinguishable as systems—cohesive and identifiable unities—by the interdependent relationships and processes which make up their internal agreement.

Identity is Self-Organizing

All entities which can be distinguished from the dense, hot origins of our universe have been organized into difference in some way. According to the Cosmogenetic Principle, this organizing is done by the entity itself, whether atom, galaxy, rock, flower, or animal, in light of what surrounds it. In the thinking of Swimme and Berry (1992), there is no need to posit an outside cause for evolution because the energy of the universe, centered in specific entities, manifests itself in autopoiesis, the capacity of matter to self-organize. This term, introduced by Maturana and Varela to designate the self-generating, self-organizing, and self-educating ability of life, has been purposefully appropriated by Swimme and Berry to emphasize the self-organizing capacity of everything in the universe.

Lest we be put off by imagining rocks self-organizing in our backyards while we sleep, Swimme and Berry (1992) point out that “molten rocks in their original mode of being” had powers that contemporary rocks do not (p. 76). In their molten state they activated their potentiality to self-organize, activities found today primarily in Earth’s volcanoes. But that does not negate the fact that this potentiality remains and could be reactivated in another molten environment. Although we will examine the idea of timing within systems more deeply in the section on Communion: Ongoing Time Development, for now it is enough to note that this capacity of matter to self-organize is dependent upon the proper conditions, one of which is timing.

It is important to recognize that what we have thought of as inanimate can self-organize. The first subatomic particles organized themselves into distinct entities and then further self-organized into the vast clouds of particles and gases that make up the galaxies. As galaxies continue to organize the gases and particles of which they are composed, they coalesce into the structures we know as stars. As stars self-manifest and flow through the stages of their evolution, they create the heavier elements necessary for the evolution of planets (Silk, 2001, p. 330). As planet Earth formed it organized its elements into dynamic levels and configurations that cooled the planet, drenched the land in ocean-forming waters, and washed into that ocean the rich nutrients that later made life possible. This is a story of so-called inanimate entities organizing themselves into greater and greater complexity, thereby creating the conditions for the explicit animation of our vibrant Earth. It is the story of an unbroken continuity of self-organizing,

self-manifesting, and self-educating potentialities achieving their potential in purposeful interactions with their surroundings.

A second example of this self-organization involves sponges which are believed to be the first multicellular organisms. Sponges are a simple network of four cell types that work together to filter nutrients from water that they move through themselves. Although lacking a nervous system or muscle fibers, they can, “if broken down to the level of their cells . . . miraculously reassemble and resurrect themselves” (Sponges: The First Multicellular Organisms?, n.d., para. 4).

The findings of geneticist Barbara McClintock provide a third example of self-organizing. Working with Indian corn in the early 1940s, she watched purposeful interaction of corn cells with their environment through her microscope, noting how the “genes on chromosomes rearrange themselves and even change in reaction to environmental stress” (Goerner, 1999, p. 202).

By attuning herself to the rhythm of the plants themselves, McClintock let go of rational mind and entered into the scenes she was studying through her microscope, relating on the level of identity to identity. She said,

I found that the more I worked with [the chromosomes] the bigger and bigger [they] got, and when I was really working with them I wasn't outside, I was down there. I was part of the system. I was right down there with them, and everything got big. I was even able to see the internal parts of the chromosomes – actually everything was there. It surprised me because I actually felt as if I were right down there and these were my friends. (as cited in E. F. Keller, 1983, p. 117)

A fourth example of self-organization concerns recent studies that attribute far more agency to bacteria than we have previously believed possible.

According to Oregon State University microbiology professor Stephen Giovannoni,

Bacteria can distinguish “self” from “other,” and between their relatives and strangers; they can sense how big a space they’re in; they can move as a unit; they can produce a wide variety of signaling compounds, including at least one human neurotransmitter. (V. Brown, 2010, “But Just How Smart,” para. 1)

These findings are redefining the boundaries of where we find purposeful behavior.

James Shapiro, University of Chicago microbial geneticist, points out that bacteria “have ways of acquiring information both from the outside and the inside and they can do appropriate things on the basis of that information. So they must have some way to compute the proper outcome” (as cited in V. Brown, 2010, “But Just How Smart,” para. 4). Marc van Duijn and his colleagues at the University of Groningen in The Netherlands claim, in the June 2006 issue of *Adaptive Behavior*, that “the presence of ‘the basic processes of cognition, such as perception, memory, and action in bacteria can now be ‘plausibly defended’” (as cited in V. Brown, 2010, “But Just How Smart,” para. 2). These findings have led to a lively discussion around whether bacteria “think” the way humans do. The author gets around this conclusion by reminding us that “complexity . . . emerges from the simple actions of many ‘dumb’ actors” united to be more than the sum of their parts (V. Brown, 2010, “But Just How Smart,” para. 3).

These discoveries illustrate a key insight about the interaction of specific identities and the wholes of which they are a part: that purposeful behavior is the product of the whole: “neither some overriding sentience nor individual

organisms have any influence over the process” (V. Brown, 2010, “But Just How Smart,” para. 3).

Embeds Within and is Open to its Environment

While the principle of identity draws our attention to an entity’s self-directed activity, it is crucial to recognize that identity arises and is sustained through purposeful interactions with whatever multitude in which it finds itself.

Writing about abalone shells, Jeannine Benyus (2002) explains that the extremely tough substance of their shells is assembled from the abalone’s internal environment rather than built. The abalone provides a soup rich in the proteins that will eventually form the abalone shell. While being bumped around in this medium, the proteins bump into and lock with molecules “that are shaped peg to hole like Lego blocks,” becoming tough, yet beautiful shells (p. 104). Benyus notes that the process is energetically downhill, meaning that it does not require any extra energy, for example, for proteins to form into the sheets that will eventually form the abalone shell.

Self-organizing dynamics within an environment are also responsible for the shape of entities (Goerner, 1999, p. 175). In embryos, “the limb bud’s shape emerges from local exchange between cells,” and by communicating with each other, cells develop a sense of where they are and then “choose their occupation. . . Each cell decides what to become based, in large part, on what its neighbors are doing” (Goerner, 1999, p. 173).

Bacteria are the most universally used example of cell communication, interdependence, and openness. V. Brown (2010) suggests that they live in a

world of such interconnectivity that “information of all kinds, including genes, [travel] in all directions simultaneously” (para. 11). Because it is believed that they can exchange genes with every other bacterium on the planet, there is even some doubt about “the notion of separate bacterial species” (para. 13).

A final example of openness, on a larger scale, is the ability of cells from one organism to migrate to another. The name for this phenomenon is microchimerism, the persistent presence of a few genetically distinct cells in an organism. This was first noticed in humans many years ago when cells containing the male Y chromosome were found circulating in the blood of women after pregnancy. Since these cells were genetically male, they could not have been the women’s own, but most likely came from their fetuses during gestation. According to researchers, it is not uncommon for cells from genetically distinct individuals to mix ending up “in many organs of the body including the lung, thyroid muscle, liver, heart, kidney, and skin” (Martone, 2012, para. 2).

This large scale openness has prompted the genetic engineering of organisms, that is, the application of “techniques of genetics and biotechnology ... to cut up and join together genetic material and especially DNA from one or more species of organism and to introduce the result into an organism in order to change one or more of its characteristics” (Genetic engineering. n.d.). Although genetically modified (GM) organisms are meant to increase food production, significant health concerns have been raised about this practice.⁸

⁸ Several animal studies have linked GM food consumption with serious health risks including “infertility, immune dysregulation, accelerated aging, dysregulation of genes associated with cholesterol synthesis, insulin regulation, cell signaling, and protein formation, and changes in the liver, kidney, spleen and gastrointestinal system” (Dean & Armstrong, 2009,

The principle of identity might influence this discussion by referring to the importance of the interior coherence of the organism and the organism's interaction with its environment which are compromised when such alterations occur. Mutating, deleting, or transferring genes from one species into another changes the interior coherence and, therefore, identity of the original organism. The new organism can no longer relate to its environment in the same way. When the modified organism is a food, its web of connections includes the organism which has evolved to eat it. The animal studies mentioned above show that the bodies meant to be nurtured by the modified foods can be adversely affected by these changes. A full understanding of identity suggests that we need to pay attention not only to the integrity of an entity, but also to its fit within its system, the perspective we examine next. Beings are essentially identities-in-communion.

Establishes a Fit

Key among the ways an organism organizes itself is the ability to change and adapt as it interacts with its surround. This evolutionary mechanism is a process of mutual change and accommodation known as niche-making, from the Middle French *nicher, to make a nest* (Biology Online, 2015). Although niche used as a noun may give the connotation of an already existing slot for an entity to slip into, the reality is more like a negotiation, with both the new species and its environment changing. An organism makes a nest or home for itself by adjusting to the resources and conditions of an ecosystem, and the ecological community will also change to integrate the new entity. We can see this in the interaction of hoofed animals with the plains of the North America. While the buffalo evolved

a physique that allows them to survive the brutal winter winds of a treeless plain by facing into the winds, the grasses under their hoofs thrived from the buffalo's tendency to churn the ground and push seeds deep enough to take hold. Both buffalo, in response to the climate, and the grasses, in response to the buffalo, changed as the result of the interactions. Negotiating a fit means coming "to play a coherent role in the web of processes" within the system (Goerner, 1999, p. 211).

We might describe a niche as the specific space an organism negotiates and inhabits. For plants, a niche includes the type of soil, the amount of water, the relationship to chemicals such as nitrogen and phosphorus, and the sunlight required. For both plants and animals it can include competition, predation, parasitism, mutualism, as well as simple pairings. For example, birds cooperate rather than compete by evolving a variety of beaks so as to prey on different species within a meadow or forest and not deplete one resource. In our bodies, multiple systems—digestive, nervous, circulatory, and muscular—have evolved a type of mutualism that provides a niche for each, even as the collective supports greater complexification.

Parasitism refers to the way species that are unable to produce their own food use their environments. The PBS Nature program *What Plants Talk About* demonstrates the way the parasitic dodder vine "sniffs" out the chemical scents of nearby plants to find a suitable host from which it can suck water and nutrients (Buffie, 2013). Researchers Consuelo M. De Moraes and Mark Mescher discovered that, to find a host plant from which to drain nutrients, the parasitic

plant sifts through the available scents and then launches itself toward the chemical scents released by the leaves of its chosen host (Buffie, 2013).

In the animal kingdom, as species co-evolve with their environments, they can develop roles that serve their environment. All over the planet, animals help in the dispersal of seeds: elephants in Africa and monkeys in South America disperse the seeds of the fruit they eat; in Britain foxes, squirrels, birds, and mice do the same. Ants in South Africa “carry [plant] seeds into their nests, eat the tasty outer covering, and leave the seeds to grow safely underground” (The Seed Site, n.d., para. 1).

Another way to look at the concept of niches is to see the negotiated fit as living with limitations. Plants use the limits of an environment as a focusing mechanism: within a tight range of temperatures and carrying capacity they maintain “an energy balance that cannot be borrowed against” (Benyus, 2002, p. 7). The most confining limits may be for the species that occupy the top of the food chain. Because top predators depend on the healthy functioning of the whole ecosystem, they “suffer first when an ecosystem begins to erode from the bottom up [whether from] climate variability or human-caused changes, including addition of pollutants and toxins such as lead, mercury, and DDT” (Eisenberg, 2010, p. 148). This vulnerability makes them the most susceptible to extinction.

The nest-making ability of an entity is its capacity for creative interaction with the limits of the environment in which it finds itself. It can accomplish this fit by changing its physique, by competing with, cooperating with, or parasitizing its neighbors—in other words, by co-evolving with them.

Maintains Self Through Interaction With Environment

Organisms not only establish themselves and their particular characteristics in interaction with their environment, they also alter their surroundings as the way of maintaining themselves through purposeful interaction with it. For example, prairie dogs let over-browsed areas lie fallow until they recover. They also selectively cultivate the area around their burrows by deliberately cutting down sage seedlings, which they do not like, to make room for the species they prefer (Knight, n.d.). Although all populations can be affected by predation, starvation, and death, the individual females of some species internally regulate their breeding to limit numbers in response to environmental concerns or when there are threats of interbreeding or infanticide (Wayne-Edwards, 1965). Species territoriality and social rank can also limit population numbers.

A rich area of research sheds light on how animals purposefully interact with their environment for healing. In addition to the well-studied primates, a growing list of animals use plants “to prevent illness, to cure illness, maybe even influence their fertility, abort their fetuses, or influence the gender of their offspring—all in response to environmental opportunities and the limits of the moment” (Benyus, 2002, p. 172). Some also use their environment to protect their offspring: butterflies “lay their eggs on antiparasitic milkweed,” wood ants use “antimicrobial resin in their nests,” fruit flies protect their eggs from parasitoid wasps by laying them in high-ethanol foods, and house sparrows and finches use high-nicotine cigarette butts to reduce mite infestations in their nests (de Roode,

Lefevre, & Hunter, 2013, pp. 150–151). More mysteriously, researchers have discovered that rhinos can heal a crack in their horns or a broken tip, even though they have not been able to find living keratinocytes (skin cells) in the horn (Benyus, 2002, p. 143).

Plants also draw on their environment for protection. The wild tobacco plant has evolved a unique way of defending itself against caterpillar attacks by alerting the caterpillar's predators to its presence. "The plant releases a toxin that, when ingested, makes the caterpillar stink. This odor attracts animals that eat the caterpillar before it finishes eating the plant" (Fard, 2013, para. 3). In the southern hemisphere, kelp forests have used the opposite strategy. Since the kelp does not have the sea otters that control marine herbivores in other parts of the world, they have evolved to taste unpalatable to the sea urchins that would prey on them (Benyus, 2002, p. 30).

Self-maintenance requires resilience when conditions change. The ancestors of our domestic crops were "hardy, disease-resistant, and well suited to their environments" (Benyus, 2002, p. 160). They "ran on sunlight, sponsored their own fertility, fought their own pest battles, and held down, even built, soil" (Benyus, 2002, p. 21). However, the domestication process, in selecting for human cultivation, has reduced species diversity and changed characteristics like growth cycle and range and time of seed dispersal. Researchers are realizing that, in the face climate change, our domesticated crops seem to have lost species resilience and flexibility to adapt to environmental stress. Today's rice, wheat, and barley crops are vulnerable to drought and dependent on artificial fertilizers

and pesticides (Christopher, 2008). While domestication of crops has helped us feed multitudes, their dependence on cultivated and enriched soil and on certain average precipitation makes them, and the populations now dependent on them, vulnerable to environmental stress.

On the other hand, James Bunce, plant physiologist, and Lewis Ziska, weed ecologist with the Agriculture Research Service of the U.S. Department of Agriculture, have found that weeds can actually benefit from the changes in CO₂ levels. By providing laboratory conditions with high CO₂ levels, Bunce found that dandelions evolve, “changing physically . . . within the space of one growing season” (Christopher, 2008, para. 15). In contrast, crop plants seem unable to adapt to changes in temperature and CO₂ levels, reducing their yield as climate changes.

Ziska discovered that an enhanced CO₂ level “not only augments the growth rate of many common weeds, increasing their size and bulk; it also changes their chemical composition” (Christopher, 2008, para. 19). Christopher (2008) notes that when Ziska grew ragweed plants in an atmosphere with 600 ppm of CO₂ (the level projected for the end of this century in that same climate-change panel “B2 scenario”), they produced twice as much pollen as plants grown in an atmosphere with 370 ppm (the ambient level in the year 1998). Not good news for allergy sufferers! More importantly, not good news for grain-dependent humans, as the climate changes and we find our domesticated crops cannot adapt.

Identity is Primary

Systems emerge as the result of the interactions of their individual organisms, influenced by their discrete identity, internal coherence, and capacity for interdependence. In interaction with their environments, individual entities initiate, define, and determine the systems which emerge. The variety of possible interactions between entities and their environments will be examined more thoroughly in the section Communion: Relationships of Cooperation. For now it is enough to note the important role of identity in the process.

The fact that the interior dimension of an organism has the capacity for spontaneity, self-manifestation, and self-articulation points to an important corollary: that the interior of an entity plays an important role in the evolution of both the entity and its environment. Since “autopoiesis refers to the power each thing has to participate directly in the cosmos-creating endeavor” (Swimme & Tucker, 2011, p. 75), I see self-organization as the mechanism by which this happens. As an entity interacts in a purposeful manner with its environment, it adapts, adjusts and morphs toward the best fit, creating in this process its own and our future.

The lessons from this section on identity are threefold. First, the energy of the universe becomes manifest in the individual entities of the universe. Second, the entities establish their identity, thrive, and evolve when they are in communion with their surroundings and participating in energy exchange according to their distinct capacities and inclinations. Third, the activity of these entities-in-communion is the locus of evolution.

The Cosmological Principle of Differentiation

Differentiation in the universe is the direct result of the self-articulation of entities in communion with their neighbors; that is, as entities interact, they become more themselves, increasingly different from other entities with which they are in communion, and deepening their capacity for relationships of interdependence. Even as we focus on differentiation in this section, we need to be mindful of the role of relationship, interaction, and communion in the evolution of difference. We live in a unity which is differentiated and in which, through ongoing time-development, matter differentiates in structure, dynamics, and function on all levels of interdependence.

Scientists marvel that difference can result from the homogeneous beginning of the “big bang” (Teilhard de Chardin, 2003, p. 186). Indeed, when we reflect on the origin of the universe, it seems highly unlikely that differences would emerge at all from the original singularity, let alone be enhanced through interaction. However, not only do our senses confirm difference all around us, but research has established that there were fluctuations—differences—very soon after the beginning. Tiny temperature variations are believed to have eventually led to concentrations of particles. From then on the forces of gravity, strong and weak nuclear forces, and electromagnetic plus cosmic wave action bumping atoms together could develop into galaxies and stars or voids (Silk, 2001, pp. 105–137). So in this universe change results from slight differences becoming magnified.

Why Differentiate, and How?

But why differentiate at all? To answer this question it helps to follow the energy, which we know from systems theory always seeks to flow faster (Goerner, 1994, p. 81). As entities interact in communion with their neighbors, the energy within them searches out new and more efficient ways of moving. We might say that energy is in a constant state of questing—not randomly—but driven by a preference to flow more freely and/or be stored more efficiently. The laws of thermodynamics remind us that energy tends to dissipate, so to fully use and conserve energy entities depend on clever innovations to slow down that tendency. Differentiation, and the specialization that result from it, make a system resistant to an interruption of its energy flow, and, therefore, more resilient (Goerner, 1999, p. 194).

On a prairie, for example, biodiversity provides what are called ecosystem services, benefits that support a continuous flow of energy, ensuring system resilience and increasing food web efficiency. The variety of organisms help the system recover from disturbances, clean both air and water, and filter out pollutants, as well as form the soil, cycle nutrients, and regulate the climate (Eisenberg, 2010, p. 157). The more biodiversity the ecosystem displays, the less it will be threatened by perturbations and the more it will be capable of dealing with a variety of changes. Biodiversity thus provides the circumstances in which energy can continue to flow smoothly (Goldsmith, 1998, p. 328).

As a result, however redundant they may seem to us, ecologists conclude that a multitude of species is necessary because each one contributes in a different

way to the efficient function and flow of energy in an ecosystem (Eisenberg, 2010, p. 157). For example, studies of assemblies of species on prairies have shown that at least eight species of prairie grasses are necessary to form persistent prairie communities, each exceling or lying dormant according to the climate in a given year. As different grasses lay down miles of roots (a single bluestone can have 25 miles of roots), they build a vast web to hold the soil in place, absorb water, self-fertilize, and self-weed. Even the roots and plants that die are essential, as they form the rich compost on which later plants will depend.

Simple Tools For Complex Results

There are three obvious ways that entities can differentiate: by addition or combining, by dividing and then diverging, and by a combination of the two. Addition/combination refers to the phenomenon whereby entities join together in systems of varying complexity. When hydrogen and oxygen join to make water, they form a simple, loosely organized but very strong bond. In more complex aggregates like topsoil, each entity retains its identity but lives interdependently. Highly complex combinations not only bond and live interdependently but can also alter to form a new structure. An example of this later type of combination is found in the lens of mammalian eyes. The normal structure of the cell is almost totally changed by the addition of new materials—minerals, crystals, enzymes, and bits of the cell organized into proteins that form “a liquid crystal array, capable of bending light to form a clear image on the retina” (Lane, 2009, p. 190). We will discuss additional combinations and partnerships in more detail in the section on communion.

The second tool of differentiation is accomplished by division into daughter cells that diverge to form different species, as seems to have happened in the evolution of the potato. According to the International Potato Center (2011), potatoes have differentiated into 187 wild species—that is 187 ways to keep energy flowing into healthy plants and within various ecosystems. Each divergence, whether by accident or by design, has developed differences—in toxicity level, nutritional content, resistance to disease, and tolerance of different climates and soil salinity—in order to thrive in a variety of circumstances.

The butterfly fish is another example of division followed by divergence. Although they all share the same body shape and structure, each species of butterfly fish has developed distinctive surface patterns of “stripes and patches, dots, eye-spots and zigzags” (Attenborough, 1979, p. 126). The physical markings distinguish their evolutionary preferences: each has evolved to inhabit a different place on the reef, at a specific depth, and to prefer a particular food.

The third type of differentiation is probably the most common—a combination of both addition and divergence. Probably any major evolutionary innovation falls into this category. The mammalian eye—with its different cells, tissues, and history of each—is a good example of using all available tools. The ability of our retina to detect light is theorized to be the result of the duplication and specialization of daughter cells of photosynthetic algae (Lane, 2009, p. 199). As masters of photosynthesis, algae call on a variety of light sensitive pigments, opsins, which appear in all types of light-sensing organs in the insect and animal phyla. It is believed that the photoreceptor cell developed in an ancestor common

to both vertebrates and invertebrates, duplicated, and diverged—one into a strain of cells that would lead to sight and another that functions as a circadian clock (Lane, 2009, p. 199). The lens of our eyes, on the other hand, evolved through selective addition: the lens' proteins (crystallins) are formed of minerals, crystals, enzymes, and bits of the cell (Lane, 2009, p. 186). Only three of the crystallins are found in the eyes of all vertebrates, implying that the rest are chosen and added independently by each species (Lane, 2009, p. 191). Finally, we have an eyelid that blinks as the result of a process that combines duplication of cells, fusion of cell groups, and final separation into two separate sections that allows blinking.

The unseen player in these very simple methods of differentiation is what is outside the entities themselves, the communion within which they differentiate. When the daughter cells of wild potatoes diverged, it was in response to the extreme temperatures and high winds of the Andean plateau. When those of photosynthetic algae diverged, it was in response to photons, as if the photons were drawing the cells out. Likewise with addition: whether cells simply bumped into others in their environment, were attracted by a harmonious vibration, or became connected by accident, combinations were only possible with something around with which to become connected. While differentiation is guided by self-articulation, it is called forth by the community in which it finds itself.

Ongoing Time Development

Differentiating takes time. As the energy of the universe presses to move faster and to store energy more effectively entities develop different solutions

toward this goal (Goerner, 1994, p. 81). Some of the solutions to energy flow are time-dependent, meaning that they are possible only during time periods in which specific conditions are present. In the early universe, for example, density and temperature triggered a sequence of one-time events that resulted in the original production of elementary particles and their distribution. Other events, like the initial formation of a star, or its production of the heavier elements, are dependent on the changing conditions that characterize the star's lifecycle.

Soil is another example of sequential transformations in the development of difference within a system. As William Bryant Logan (2007) explains, soil is the result of the effect of time and climate (sun, temperature, and rainfall) on parent material, organic matter, topography or relief. Of these, we will focus on how the increase of difference in the parent (mineral) material is time-dependent.

The sequence of steps in soil formation begins with water depositing nutrients, windblown seeds, and spores in porous lava bedrock. Lichen can then colonize the rock, digest the minerals, be digested by airborne microbes, and be deposited as detritus (Logan, 2007, p. 96). Mycorrhizal fungi also break up the rock into smaller particles and free the minerals providing an even more welcoming environment for organic material. This first process is a very slow one.

Wind and rain move the finer-grained particles, building up deposits of minerals and organic medium. Rainfall also frees minerals and contributes to their chemical decomposition. The combination of carbon dioxide and water results in the more soluble calcium bicarbonate which sinks deeper into the rock

where the CO₂ separates from the molecule depositing the calcium deeper in the rock (Logan, 2007, p. 180).

Seasonal temperature fluctuations cause water in the soil to widen cracks as it freezes and thaws, breaking up rocks and other consolidated material, and allowing organic colloids, carbonates, and soluble salts to move downward.

The second ingredient in soil formation, organic material, can only build up at the pace that bedrock is being weathered to provide a nurturing medium. Even in well-established soils, time is needed for plant roots to open channels, release CO₂ and fix nitrogen to prepare for other species. Water makes use of these channels.

Third, topography or relief also works in time to build up soil. The incline of the soil surface causes runoff to erode minerals which a depression can gradually gather to combine with other matter deposited by dying plants and wind erosion.

Researchers speculate that it can take from 800 to 1000 years for lava bedrock to weather into one inch of fertile soil (Logan, 2007, p. 27). For soil to become “one of our largest reservoirs of biodiversity” (Grover, 2013, “All Soils,” para. 5), multiple varieties of microflora and microfauna need time to find a home there. They need to gather in colloids or clumps that form channels that allow air and water to sink to lower levels. Because of this time element, topsoil “is essentially non-renewable.” If it is “eroded or poisoned, it can take thousands of years to rejuvenate itself” (Benyus, 2002, p. 14). Soil is an historical artifact, a priceless heirloom left to us by the assembly of diversity.

However, soil is not the only representative that reveals a relationship between time and differentiation: we are all historical artifacts, revealing even more than the history of our collaborations and specializations. In the words of Neil Shubin (2008),

If you know how to look, our body becomes a time capsule that, when opened, tells of critical moments in the history of our planet and of a distant past in ancient oceans, streams, and forests. Changes in the ancient atmosphere are reflected in the molecules that allow our cells to cooperate to make bodies. The environment of ancient streams shaped the basic anatomy of our limbs. Our color vision and sense of smell has been molded by life in ancient forests and plains. This history is our inheritance, one that affects our life today and will do so into the future. (p. 184)

Variety in Structure

As we look at the more-than-human world we see an explosion of variety almost everywhere we look. Not only do these differences delight our eyes, but they reveal the way entities negotiate with their environments to fit and thrive. Differences in physical structures, especially among living organisms, serve a variety of functions, allowing them to fit into different habitats and seasonal changes, to mix in complex communities that support each other and make full use of the energy present, and to avoid predation.

The easily observable differences in the form of birds, fish, and land animals are specific to their habitats. The structure of the eagle is related to the medium of air, and the shark to water. The hollow bones of bird's wings prove to be the lightest bones can be and still have the strength they need to lift a bird's weight into the air. Light bird bones also take less energy to move, thus helping a bird fly longer on less food. Studies of the function of shark skin suggest that the distinctive, tooth-like scales, or denticles, foster a "leading-edge suction, which

might [contribute] to the observed increase in swimming speed. Shark skin denticles might thus enhance thrust, as well as reduce drag” (Oeffne & Lauder, 2012, para. 1). Hollow wings and tooth-like skin both help their organisms use energy economically.

The different grasses of a prairie are uniquely adapted to their wind-swept and harsh environment. They differ in height, width, root type and length, need for water, seasonal maturation, pest resistance, and hospitality to beneficial insects (Benyus, 2002, p. 23). This variety allows the prairie to thrive through seasonal changes, pestilence invasions, and years of sparse or heavy rainfall. It also allows the grasses to maintain and build up the soil, using and reusing the energy of the area.

Finally, physical structure can suggest whether an organism is predator or prey, herbivore or carnivore, or dwells in a hot, dry or cold, wet environment, or any number of other realities about it. Predators tend to have front-facing eyes, like wolves, owls, and humans, helping them to lock on to their target in pursuit. Prey animals, like deer or rabbits, tend to have side-facing ones to help them detect predators. Herbivore teeth tend to have both cutting and grinding teeth to cut and break up their food. Predator’s teeth are made for killing and tearing their prey. The presence of thorns on succulents suggests they need to guard the water they store, while the broad, flat needles of the coastal redwood aid them in taking moisture from the fog. A tall, spindly shaped tree is likely reaching for sunlight in a stand of trees that block it. Other trees, like the California Valley Oak, develop branches which seem to twist themselves into any open space, often

branching at acute angles along a section, to find the light (Pavlik, Muick, Johnson, & Popper, 1995, p. 10).

One tree provides a unique example of variety in structure, the apple tree. The seeds of most plant species will reproduce similar offspring—a kernel of white corn will produce a plant with corn that tastes the same as the parent plant. Not so, the apple. The priority for the apple tree seems to be reproducing offspring that can thrive in new environments, not producing tasty fruit, so the seeds in a single apple are genetically diverse and would each produce “a completely new and different apple tree” if planted (Pollan, 2002, pp. 10–11). Each seed is a wild guess at a better solution to thriving in a new environment. As Pollan (2002) notes, the apple reaches “down into its vast store of genes [to] discover the precise combination of traits required to survive” in its environment (p. 13).

Unique Internal Dynamics

The relentless press for more efficient movement of energy also leads to the development of complex and highly differentiated internal dynamics. One example of unique internal dynamics is the six inch long golden orb weaver spider which produces six different silks, each with its own chemical and physical properties and uses. For example, one silk swaddles its eggs, a second acts as a wind surfer to move it to a new site, a third catches food, and a fourth is “laced with pheromones to attract a mate” (Benyus, 2002, p. 130).

The small blue mussel *Mytilus edulis* provides a second example of unique internal dynamics. This mussel uses a small translucent tether called a byssus to

attach itself to any surface with an adhesive that is both produced and applied under water. The byssus first presses its fleshy foot against the surface to which it will attach. Then,

Specialized glands secrete a collagen protein (the same protein that is in our tendons) into a longitudinal groove in the foot that acts as a cast or mold. The thread and plaque self-assemble and harden in the groove and then an adhesive gland near the tip of the foot squirts protein between the plaque and the surface. (Benyus, 2002, pp. 118–119)

Through this internal process the blue mussel has found a way to root itself where it finds the most nutrients.

A third example of unique internal dynamics is the abalone which produces an enviably stress-resistant shell using a combination of organic polymers and inorganic minerals. The abalone builds a complex design of

Intricate crystal architecture . . . with a narrow mortar of squishy polymer . . . [that] acts like a thin smear of chewing gum—it stretches ligamentlike when the disks are pulled apart and it slides and oozes in response to head-on stress. (Benyus, 2002, p. 99)

The combination of crystal structure and flexible protein layer stops any cracks from spreading. The final piece of this complex structure is the twinning of the hexagonal disks, a common way nature builds strength that is found also in the tendons of our arms.

These examples of internal differentiation point to an important learning that relates to larger realities. Internal differences produced by the self-organization of an entity-in-communion contribute to that entity becoming more complex, more itself, and securing a better fit with its environment.

Variety in External Dynamics and Relationships

Difference in external dynamics and relationships, some based on avoiding competition, others on combining efforts, also work to move energy more efficiently. Specialization not only conserves energy by avoiding competition for the same resources, but also allows organisms to more fully use the energy in their habit (Benyus, 2002, p. 253). Through differentiation, plants and animals take advantage of different ecological niches in a given area according to, for example, acidity of the soil, the amount of sun or shade, or the oxygen content at different water levels or altitudes. They can have different periods of activity and focus on a particular food, like the varieties of butterfly fish that have carved out niches in different parts of the reef. Birds have evolved different beaks so as to make use of different food sources: sparrows have a beak good for catching insects while flying, wood peckers have a longer beak to get at the insects deep inside the tree, flamencos have a curved beak perfect for feeding upside down on small marine animals. Each specialization helps the energy keep moving through the food web in as many ways as possible.

Using another strategy, entities combine their energies through strong or loose bonds to bring forth new dynamics. Water molecules offer an example of straightforward bonding, deceptive in its simplicity, but one on which life itself depends. The hydrogen and oxygen atoms in a water molecule bond in such a way that the characteristics of each are not submerged into a new whole but rather remain present though changed. The hydrogen atom is no longer light and flighty as in its gaseous isolated form, and the oxygen atom becomes less caustic. The

loose bonding of water molecules to each other allows new properties to emerge: they are able to carry small particles without losing the basic structure of the water molecule, and they can move against gravity, flowing upward in plants and trees.

A second way entities interact is called coupling, where “multiple bodies become bonded, essentially by nudging each other into synchronization” (Goerner, 1999, p. 153). A well-known example of coupling occurs when independently-moving pendulums on a wall synchronize their movement into a rhythm which is “mutually maximizing,” supporting each other’s pendulum swing and reducing the effects of drag (Goerner, 1999, p. 154). A whirlpool is an example of synchronized behavior which forms a structure with coherence and synergy as the result of a complex form of linked causality. What would be a chaotic clash of moving liquid is organized into a structure of efficient flow-through of energy (Goerner, 1994, p. 19).

A third type of external dynamics is the relationship called synergy, the bonding of organisms which allows them to be and do more as a whole than would be possible separately (Goerner, 1999, p. 193). For example, researchers have discovered that, due to their ability to “communicate in sophisticated ways, [bacteria can] take concerted action [to] influence human physiology [and] alter human thinking” (V. Brown, 2010, para. 9).

Finally, the edges and spaces between environments provide for particularly rich mutual interactions of entities from different systems. Birds living at the boundary of forest and meadow can nest in the protection of the trees

and feast on the diversity of species in the open meadow. The boundaries of water and land are especially prolific habitats, providing anchorage for plants and rock dwellers in nutrient-rich waters with plankton and abundant sealife (Eisenberg, 2010, p. 55). The ecosystem services (benefits available to humans) that wetlands provide include “water, fish, recharging of groundwater reservoirs, water purification and waste treatment, flood control and storm protection, recreational and spiritual opportunities” (Ramsar Convention on Wetlands, 2010, p. 5).

Ecosystems depend on these different methods of avoiding competition and/or combining efforts to conserve and support the flow of energy. The central elements of an ecosystem are the “variety of its living organisms, the genetic differences among them . . . and the evolutionary processes that keep them functioning . . . changing and adapting” (Eisenberg, 2010, p. 147). Through diversity, the network of living and non-living parts in the ecosystem maintains “the flow of energy and the cycling of chemical elements that, in turn, [supports] life” (Botkin, 1990, p. 7). Although the variety of relationships will be more fully discussed in the section on communion, it is important here to emphasize the role of differentiation in the formation of coherent systems.

A Multiplicity of Functions

Along with variations in structure and internal dynamics comes an increase in an organism’s or a system’s ability to do things. Within an ecosystem, species differentiate into food producers, consumers, or decomposers, each function allowing inhabitants to keep energy and matter moving back and forth

through the area, from the harvesters of sunlight to the herbivores to the carnivores. In some places there is a fairly linear movement of nutrients, like the three-level food chain relationship in Yellowstone between the aspen, elk, and wolf. In other places, like rainforests, we find a more complex food web of multilayered relationships.

Bee and ant colonies are commonly referenced as examples of the benefits of specialized function. In a bee colony, the queen is usually the one to find and initiate the nesting area and lay the fertilized eggs; the drones do the fertilizing; the workers feed the queen and young, build up the hive, and take care of housekeeping and maintenance. When the hive needs to move, the versatile workers assume the role of scouts, going out to investigate various sites and returning to report. After observing the scouts' report on the advantages of the different sites, other workers become a fact-finding committee, going out in groups to assess sites with the most potential (Milius, 2009, p. 16).

The value of differentiation of functions within systems becomes even clearer as we study more complex organisms. The division of labor extends from organ systems (respiratory, digestive, etc.) “to the smallest levels of structure, including the cells, genes, and proteins that make our bodies” (Shubin, 2008, p. 118). All of these systems depend on immigrant labor: the bacteria. The bacteria in our guts (gut microbes) control and influence nutrient supply to the host, for “the development of mature intestinal cells and blood vessels, the stimulation and maturation of the immune system, and blood levels of lipids such as cholesterol” (V. Brown, 2010, para. 14). Bacteria influence brain function, emotional

behavior, and mood, producing serotonin, among other types of neurotransmitters. Researchers find that bacteria play an intimate role in “metabolism, cardiovascular processes and defense against disease” (V. Brown, 2010, para. 14).

Differentiation is How Evolution Happens

In summary, differentiation, over time and through change in internal and external structures, relationships, and dynamics, is fruitful. It contributes to the emergence of new abilities and characteristics, like complex eyes which see sharp images and water molecules which defy gravity to flow up the stems of plants and trunks of trees. Differentiation allows food webs to use and reuse energy, maintaining a dynamic equilibrium. It allows species like apples to adapt to an endless variety of climates and ecosystems. Differentiation is active in the breakdown of volcanic rock and the build-up of rich soil. Through differentiation chaos can be organized into coherent movement like a whirlpool. And internal differences produced by the self-organization of an entity-in-communion contribute to that entity becoming more complex, more itself, and securing a better fit with its environment.

However, the most significant role that differentiation plays is in relation to evolution. If identity is where the process of evolution begins, then differentiation is how it happens. As energy seeks to go faster, it makes use of slight fluctuations and new configurations of matter to accomplish its goal, encouraging continuous innovation. When entities and species differ, evolution moves forward.

The Cosmological Principle of Communion

So far we have seen that identity is enhanced when entities are in purposeful interaction with their environment, and that this interaction gives birth to differentiation on a variety of levels. Underlying the feasibility of both these conditions is communion, a condition that supports identity and differentiation through beneficial connections. When there is a state of dynamic communion among entities, that is, where there is interdependence, diversity, a variety of relationships, and system organization, the universe can operate most creatively and resiliently.

These characteristics of communion help energy to move in more effective ways, to be reused, and be sustained longer. Interdependence keeps energy flowing between entities, diversity provides new options for energy movement, a variety of relationships assures that the energy in an area remains in play as much as possible, and organization helps energy find and use more productive pathways. Sally Goerner (1994) concludes that energy flow is what drives evolution toward increasing complexity and efficiency (p. 81).

Our United States culture has undergone an evolution of thought with regard to this third principle. In grade school geography I remember learning what a good thing it was that the United States was isolated from Europe and Asia and from the wars to which their proximity led. We have progressed since then, particularly in the last 50 plus years, to recognize that the perception of isolation is an illusion and that we are interconnected and interrelated from our origins to our everyday lives. Studies in systems theory and ecology have made the case

that we are actually mutually dependent on each other as parts of larger systems, “entwined and co-evolving” (Rolston, 2012, p. 162). This last understanding—interdependence—has met with some vocal resistance in audiences I have worked with, perhaps out of fear that dependence is weak, and out of discomfort with guilt—with having to acknowledge that our actions may be having negative effects on others in our systems.

These progressions in understanding acknowledge a deepening acceptance: we are not only connected, but are related, like family, and not only family, but to some degree inseparable (Goerner, 1994, p. 45). With each realization, we progress to a deeper understanding of the intimacy of our connection. Even non-organic environments such as tundra or seashore operate in mutually affecting system of rocks, sand, water, non-biotic soil, and climate (Rolston, 2012, p. 166). Acknowledging mutually dependent webs of cause and effect put us in a new relationship with everything around us.

In this section we will examine the way entities which are in communion solve energy problems through patterns that move energy faster and more efficiently, thereby developing complex webs of cause and effect. We will look at the relationship of time and complexity in the synchronization of activities of a system and in progression through sequences of events that may be unrepeatabe. We will note the value of diversity from the aspect of communion and survey a variety of relationships from resonance and cooperation to competition. While these characteristics are not all present or operative at all times, they are the

dominant tools through which collections of species and elements achieve dynamic equilibrium.

Interdependent and Inseparable

There are two assumptions which provide a foundation for deepening our understanding and integration of communion: first, our current interrelatedness is the artifact of the activity of the whole universe throughout its 13.7 billion year history; second, larger systems are built up of smaller systems functioning as a unit and are, therefore, interdependent and inseparable.

The first foundational assumption is that communion is an artifact of deep time—time that goes back to our origin. Everything that now exists has been related since its beginning in a dense, hot oneness. In cooling and expanding, and eventually coalescing into forces and matter, everything has remained connected by links of reciprocal interaction. Regardless of its current form, all of the universe's dynamics and matter can be traced back to the original singularity, to the four forces (strong and weak nuclear, electromagnetic, and gravitational), and the hydrogen and helium atoms that now permeate the universe.

Various models have been proposed in particle physics to explain this earliest connection: the grand unification theory (GUT) connects three of the forces of the universe (strong and weak nuclear and the electromagnetic); the standard model uses some of the ideas of GUT but does still not include gravity; and string theory attempts to unite a theory of gravity, quantum physics, the theory of relativity and the big bang into one “string” (Odenwald, 1997). Even if we are never able to empirically prove what form this original oneness took, we

know enough to recognize that everything points to an original singularity which connects us.

Because of the inescapability of our interrelatedness and interdependence, the health of the whole (body, system, society, ecosystem) is essential for the survival of each, and the health of individuals and populations is the foundation of the health of the whole. We cannot have one without the other. This perspective needs to be the context within which we decide our future.

The second assumption is that at each stage of our history new forms emerge from beneficial combinations of the systems already present, from healthily functioning cells, to organ systems, to bodies. The development of any community implies a history of innovation and evolution in its ancestors, whether at the level of the solar system or the organism. Smaller systems organize themselves into larger wholes, bringing to each new assembly tight fitting structures that already move energy efficiently. The first subatomic particles organized themselves into the first particles, which then organized into protons and neutrons, which united to form the first atoms, which then made up the dust clouds that organized into galaxies, which created stars out of these elements and processes. Each new organization, with its new properties and greater capacity for relatedness, is dependent on the subsystems of which it is made. At each stage, building on small systems that are well-linked “is the trick to getting bigger” (Goerner, 1999, p. 144).

Fusing the lighter elements, stars produce the more complex atoms and elements that could be organized into life, which created from them the

innovative systems on which we depend—like our systems of respiration, digestion, and circulation. In the natural world, the larger and more intricate a system becomes the more entities-in-communion are intertwined and co-evolving.

Unlike the ordering of more familiar human organizations, this model of inclusion and emergence requires all parts of the web, which, related by subtle cause and hidden connections are, therefore, interdependent and inseparable. In such a system “small nudges make a very large difference” (Goerner, 1999, p. 154). These basic tenants of systems theory are foundational to this dissertation’s understanding of communion.

Diversity and the Whole

Ecosystem functioning depends on a variety of living and non-living elements above and below ground. As Benyus (2002) reminds us, the assembly of species above and below ground is the secret to maintaining a prairie in a dynamic steady state (p. 24). Biological diversity keeps energy, in the form of chemicals and nutrients, flowing through trophic pyramids, one species feeding on another (Rolston, 2012, p. 145). In order to fully use the energy in their habitat, species may compete for resources or cooperate with each other in their use (Rolston, 2012, p. 146). When species richness declines, the efficient flow of energy also drops, reducing ecosystem resilience (Eisenberg, 2010, p. 157). Difference is what catalyzes a “structure of interdependence toward life” and keeps energy flowing to support it (Goerner, 1994, p. 70).

General systems theory goes even further to claim that reduced diversity endangers system functioning. According to Sally Goerner (1994), when a

system reaches an unstable state, it requires diversity to seed a better organization, change, and growth (p. 153). If all impurities (diversities) have been removed, the system will explode instead, as has been demonstrated by heating super-purified fluids (p. 144).

The value of diversity is realized when species form complementing communities, that is, species with their own integrity in mutually beneficial interactions (Rolston, 2012, p. 146). Permaculturists focus on relationships between diverse species to design plant guilds which meet all of the essential needs of the insect/plant/animal community in a given area (Hemenway & Todd, 2009, pp. 26–27) And systems theorists remind us that “the way to create strength [is to] specialize and integrate” (Goerner, 1999, p. 194).

A Variety of Relationships

The capacity for relationship is part of every entity, to a greater or lesser degree depending on its level of complexity. The web-like nature of natural systems means that everything is in relationship with everything else at all times to varying degrees. The elk has a relationship with its herd, with its regular food and its seasonal foods, with its predators the wolves and its nuisances the black flies, with seasonal shifts, and with the micro areas within its foraging range. The black fly is not only in relationship with the elk but also with the deer in its area, with certain types of woodlands and the streams where it breeds, and with the parasites that it may carry. While this section will focus on examples of connections that can occur between two entities, it is important to remember that

these relationships occur within “a mutually reinforcing web” with all the various parts working “together in a highly functional way” (Goerner, 1999, p. 181).

These relationships are already present in gestation, like the claw of the grizzly already formed to catch salmon (Swimme & Berry, 1992, p. 77). Upon its birth, the grizzly discovers from its ancestors a legacy of relationships with its community. A species becomes what it is within the matrix of its community, and in turn, forms the system of which it is a vital part (Rolston, 2012, p. 146).

Consistent with the principle of differentiation, linking and interacting happens in a variety of ways, each with specific benefits and limitations.

Competition.

Systems theorist Sally Goerner (1994) contends that competition and cooperation are both necessary to the process of becoming (p. 152). Entities in competition for the same resources have to maintain optimum fitness and honed survival skills, and tend to limit their populations. On the other hand, philosopher Robert Augros and physicist George Stanciu (1987) argue that evidence of direct confrontation over food or habitat occurs very seldom in nature. They refer to ecologist Robert Ricklefs who asserts that “competition is perhaps the most elusive and controversial of all ecological phenomena” (p. 90).

Although Augros and Stanciu (1987) are not biologists, they ground their claims about lack of competition in abundant examples from biology. Most evidence shows that species avoid competition in any way possible, like the cheetah that abandons its kill when the lion moves in. Birds and animals separate themselves geographically, have different feeding ranges and times, and

specialize in different foods. Plants have different requirements for soil, water, nutrients, and sunlight, and differ in depth of roots and plant height. The reason competition is less frequent in the natural world is simple—to conserve energy.

Cooperation.

Cooperation, by far the more common interaction, makes good use of energy, produces novelty, and provides for varied use of space and nutrients. As entities enter into new collaborations the complexity of the system increases and evolves. Cooperation helps organisms get a foothold in an environment, resist invasion, and thrive with a variety of species (Axelrod & Hamilton, 2010, p. 350). Cooperation makes evolutionary sense. I will highlight two ways energy has found to conserve and flow—synced behavior and symbiotic relationships.

Synced behavior.

On the simplest level, resonance, entrainment, and harmonic coupling synchronize the use of energy. Activated by frequencies that bypass surface relationships to resonate on a more whole-body level, entities can become bonded in an unseen yet measurable relationship by oscillating together. Resonance is the tendency of a system to vibrate in sync with an outside influence. Physical objects can have one or more resonant frequencies at which they will vibrate. Tuning forks have one frequency. The tendency of electrons to spin in sync even at a distance is another basic example, as is the vibration set off when a wine glass is tapped and it rings. Simple resonance is at work in the timekeeping mechanisms of clocks and watches, synchronizing and maximizing their rhythms.

The resonance of a playground swing is a little more complex, establishing the tempo and arc at which it will swing at different speeds. This more complex resonance is at work in tidal resonance, where ocean waves are magnified by the specific depth and width of a continental shelf, like in the Bay of Fundy.

Organisms can align their circadian rhythms to natural factors in the body or to external rhythms of light and dark within their environments. This synchronization is controlled by “a group of nerve cells in the brain called the suprachiasmatic nucleus, or SCN” (National Institute of General Medical Sciences, 2013, “Master Clock,” para. 1). We find this group of about 20,000 nerve cells in the hypothalamus, near the optic nerves, reminding us that both the cells for sight and for our circadian clocks specialized from the same photoreceptor cells.

Multiple bodies can couple or become bonded by building a resonant frequency and coming to act as one. They can also bond when the energy produced by one reaction or system is used to drive another reaction or system. *Energy coupling* refers to any number of biological processes where the energy from one action influences another, as when cells regulate anabolic and catabolic reactions to create efficient energy exchange cycles (Alberts et al., 2007).

In meteorology, entrainment indicates the ability of certain weather phenomena to gather up their opposites. Turbulent air can entrain or capture a non-turbulent air flow, and the warm, moist updrafts of a thunderstorm, triggered by rain, can drag cool, dry air into the cloud, eventually stabilizing the air (Ritter, 2009).

A final area of interest is *limbic resonance*, “the capacity for sharing deep emotional states arising from the limbic system of the brain” (Scioli & Biller, 2009, p. 154). While the reptilian brain enables an animal to read and adjust to its physical environment, the limbic brain specializes in internal interaction, “in detecting and analyzing the internal state of other mammals” (Lewis, Amini, & Lannon, 2000, p. 62). Limbic resonance is interactive; it is “a symphony of mutual exchange and internal adaptation whereby two mammals become attuned to each other's inner states” (Lewis, Amini, & Lannon, 2000, p. 63). Limbic resonance is, therefore, what is responsible for moods or emotions being contagious. Empathy, arguably “the heart of mammalian development,” is an aspect of this limbic activity (Farrow & Woodruff, 2007, p. 51).

This last example might be an illustration of what Teilhard de Chardin (2003) understood to be the communion of all life which, from the first cells, was “subject from inside to a form of interdependence that was the beginning of a ‘symbiosis,’ or life in common” (p. 54). The phrase “no longer a simple mechanical adjustment” suggests his sense of a deeper level on which all living beings participate in the same life. It is a challenging prospect—to think beyond the admittedly challenging aspects of physical connections and influences to the effects we can have on the identity and evolution of all living beings.

Symbiosis.

According to Lynn Margulis (1998), “most evolutionary novelty arose, and still arises, from symbiosis” (p. 33). When members of different species live in physical contact, symbiosis can happen in at least three different ways. The

relationship may be parasitic, where one species slowly consumes another, like what the dwarf mistletoe is doing to the hemlock forests in the Pacific Northwest. The symbiotic relationship may be commensal, where one species experiences a positive effect and the other species no effect, like the single celled brown algae that help coral polyps produce calcium carbonate with which the coral builds the coral reef (Eisenberg, 2010, pp. 76, 158). The relationship can be mutual, where both organisms benefit.

This third type of symbiosis, mutualism, is so common that Lynn Margulis (1998) refers to humans as “symbiotic beings on a symbiotic planet” (p. 49). Examples of mutualism range from fungi and insects to the atmosphere to the cells in our bodies which depend “on one another to survive independently *and* collectively” (Goerner, 1999, p. 194).

Mycorrhize fungi that help the mother tree of a forest support their plant community are mutual symbiotes. They require the carbohydrate supplied by tree photosynthesis and in turn take up and distribute nitrogen, phosphorus, and water from the soil (Eisenberg, 2010, p. 119).

Animals that live off the insects or fungus that they farm are in mutual relationships with their crops or “farm animals.” Some ant species farm aphids like dairy farmers, choosing the pasture area, protecting the aphids from predators, and living off the sugary honeydew excreted by the aphids (Nelson, n.d.). Leaf-cutter ants use leaf fodder as manure in which to grow a fungus off of which they live (Nelson, n.d.). Ambrosia beetles feed both adults and larvae off crops of ambrosia fungus they farm in the chambers they bore in decaying trees

(Nelson, n.d.). One of the food sources of the Lagoon Jellyfish *Mastigia papau* is the carbon rich nutrition produced by unicellular algae called *zooxanthella* which it carries in its body. The jellyfish supports its symbiotic partner by following the sunlight across the lagoon during the day to provide the algae the best source for photosynthesis (Dickerson & Sinha, 2011).

On a larger scale, there is an essential link between life and atmosphere on our planet. It was living organisms which precipitated the oxygen crisis on the planet about 2.4 billion years ago. Subsequent species, forced to adapt to an oxygen-based system or die, have also reaped the benefits of faster metabolisms which make faster energy cycling possible and lead to greater structural complexity (Goerner, 1999, p. 188). Researchers have found that “root-associated fungi [are] important regulators of ecosystem carbon dynamics” (Clemmensen et al., 2013, para. 1).

System Organization

According to environmental ethicist Holmes Rolston (2012), order arises “spontaneously and systematically when many self-actualizing units jostle and seek their own progress, each doing its own thing and forced into informed interaction with other units” (p. 163). There is nothing imposing organization from the outside. There are only entities-in-communion becoming through interaction. As we continue to discuss the characteristics of system organization, the self-actualizing, self-organizing, and self-regulating abilities of individual entities will resurface again and again.

Rolston's (2012) statement describes interaction among entities as "forced," as if it is against the nature of an entity to be in communion, and as if individual progress and group interaction are two separate things. When Goerner writes (1994) of the "rights, privileges, duties, and conditions of membership" in the community of life, her words, likewise, carry a flavor of pressure to conform from the outside (p. 153). Since we are examining system organization in terms of cosmogenesis, my perspective is that both individual behavior and group restraints are constantly forming each other. They are indispensable elements of each other's becoming.

Nevertheless, in the spirit of Rolston's (2012) idea, system organization is a product of entities organizing themselves to facilitate faster and more productive energy movement. In the oft-quoted example of boiling water, the formation of the Barnard cell allows the system to process a higher amount of heat energy, efficiently spreading it out through the whole volume of water (Goerner, 1999, p. 141). The Barnard cell is an example of how, as energy increases within a system, it exhausts the ability of one structure's flow-through ability and progresses to another able to process higher amounts of energy.

Entities make best use of energy when they organize themselves to move energy in patterns, like whirlpools and hurricanes, and establish webs of cause and effect, like food webs and ecosystems. They also establish order through synchronized or sequenced timing. Animals like caribou and wildebeest synchronize their mating cycles and migrations with the growing cycles of plants or the coming of the rains. The organization of some systems, like the early

universe and star formation, is established by a progression through sequences of one-time events.

The organization of ecosystems is a combination of webs of relationship and synchronization. A redwood forest thrives by following certain prescriptions, like building on a diversity of smaller systems (like food webs) with coordinated cycles of maturation. They can fully use the habitat by sharing energy in a continuous loop rather than privileging one species, by using waste as a resource, by remaining in balance with the cycles and limits of the biosphere, and by using materials sparingly so as to not draw down the area's resources (Benyus, 2002, p. 253). The organization of a redwood ecosystem is a "holistic ordering" guided by the forest itself (Goerner, 1994, p. 48). Evolution progresses as systems like this increase in intricacy and movement of energy, establish an increasing number of relationships among entities, and follow the "energy rules of forming cycles and creating speed" (Goerner, 1999, pp. 147, 149).

Chaos is not divorced from organization but is intertwined with it (Rolston, 2012, p. 162). Ecosystems fluctuate between equilibrium and non-equilibrium, influenced by successions of population growth and limits of food supply, predation, disease, and habitat modification. Evolution takes place as "competition, symbiosis, energy flow, carrying capacity, [and] niches" push an ecosystem to the edge of chaos where its capacity for self-organization and survival is greatest (Rolston, 2012, p. 164). In systems poised on the edge of chaos, "creativity is entwined with chance and chaos" to construct another dynamic equilibrium (Rolston, 2012, p. 164).

Rather than operating in a rigid order, ecosystems are guided by what Evan Weiher calls “vague, gentle restraints” (Rolston, 2012, p. 161). A constant flux of factors like competition, cooperation, predation, together with more random disturbances like insect epidemics, fire, or extreme weather keeps an ecosystem moving between predictability and unpredictability, and limits the way it operates (Rolston, 2012, p. 161).

Patterns which move energy.

In addition to vortex patterns like whirlpools and hurricanes, entities can organize themselves into mutually-enhancing rhythms of energy flow (Goerner, 1999, p. 143). Migrating geese flying do this when flying in a V-formation that conserves energy, while pelicans not flying in a V have been found to have higher heart rates and need to beat their wings more frequently (Library of Congress, 2012). Systems theorist, Sally Goerner (1999), attributes the formation of these dynamic structures to a “web of forces [pulling] bodies into a pattern” (p. 155), which sounds like forces from outside the entities do the organizing. However, considering the agency of everything from water molecules to geese, it is more helpful to understand that entities in interaction with things like their neighbors, gravity, physical features, and temperature changes ease themselves into an efficient flow pattern. Water molecules, moved by gravity yet constrained by some physical feature like a sharp turn in the water’s path discover a sustainable and efficient way to keep energy flowing.

The natural path of a waterway is another example of energy efficiency. As water flows through sunlight, over and through rocky beds and a variety of

plants and organisms, it can cleanse itself of impurities and maintain its integrity. If it is allowed to meander through an area, it serves a greater number of plants and protects the land from erosion by maintaining intact banks. But attempts to stabilize a waterway by lining it with concrete only serve to increase the water's speed, deepen and spread the channel, and reduce its ability to serve the plants in the area (Orr, 2011, p. 22). By establishing flood plains and wetlands, water deposits silt where it can enrich the system (Eisenberg, 2010, pp. 170–171). In Scottsdale, AZ, vegetated pathways and wetlands have been shown to minimize flood damage from desert flash floods, “improve water quality and land values, and create a park like setting for human recreation” (Eisenberg, 2010, pp. 167–168).

The Napa River Restoration Project in northern California has produced similar effects. In addition to protecting land from floods and erosion and improving surface and ground water, the project is restoring spawning habitat and rest spaces for salmon and trout, as well as native plants systems (Fimrite, 2011). By reestablishing the meandering water pathway, silt build-up in the river has been reduced, instead being deposited in wetlands where it can soak up rainfall and chemicals, and filter pollutants. The filtration function benefits both habitats and humans: “New York City found that it could avoid spending USD\$3-8 billion on new waste water treatment plants by investing USD\$1.5 billion in the purchase of land around the reservoirs upstate. This land purifies the water supply for free” (World Wildlife Global, n.d., para. 1).

Webs of cause and effect.

What we discover in ecological studies is webs of “cause and effect that [have] coherence, hidden order, inseparability, and subtle connectivity” (Goerner, 1994, p. 54). How do these work? First, entities interact in relationships that are mutually dependent. Second, synergistic relationships among the individual entities allow them to achieve cohesion and organization without a control center, and to operate differently than the separate parts would or could. Third, systems are web-like, therefore changes to one part of the system have rippling effects for the rest of the system.

First, mutual dependence may act as feedback loops, where one variable affects another which in turn affects the first (Goerner, 1994, p. 46). As an ecosystem grows, more recycling loops are central to keep it from collapsing (Benyus, 2002, p. 54). In an ecosystem feedback loop, forces from the bottom of the food system, like soil composition, climate, availability of diverse nutrients, and plant productivity are just as consequential to system health as those at the top, like the activities of herbivores and predators (Eisenberg, 2010, p. 31). Change triggers change in both top down and bottom up directions, in a self-reinforcing cycle.

Feedback loops can also be highly detrimental, as in the case of the causal agent of the Irish potato famine. Researchers have found that the pathogen *Phytophthora infestans*, responsible for the potato blight, has evolved effector proteins which suppress plant immunity, which then feeds further colonization of the host (Yoshida et al., 2013).

Second, synergistic connections produce a greater effect than can be accounted for by merely adding up the efforts of the entities within them. For example, researchers Penrose and Hameroff speculated that it may take as many as 10,000 cooperating neurons for the mind to have a conscious event (Benyus, 2002, p. 228). Rather than simple switches, neurons operate more as “sophisticated computers” (Benyus, 2002, p. 198). As Benyus (2002) explains, “every neuron must continually integrate up to one thousand synaptic inputs, weigh them, and decide which enzymes to activate” (p. 199).

Bacteria also operate synergistically: microbiologists speculate that by shaping planetary

Geochemistry, creating substrates and chemical processes that support the development of complex organic molecules, regulating the cycling of energy and nutrients both in “higher” organisms and their environments [bacteria may] constitute a kind of distributed awareness encompassing the whole planet. (V. Brown, 2010, “How Smart,” para. 6)

When entities incorporate synergistically, the new whole is more, and can do more than would be possible by entities in proximity but not connected, a phenomena which gives birth to new properties, like coordinated action and thought (Goerner, 1999, p. 193). A consequence of this incorporation is that influence flows both ways, from the whole to the individuals, as well as from the individuals to the whole, an idea that ecologists call “holism” (Rolston, 2012, p. 163). In a final example of synergy, biologists now accept that everything is not defined, controlled, and started by genes. Instead they recognize that it is the dynamics of the collective that “produce most shape and function. Neighbors, experience, and environment also play big roles” (Goerner, 1999, p. 201).

Third, interactions within web-like system are complex: tugging on one part of the system touches everything else, for better or worse. Changing one part of a system may fix a target concern, but also trigger unexpected and radical consequences for the whole system. One such example of complex interaction was triggered by the decline of the Johnson's hairstreak butterfly in the mature Hemlock forests of the Pacific Northwest. The butterfly lays its eggs on the dwarf mistletoe that lives on the hemlock. When logging in the area and insecticide spraying for tussock moths and budworms had the side effect of decreasing the butterfly population, the mistletoe began "taking over the Hemlocks, impairing their health" (Eisenberg, 2010, p. 135). The Hemlock decline triggered the decline of other species dependent on hemlock cones for nutrition, such as common crossbills. Hemlock decline also affected the mycorrhizal fungi which serve as extensions of the hemlock roots and are central to the healthy soil composition on which other tree species, the understory, and wildlife depend.

The decline of the Johnson butterfly had a cascading effect on the whole area. Although the butterfly is not counted as a keystone species, it is what is called a strongly interacting one. Its "presence or absence has tremendous influences" on the forests where it lives (Eisenberg, 2010, pp. 135–136).

Another example of unexpected side effects involves the introduction of recombinant bovine growth hormone (rBGH) for use in the dairy industry. Its purpose was to increase milk production, but its use has become highly controversial as health problems have appeared in both cows and humans. The

Center for Food Safety found that “cows treated with rBGH suffer a 50 percent greater incidence of lameness (leg and hoof problems), 25 percent more udder infections (mastitis), and serious reproductive problems including infertility, cystic ovaries, fetal loss, and birth defects” (Center for Food Safety, n.d., para 2) According to Food and Water Watch (2007), studies have found high levels of IGF-1 in humans with breast, prostate, colon, and other cancers who had consumed rBGH milk.

A third example of what happens when we try to make changes in complex systems has a slightly different outcome. In this example, once an invasive species had completely displaced the native species and assumed its function within the system it was found to be an essential player in ecosystem interaction. As the result of studying an oak savanna in British Columbia and a degraded prairie in southwestern Saskatchewan, biologist Andrew MacDougall of the University of Guelph, Ontario, reached the conclusion that invasive plants fill “in as the natives disappeared . . . serving a stabilizing role” rather than a disruptive one (Christopher, 2008, para. 32).

McDougall had assumed that, once invasive species were removed from the oak savanna, native wildflowers and grasses would recolonize it. What he found instead was that removal fostered further decline of native plant species, “and the fundamental character of the flora within the plots began to change, with woody plants encroaching on the formerly open, grassy areas” (Christopher, 2008, para. 31). MacDougall concluded that invasives fit into the ecosystem

when they fulfill the role of the native member of the same plant guild which they had replaced.

Considering that almost every area of the planet has suffered an invasion of non-native species to some extent, and systems with invasives are the new norm, we need to look for criteria other than native/invasive categories. Canadian theologian and ethicist Laura Westra (1998), working with five scientists, developed a list of four points for judging system integrity. First, the ecosystem must be healthy in its present form, meaning that even if the area has been significantly altered, it is functioning successfully as a system. Second, the ecosystem retains the ability to recover from perturbations “and, if necessary regenerate itself.” Third, the system retains a capacity for “ongoing development within its time and location.” Fourth, the system can “continue its ongoing change and development unconstrained by human interruption past and present” (pp. 8–9).

According to these criteria, then, we can judge the changed systems that MacDougall investigated as having integrity within their new, altered form. As long as the complexity and interdependence of the new systems are preserved the systems will be able to satisfy Westra’s four requirements.

Food systems.

Food webs are usually the way energy moves through the living and non-living elements of an ecosystem. Dynamic stability in an ecosystem is aided by its keystone or highly interactive species and by the complexity of its trophic organization. The former affects the latter. Keystone species encourage more

diversity and complexity in the food web, which makes the system more stable (Eisenberg, 2010, p. 54). The keystone, or highly interactive species, within an ecosystem enriches the habitat and effect symbiosis and competition. They aid in nutrient cycling, in establishing healthy soil and robust plant communities, in seed dispersal, and in preserving clean water (Eisenberg, 2010, pp. 23, 107). Removal of a highly interactive species tends to reduce biological diversity, and in linear systems, can cause what is known as a trophic cascade, a series of negative effects on the herbivores and plant species of the system. What happened in Yellowstone National Park was an example of this linear trophic cascade.

The removal of wolves from the Yellowstone Valley in the early 1900s did not result in immediate effects, but by 50 years later it was apparent that the ecology of the area had been undergoing a significant shift. Stream banks were eroding, waterways spreading, and beavers and songbirds seemed to have left the valley. There was a 55 year gap in the ages of aspens, willows, and cottonwood trees, the winter food of the elk (Eisenberg, 2010, p. 93). The trees that remained showed evidence of repeated browsing on young spring shoots resulting in thick, deformed trunks topped by a multitude of long, spindly shoots.

In the mid-1900s, the reintroduction of wolves into the valley had the cascading effect of decreasing the elk herds, changing herbivory patterns (more moderate grazing of aspen, willows and cottonwood), reducing mesopredators (coyotes and bears), thereby spurring the recovery of woody browse species and increasing biodiversity as beavers and songbirds returned (Eisenberg, 2010, p. 14). The presence of wolves did not stop elk from eating the tender young tree

shoots, but influenced the elk to move more frequently, reducing over-browsing (Eisenberg, 2010, p. 17).

We can also see the effect of a keystone species on the northwest coast of the United States where healthy tidal systems are made up of sea otters which keep down the population of sea urchins which feed on the kelp forests which provides the habitat for a rich diversity of sea creatures. However, researchers began noticing large areas of the sea floor covered in sea urchins with nothing else in sight—no kelp forest and no diversity of species. They also discovered that killer whales were feeding on the otters needed to control the sea urchins population (Eisenberg, 2010, p. 62).

Since marine researchers knew that sea otters were not the normal prey of killer whales they went looking for what triggered the whale's behavior. Researcher Terrie Williams discovered that the whaling industry's harvesting of great whales had reduced the availability of the killer whale's usual prey of whales, forcing them to switch their prey to smaller and smaller species. From great whales the killer whales had switched to feeding on sea lions and seals, then Steller sea lions, and finally otters (Eisenberg, 2010, pp. 64–65). As their predators disappeared, the urchins ate their way through the kelp and destroyed the trophic system. In this case the cascade of degradation crossed two food webs—the great whale/killer whale system as well as the tidal system.

Keystone species are not always predators, as the example of the Johnson's hairstreak butterfly shows. "Mother trees," the large, older trees in a forest are another example of a highly interactive species, providing carbon,

water, and nutrients to younger trees through the web of fungi within in and between their root systems. Using stable isotope tracers, researchers have found that these mycorrhizal webs help in seedling establishment and survival where a mother tree can “manage the resources of the whole plant community” (Engelsiepen, 2012, para. 3). Cutting down a mother tree has been shown to diminish the survival rate of younger trees in the area.

In the words of E. O. Wilson (1992), “the loss of a keystone species is like a drill accidentally striking a powerline. It causes lights to go out all over” (p. 348). On the other hand, reintroduction of a keystone species “increases plant growth; the resultant energy surge drives nutrients across an ecosystem, increasing biodiversity” (Eisenberg, 2010, p. 15). As Goerner (1999) notes, the goal of any changes within an ecosystem is not to “win” but to improve energy flow (p. 211).

Timing.

We know both from observation of the natural world and systems theories about the world that timing organizes systems by way of stages and cycles. In harmony with seasonal changes, species go through breeding/seedling, maturation, migration, and hibernation cycles—what Rolston (2012) calls ordered regularities. Studies in permaculture help us understand the succession of species needed to build soil and prepare for sustainable, mature communities (Hemenway & Todd, pp. 24–25). Our 24 hour sun cycle and our four season cycle impose an outer directed organization on living organisms which species then integrate into their own cycles and behaviors.

The character of a forest is defined by a succession of species working with energy flow. The requirements of each species for soil, sun light, and moisture are accommodated in phases, as conditions change which favor one species over another. Succession is most visible after an event such as a forest fire, volcanic eruption, or clear cut. Each of these invites the same progression of organic sequence. The recovering forest first supports a high diversity of species that thrive in full sun, allowing species like Douglas fir to sprout its seedlings. With the development of the forest canopy, sunlight decreases and plants and trees that require shade, like red cedar and western hemlock, sprout and thrive. When old Douglas fir trees die, new seedlings cannot sprout. Diversity tapers off leaving a western hemlock climax forest (Eisenberg, 2010, p. 117). The old growth forest which then remains differs significantly from its beginning in physical structure and composition, and, therefore, in the flow of nutrients, water, and energy (Eisenberg, 2010, p. 122).

The development and organization of a prairie is also governed by a succession of species. When a prairie has burned, recovery begins with the species that require more light, space, and moisture, and which fix nitrogen in the soil. They lay down the conditions that succeeding species will require. Earlier species may then disappear or remain dormant until the conditions are again appropriate for them. As the soil, moisture, and sunlight conditions change, the vegetation they support changes. What makes the final community of species last is the history which has assembled beneficial conditions (Benyus, 2002, p. 31).

These successions are governed by a systems theory principle that Sally Goerner (1999) calls the complexity catch. Getting bigger is tricky, she explains, therefore systems do it in stages. Before moving to a more complex organization, the smaller system must be stable. In the case of the examples we have just noted, soil is the first system that must reach a certain richness and stability. The second stage of sun-loving plants provides the shade needed for the third stage. Small, well-linked systems keep a larger system from falling apart because they are tighter and move energy faster (Goerner, 1999, p. 144).

The result is increasing intricacy. When a big circle reaches its breakpoint, it breaks into smaller circles which link together. Intricacy, like a lace tablecloth, involves lots of small, interlinked circles. Energy actually pushes increasing speed and intricacy at the same time. (Goerner, 1999, p. 145)

Migrations are another example of organized regularity, a phenomenon that is dependent on smaller systems like plant maturation working well. Robin Baker (1981) explains that migrations are organized mainly by seasonal climate changes, availability of food, and the presence of predators. Over time these timings have become synchronized, so that a species will time births to occur during the height of food availability, and regularly vacate areas when the weather or insect pests make it inhospitable.

Chimpanzees, moose, and elephants move in altitudinal migrations, going between higher ground in the dry season and lower altitudes in the wet, alternately feeding on new plants and allowing food sources to recover. Reindeer and caribou move between tundra and forest. They eat the leaves of any available plant, lichen, and sedges, but migrate to the forest when winter conditions of

freezing and thawing form an ice crust over their food. The fluffy snow of the protected forest allows them to “make feeding craters” to reach lichens and sedges (Baker, 1981, p. 206). Long distance, circular migrations take place in tundra, desert, and grassland habitats because drought, rainfall, and snowfall make food availability highly seasonal or erratic. This affects animals such as wildebeest, zebra, and gazelles (Baker, 1981, pp. 201–202).

The synchronized behavior of migration according to temperature, rainfall, and plant maturation make this system vulnerable to the effect of global climate change. Some of the effects that are hazardous include decreasing or increasing rainfall and drought, increased temperature, early maturation of grasses, reduced die-off of insects. Birds and butterflies whose migrations are triggered by temperature are becoming confused and failing to migrate (Guerra & Reppert, 2013). The increasing incidence of some bird’s failure to migrate is thought to be due to changes in the winds that helped their migration or to the increasing size of deserts (Environment News Service, 2006).

Hibernation cycles also depend on other systems like plant growth regularity, a requirement affected by climate change. One degree of warmth is enough to bring marmots out of hibernation, but not enough to melt the snow that triggers wildflower growth. The marmot metabolism returns to normal levels, but lack of food means they cannot replace the energy they are now using. The result is starvation or an increased threat from predators as they forage farther from safety. The hibernation cycles of brown bears, chipmunks, and squirrels have been similarly affected (Hamashige, 2010).

By organizing themselves by means of patterns, webs, systems, and timing, entities make the best use possible of the energy present in their habitat and enhance the communion among them.

Communion, the Matrix of Evolution

In summary, entities which are in communion are fertile ground, a matrix for the emergence of new structures, properties, and potentials. If there is diversity, a variety of relationships, interdependence, and system organization in the communion, it forms a web of possibilities. Communion allows energy to flow in reciprocal causality among all the members of the communion.

Aligning ourselves with the principle of communion, however, poses a big challenge for humans. I believe that the quality of communion of which Teilhard de Chardin (2003) wrote, that cells are “subject from inside to a form of interdependence” (p. 54) defines our growing edge. The American Sign Language gesture for communion forms a link with the thumbs and fore fingers of both hands—center connecting to center. The two circles are not just next to each other but are inter-linked, interpenetrating each other. Communion is based on this deeper connection, requires strong centers for its depth, and acknowledges the immense influence signified by the connection of center to center. It is this “matrix of interconnections between centers” (p. 166), which environmental ethicist Holmes Rolston (2012) claims stimulates our creativity and activates our potential. Living into the challenges of this concept means recognizing that we become who and what we are within this matrix and because of it. Our

interdependence through this center-to-center connection is both a treasure and a responsibility.

Foundation for an Alternative Consciousness

I had three goals for this chapter: first, to anchor the mutually enhancing function of the cosmogenetic principles in scientific reality; second, to document the value of this combined activity; and third, to establish why adherence to the cosmogenetic principles-acting-in-concert might lead to a mode of consciousness that would liberate us from the destructive habits of the dominant western worldview.

In this chapter I have documented that the universe, in contrast to the industrial growth society's view of it, does everything in a web-like manner, with energy flowing freely among all parts, from subatomic particles to ecosystems. This communion is cosmos-building when diverse members are interdependent and diverse, when they are free to interact in a variety of ways, and when this activity generates a system organization unique to the community. I have demonstrated that differentiation is an essential element of a communion which is generative; that it is time-developmental, the product of self-organizations of entities; and that it results in difference in visible and hidden physical structures, dynamics, and functions. Finally, I have established that energy is centered in entities-in-communion, and that by purposeful interaction with their environment they are the locus of evolution.

In Chapter Two, I used the iceberg model to illustrate the role of core beliefs in our lifestyle choices and our current reality. I argued that our

ecological, social, and spiritual crises are rooted in adherence to a combination of beliefs about separation, about monism or de-differentiation, and about the insignificance of non-material, non-measurable things. The cosmogenetic principles present an alternative to these core beliefs and generate alternative images of the universe, the human, and the divine, ones which are in harmony with the evolutionary activity of the universe. The image of the universe is of a web, dynamic and evolving, dependent on the healthy functioning of each member of a diverse community. The image of the human is of a whole embedded in a larger whole, whose actions always have consequences for her community. Her emergence as a responsible member of the community is dependent on her own growth in identity, on the deepening of her interior coherence, and on the emergence of her unique difference.

The image of the divine suggested by these values is of a communion-of-differentiated-identities-in-dynamic-interaction, a trinity whose interactions are easier to understand as we become more familiar with the cosmogenetic principles. In light of a nuanced understanding of these principles, we enrich traditional trinitarian images of Virgin, Mother, and Crone; and Father, Son, and Spirit by describing the internal dynamics that make such a communion generative. By understanding the divine as interacting-differentiated-identities-in-communion, we bridge the gap between the activity of the source of the universe and the universe itself. The idea of a universe created in the image of the divine takes on deeper meaning when we imagine that the dynamics are the same for both. A communion-of-differentiated-identities-in-dynamic-interaction is a

radically different image than the monarchal, separatist god image which Bateson (2000) judged to be so destructive. Focusing on the internal dynamics of the divine can also add significant dimension to other images of the universe, such as the Body of God (McFague, 1993, p. 19). Imaging the universe as continuing the Dynamic of God suggests that there is seamless connection between the way the universe functions and the way its source organizes itself. It urges us as humans to align our behavior with this way of being, which we might call the divine organization. To align ourselves with the cosmogenetic principles is to align with the internal dynamics of the source of the universe. It is to become earthly manifestations of this divine organization. The boomerang effect can work in our favor if it helps us to participate in the dynamic unfolding of the universe. When God is imaged as the source and first model of the cosmogenetic principles, aligning our behavior with these forces seems the only logical choice.

Using Cosmological Principles as Ethical Guidelines

One further question needs to be addressed: can we abstract guidelines for human behavior from the examples of the cosmos's operational dynamics in a way that might avoid abuses that have come from other attempts to apply scientific principles, like "survival of the fittest," to human society? I believe that there are at least four reasons that we can safely do so. First, unlike Spencer's social Darwinism and its premature conclusions, the cosmogenetic principles are supported by data from multiple scientific disciplines. They have been found to apply at all levels of existence from macro to micro. Second, the principles have long been recognized as values in the human community, although not seen to be

mutually interdependent, nor applied as ethical standards. Third, much of our ecological, social, and spiritual crises can be traced to violation of these principles.

Finally, major theorists of an alternative worldview support the importance of these dynamics in the human dimension. Teilhard de Chardin (2003) saw an entity's openness to its environment as intimately connected to its evolution, noting that, from the beginning of life, an entity establishes "a form of interdependence that . . . [is] . . . the beginning of a 'symbiosis,' or life in common" (p. 54). Thomas Berry (1988) claims that our current crises are the result of "our limited, our microphase, modes of thought," (p. 43) and that the way out of our limited thinking is through accessing the "deep psychic energies" (cosmogenetic principles) of the universe itself (p. 48). Swimme envisions them as a cosmological ethics, arguing that good or evil for our planet relates to how our actions conform to these ethical imperatives, either enhancing and intensifying differentiation, subjectivity (identity), and communion or impeding them. In his essay "Cosmic Directionality and the Wisdom of Science," Swimme (2000) notes that humans already operate in conformity with "expansive differentiation, autopoiesis [identity], and interrelatedness [communion]" (p. 95) but that, without sufficient consciousness, our actions tend to distort the principles, apply them in an unbalanced manner, and lead to a destructive presence on the Earth.

The cosmogenetic principles, with their wealth of examples from various disciplines, provide a bridge between theory and practice. They summarize much

of what contemporary science reveals to us in lay terms, but also recall and give increased depth to some traditional religious beliefs. They can provide the foundation for a practical ethic that is crucial to addressing our ecological and social challenges. As primary features of all form-building interactions in the universe, they provide the best guidance to bring human actions into harmony with the form-building powers of the universe. They are what Ken Wilber might call *orienting generalizations* in that they point to general behaviors we need to exhibit, even though they do not suggest specific actions (Crittenden, 1997). By assuring that these orientations are present in the structures, organizations, and communities we build, and that each principle is given room to grow and intensify, we set up ideal conditions for humans to be a vibrant part of the Earth community.

CHAPTER 4: THE ROLE OF RELIGIOUS LEADERS IN SOCIETAL CHANGE

If we in capitalistic consumer cultures wish to implement new behaviors that are aligned with the cosmos-building power of the universe, we face a question: How can we do that while living in a consumer culture that is not only committed to a lifestyle that is familiar and comfortable, but that is also so seductive? Using the iceberg model in Chapter 2, we realize that not only do we need to let go of our destructive beliefs about the human, the world, and the divine, but we also must be willing to lose the psychological rewards we get for living in this consumer society—the comforts, efficiencies, luxuries, and protections that we expect from modern life. This sounds too much like sacrifice, not a high value in United States culture! Not only do we need a compelling vision to challenge the American Dream, but we need one that stirs our hearts to make the sacrifices that embodying that vision will entail. For this we need religions “to do what they do so well, namely articulate an inspiring moral vision for human-Earth relations” (Tucker, 2003, p. 82).

On the theoretical level there seems general agreement that religions need to be involved in the solution to our environmental crisis in the ways that they have been involved in social justice issues, namely as teachers and activists. Many scientists and religious leaders such as the Union of Concerned Scientists (1992), Thomas Berry (1988), Mark Hathaway and Leonard Boff (2009), Gary Gardener (2010), and Mary Evelyn Tucker and John Grim (2000) recognize that religions provide the necessary link to behavior change through their capacity to

influence believers' attitudes and values. As "the repositories of key attitudes and values" religions promote the "change of attitudes (worldviews), values (moral and spiritual commitments), and ways of living (consumption and production habits)" that are essential to societal transformation (Tucker, 2007, "Choice," para. 2).

In 2003, the Worldwatch Institute devoted a chapter of its *State of the World* report to the role of religion in working for sustainability. As author Gary Gardner (2003) noted, "religion has the capacity to provide meaning for a person's life by shaping the individual's cosmology . . . which translates into influence over ethics, and, in turn, over behavior" (p. 154). His message was clear and unambiguous. Seven years later, Gardner raised the issue again in a chapter titled "Silence on False Gods?" in *State of the World 2010*. He noted a gap between the leadership potential of religions and the fact that they seemed to be giving little guidance on consumerism, providing only sporadic and rhetorical intervention rather than strong religious initiatives on simpler living (Gardner, 2010, p. 26). Why is there such a gap between the potential of religions and their actual leadership in helping their believers toward the "conversion experience deep in the psychic structure of the human" (p. 60), which Thomas Berry (1999) sees as essential to bring about the needed transformation of our society? For an answer to this crucial question we need to look at the close relationship between the consumer capitalist, empire-oriented, human-centered culture in which we live and western religions.

Western Religion and the Worldview of Dualism and Patriarchy

Since Lynn White's article in 1967 on the historical roots of the environmental crisis, there has been a tendency in the literature of religion and ecology to see religious beliefs as the cause of destructive cultural values and behaviors. This is not defensible, or even the most helpful way of looking at the relationship between religion and culture. Rather than seek a causal relationship, it may be more productive to recognize that western cultural and religious beliefs are intertwined and interdependent, and that together they form the foundation for our consumer society. Western Christian values provide an atmosphere that influences the way we, in the United States, behave in our treatment of the natural world. Religious leaders need to address this entanglement of values. They need to help their believers distinguish between socially and politically derived values and the values for which religions claim true spiritual grounding. For example, without guidance, ecologically problematic beliefs about the separation of spirit and matter, human and nature, and the superiority of humans over other species can seem to be founded on infallible religious truth. Preaching against them can, therefore, be seen as taboo and sacrilegious.

Theologian Theodor Hiebert (2000) finds dualistic thinking in the first, priestly version of the creation story in Genesis which differs from the second that has the human made from the clay of the earth. "The priestly writer views the human, created alone in God's image, as distinct from other life forms . . . as master of the earth . . . [and whose] vocation is one of dominion and supervision" (p. 140). This perspective, then, is ancient, possibly documenting a prevailing

cultural perspective. Later, drawing on the metaphysical dualism that prevailed in the Hellenistic culture of his time, the early Christian theologian Origen deepened the notion of human separation from nature, adding doctrines of “the hierarchy of being and the dualism of spirit and matter” (as cited in Hiebert (2000), pp. 140–142). Augustine continued to amplify the philosophical dualism.

This dualistic thinking embedded in the Judeo-Christian tradition provides a foundation and ongoing support for a variety of anti-ecological ideologies. The Latin American theologian Leonardo Boff (1979) suggests that these include: patriarchy, monotheism, anthropocentrism, limitless demographic growth, the tribal ideology of election, and the fall of nature (pp. 78–80). We will examine these in their religious and cultural manifestations.

Patriarchy, the first of Boff’s (2000) anti-ecological ideologies, initially referred to “the rule of a senior male person over an extended natural family or tribal people” (p. 142). It is clearly evidenced in the patriarchal period of the Hebrew scriptures and later in Roman law, where the concept of the “*patria potestas*” granted the family patriarch “absolute rights over his entire family, including the right to impose capital punishment. The extended family was the father’s total possession. The father owned everything and decided everything” (Berry, 2000, p. 142).

Since its ancient beginnings patriarchy has acquired a variety of corollaries that extend its capacity to engender oppression and ecological degradation. Thomas Berry (1988) names four specific patriarchal establishments that contribute nuances to the patriarchy dominating the political and corporate

systems we know today. He cites the first patriarchal establishment as the classical empires of antiquity such as Egypt and Sumeria, through the Romans, and up to and including the world dominating empires like the Spanish, British, and Russian. From the beginning these empires founded the civilization they exported on the oppression of people and extensive domination of the land (p. 146).

Berry's (1988) second establishment, the western ecclesiastical establishment, solidifies into patriarchy mentality the concept of a people chosen by a transcendent Father God for a heavenly kingdom. The natural world is not seen as the place where the human and the divine meet, but as an exile from the true home of the human. Women, as the avenue by which evil enters into the world, are seen as responsible for the breakdown in human-divine relationships. All things associated with them—sensuality, the senses, and matter—become suspect (pp. 148–152).

Berry's (1988) third establishment, the nation-states that developed after the fifteenth century, operated on the assumption that they had a divine commission to be saviors of the people. Slavery, which contributed to the wealth and prosperity of the state, was justified as allowing lower beings to participate in the higher purpose of the state. Aggressive use of power in pursuit of conquest and domination was also justified. The colonialism engaged in by these and the earlier classical empires established within patriarchal behavior the oppression of

the people and land of their colonies, the hybridization of people's identity,⁹ and the extraction of both people and resources for use by the "father country" (pp. 152–155).

Each one of these characteristics is visible in Berry's (1988) fourth establishment, the modern corporation, which claims the right to make life or death decisions over peoples and ecosystems, and that the exploitation of resources brings prosperity to the people of a region. These four "destructive manifestation[s] of patriarchy" reveal, as Thomas Berry claimed, "the awesome dimensions of our cultural and institutional pathologies" (pp. 155–159). They reveal the depth to which our western way of life is entangled with values which violate respect for the identity of peoples and species and the dependence of natural and human systems on the internal and external dynamics of its unique structures.

Second on Boff's (2000) list of anti-ecological ideologies is monotheism, the belief in a single creative principle. The concern is not with monotheism itself but with the way it has been formulated through history in psychological and political ways. In reacting to the ubiquity of polytheistic cultures, monotheism was so over-emphasized that the Christian and Jewish traditions no longer "discern the presence of divine energies in the universe and specifically in human

⁹ Hybridity is an expression of patriarchal control in that it erodes an indigenous population's identity. Hybrid offspring belong to neither one culture nor the other. The tension of this in-between place is brought home forcefully by a Gloria Anzaldúa (1987):

To live in the Borderlands means you
are neither *hispana india negra española*
ni gabacha, eres mestiza, mulata, half-breed
caught in the cross-fire between two camps
while carrying all five races on your back
not knowing which side to turn to, run from. (pp. 194–195)

beings themselves” (p. 78). The worship of many gods and goddesses not only drew attention to the energies and mysteries of the universe but were reflected in human attitudes and became archetypes of behavior. Without this multidimensional view, the universe became one-dimensional and humans were left as the only beings of depth. The psychological effect of the shift from a polytheistic lens was a failure to sufficiently appreciate and develop a sacramental stance toward the natural world, one that understands the natural world as signifying something sacred and as a source of grace. Bereft of any sacred meaning, the world is viewed as profane. Politically, monotheism reinforces authoritarianism and the centralization of power, discouraging equity, dialogue, and the formation of community. As with patriarchy, the image formed of the divine boomerangs back to the human realm, where it can be used to legitimize the actions of those humans who most resemble the projected image, in this case, powerful male authority figures.

Boff’s (2000) third anti-ecological accent is anthropocentrism. This belief that only humans can carry on the creative activities of the divine follows directly from monotheism because only humans are created in the image of the divine, and they are the only creatures that matter (p. 79). In magnifying the importance of the human, anthropocentrism sets the stage for assuming that all of creation is to be directed by and for the use of humans, a key attitude in the plundering of the planet.

Boff’s (2000) fourth anti-ecological ideology follows from anthropocentrism, and is an idea that finds legitimization in the Genesis directive

to “fill the earth and subdue it” (Gn 1:28, Revised Standard Version). Boff (2000) sees this directive, repeated after the flood and again in Psalm 8, as “a clear call to limitless demographic growth and unrestricted *dominium terrae*” (p. 79). Despite the work being done to soften destructive interpretations of this directive, the currently preferred translation, “steward the earth,” retains the superior role of the human in relationship with Earth. Boff claims that anthropocentrism’s anti-ecological tenor, which has dominated western culture since the seventeenth century, has served as a “divine legitimation of the savage conquest of the world and the subjugation of all beings in creation to humanity’s self-willed ambitions” (p. 80). Theologian Catherine Keller (2008) also notes that the Cornwall Alliance, a right-wing politico-religio-economic alliance, “bases a theology of ‘forceful rule’ of the earth on the ‘dominion’ passage of Genesis 1:28” (p. 6). She cites as an example of their influence the Southern Baptist Convention statement that rejects “government-mandated limits on carbon dioxide and other emissions as ‘very dangerous’ because they could lead to government interference in business and ‘major economic hardships’ worldwide,” even though it is “predatory global corporations that are causing the major economic hardships” (p. 65).

Boff’s (2000) anti-ecological ideology is the tribal ideology of election, the concept of being a chosen people. Historically, the exclusion of diversity, exclusive truth claims, imposition of dogmas, fundamentalism, and events such as the Inquisition and religious wars manifest this belief. Today the ideology of election might be seen to fuel the idea of American exceptionalism, which

attempts to set the United States apart from other nations. As the nation with the highest rate of consumption of resources, we are being ecologically challenged to change our lifestyle. As long as we think of ourselves as exceptional (superior), we have little incentive to scale back our lifestyle. Thinking of ourselves as exceptional means we are exempt from the changes required of all peoples. Even though every group of people may consider itself special or chosen, when such a belief leads to the demonization of the other and armed conflict, the sustainable functioning of the surrounding ecosystems is forgotten and suffers. This progression is exemplified by the repeated firing of forests and farm crops in the decades-long civil war in Angola or the ecological devastation caused by the burning of the Kuwaiti oil fields by Iraq.

Boff (2000) claims that the sixth ideology is the most virulent: belief in the fall of nature. This Christian doctrine holds that because of original sin “the whole universe has fallen under the power of the devil” (p. 80). The belief not only demonizes nature, but also makes suspect the enjoyment of nature by its connection to the devil. Boff concludes, “In this way of seeing things, original sin outweighs original grace” (p. 81).

Taken together, these powerful Judeo-Christian foundational beliefs support, and do not challenge, human separation from, dominance over, and exploitation of Earth. Although there are two creation stories in the book of Genesis, only the priestly version, which legitimizes the western way of life, has become part of the unconscious foundational beliefs of the West. The second Genesis story (Gn 2:4b–3:24, Revised Standard Version), which begins with

humans being made from Earth, does not include a separation between humans and Earth and would have the potential to provide a new moral vision for human-Earth relations (Hiebert, 2000, p. 138). Its implications need to be brought to a new prominence and connected with the cosmogenetic principles, if we are to lay foundational beliefs for new behaviors.

Religious Leaders and Cultural Transformation

It is unrealistic to believe that religions as institutions could move quickly to embrace changes that may challenge their traditions, even when those changes could bring them into closer alignment with the central truths of their faith. Not only do religious institutions tend not to change quickly, their purpose is to preserve their individual traditions not challenge them. It would take a very compelling argument for them to consider altering age-old “truths” regardless of how entwined with a destructive worldview they might have become. Those who advocate radical change tend, like in the Protestant Reformation, to break off, rather than influence the primary group to change.

However, religious and spiritual leaders as individuals could be the point of conversion and transformation. Theologian Bernard Lonergan (1972) describes conversion as an ongoing act of self-transcendence from a less authentic to a more authentic self in three areas: intellectual understandings, moral development, and religious orientation. Intellectual conversion involves going beyond the habits of thought which have been our personal horizon to a larger and more accurate understanding of reality. Moral conversion consists of coming to new moral perspectives and acting on them. Religious conversion entails

perceiving and orienting toward a larger spiritual truth (pp. 238–243).

Conversion is needed in all three areas if we are to come to beliefs and behaviors that are aligned with cosmos-building powers. In Lonergan's understanding, the order is reversed: conversion to a larger spiritual truth involves becoming emotional connected, which then leads to acting on larger moral perspectives, which finally urges conversion to more authentic intellectual truths.

If individual religious and spiritual leaders,¹⁰ sensitive to the hungers and needs of the believers they serve, underwent these three conversions, I believe that it would have a transformative effect on the attitudes and understandings of those they serve. For intellectual conversion, religious leaders need clear thinking about the ways in which western cultural values have become entwined with their own religious beliefs. It would help to offer a more Earth-friendly theological foundation to their believers, one which specifically addresses the pathologies of western culture and provides a more inspiring vision of human-Earth relations. A cosmology based on the cosmogenetic principles can provide the scientific foundation for such an Earth-friendly theology and for disengaging Christian doctrines and traditions from our current destructive cultural beliefs and behaviors.

We can find theologians and scholars who are addressing the entanglement of Christian and western cultural values, notably Sallie McFague (1997), Jay McDaniel (1995), Ivone Gebara (1999), Tu Weiming (1996),

¹⁰ I use the phrase *religious and spiritual leaders* to include lay spiritual directors, religious education teachers, and others who provide spiritual guidance on personal and group levels, not just ordained ministers.

Catherine Keller (2008), Carolyn Merchant (2004), Charlene Spretnak (1997), Leonardo Boff (1997), and John Grim and Mary Evelyn Tucker (2014).

However, a knowledge gap exists between the work of these theologians and the understanding of those who minister directly to the people in services and preaching. People need to hear clear teaching that helps them make daily practical decisions. Every part of our lives is influenced by industrial growth oriented resource exploitation and consumption which is supported by a Christian belief that the wealth and resources of this country are signs of God's favor (Ritzer, 2005, p. 250). Together with other cultural assumptions like, Manifest Destiny, that blend religious, political and economic beliefs, these convictions form a web of deeply held assumptions that work against changes that would entail limits. Why should people respect the natural world and treat it frugally when abundance is a sign of God's affirmation of who we are and what we are doing (Weiming, 1994)?

If contemporary scientific cosmology were to be integrated into religious rituals, preaching, and ministries, the new understanding would have the capacity to affect believers on deep levels, both intellectually and emotionally. As anthropologist Roy Rappaport (2000) explains, "that which is learned in ritual may . . . override, displace or radically transform understandings, habits, and even elements of personality and character laid down in early childhood" (p. 390).

With the powerful tool of ritual at their disposal, religious leaders could be central to the conversion of large areas of society to a more sacred regard for our common home (Pope Francis, 2015).

In order to help their believers integrate Earth-friendly attitudes and behaviors, religious and spiritual leaders may look for guidance to the works of theologians who are probing contemporary science for religious and spiritual meaning. Notable among these are Michael Morwood (1997), Denis Edwards (1999), Diarmuid O’Murchu (1998), John Haught (2000), Paul Collins (2008), and the contributors to the Harvard Press volume, *Christianity and Ecology* (Hessel & Ruether, 2000). The most pastoral writings (those that are directed towards believers with little or no theological experience) are being presented by Sallie McFague (1997), Jay McDaniel (1995), Michael Morwood (1997), and Ilia Delio (2013).

There is enough information available for religious and spiritual leaders to recognize, with reflection, the spiritual implications of these scientific discoveries and the potential they represent for addressing our challenging ethical issues as well as general religious disaffection. People are hungering for guidance in negotiating the challenges they feel to their traditional beliefs about the source of the universe, creation itself, and the place of humans within it. As we deepen our awareness about the beauty and complexity of the universe, we are simultaneously discovering the role the human community is playing in unraveling the fabric of that part of the universe on which we depend. Both of these insights are about the sacred: we welcome the sacred by expanding our insights into the revelations of our mysterious universe and we accept responsibility for our sacrilege against what we should have been treating as sacred. We need religious leaders to provide leadership as we face both these

evolutions in thinking and to clarify the place of each tradition within this new view of the universe. If religious leaders are to fulfill their potential as guides to new values, ethics, and behavior, they will need to take seriously both our deepening reverence for and our desecration of our world. With prayer and reflection, they can provide their believers with rituals that embody the insights and convictions that lead to transformed behavior. Praying over the revelations of the universe reinstates the Christian recognition and experience of the two scriptures upheld by Thomas Aquinas, that creation is the primary revelation of the divine (Rohr, 2015), and emphasized by Thomas Berry (1999), that the “most profound mode of experiencing the divine [is] in the immediacy of life” (p. 75).

In addition to intellectual conversion, if religious and spiritual leaders were to experience moral conversion, they could provide insight into what changed conduct is called for when we untangle the consumer capitalist, empire-oriented, human-centered culture from authentic religious and spiritual traditions. Their transformed behavior could provide a clear and coherent witness to alignment with the sacred order of the universe. They could also help their believers to integrate behaviors more aligned with those aspects of contemporary scientific cosmology that provide the most potential for regaining a sense of a sacred creation,¹¹ in harmony with the evolutionary work of a communion-of-differentiated-identities-in-dynamic-interaction.

Finally, with regard to religious or spiritual conversion, there is much in contemporary science to help us understand ourselves as part of a sacred creation

¹¹ *Sacred* is understood as deserving of respect because of its association with a source greater than ourselves.

living in harmony with the evolutionary work of an active Creator. To integrate these insights would effectively reinstate the concept of Earth as sacred in both a religious and an etymological sense. By understanding evolution as the on-going creative activity of God, we liberate ourselves from our human-centered focus and from the belief that nature is fallen and needs to be subdued, and understand the evolutionary aspect of suffering. If God is active in this on-going creative action, it is a sacred activity and we no longer need to separate ourselves from it but to embrace it. Etymologically, the word *sacred* connotes something that is the provenance of “the gods” (something greater than ourselves) and whose complexity is beyond our ultimate grasp. If we adopt the attitude that Earth’s processes are sacred, we might limit our interference with natural systems and only approach them with offerings and praise, and with careful monitoring of the effects of our actions on the other beings within the system. Adopting the language of the sacred could help us live into our role as a conscious part of the Earth and its dream for itself, guided by its psychic energies towards fulfillment (Berry, 2000, p. 44).

An additional insight, derived from the work of anthropologist Roy Rappaport (2000), provides support for movement in this direction. Rappaport’s work demonstrates that our cultural ancestors had long believed in the importance of human participation to complete the sacred order of the universe. Recognition, acceptance and conformity to what they understood as the “true, moral, eternal, harmonious, encompassing unitary order” was a central tenet of the ancient Egyptians (Ma’at), ancient Greeks (Logos), Zoroastrians (Asha), ancient

Iranian/Indians (Rta), and Mexicans (Nelli), as well as contemporary Sioux (Wakan-Tanka) and Navajo (Hozho) (p. 363). The rituals they performed consisted of (a) recitations or readings on some aspect of this unitary order, (b) the giving of praise, (c) the acceptance of obligations connected to this order, and (d) the making of commitments, all of which were intended to align the individual with the order of the universe. The rituals were the way to restore and maintain the sacred order, and conformity to the sacred order gave nourishment to the gods. Rappaport uses these insights to ground his thesis that we, in the late modern world, need a new religion compatible with contemporary scientific laws, because these traditions oriented toward maintenance of the order of the universe have been central to the making of our humanity, and would give us a firmer foundation on which to base our decisions (p. xv).

Religious and spiritual leaders who lead through transformed personal behavior are a third important aspect of the conversion of human community into a vibrant part of the Earth community. Understanding the connection between our religious doctrines and ecological destruction, adopting more appropriate beliefs about the sacred, and integrating these into our daily behavior is spiritual work, and, in such a sacred undertaking, we should expect religious and spiritual leaders to lead in both word and action. As moderns, we are accustomed, even addicted, to convenience, efficiency, comfort, immediate gratification, and other such psychological rewards. No matter how convinced we are about the need to change our behavior, we must still face the fact that we are embedded in the

luxuries of a modern lifestyle. We rage against any limitations on our freedom (Berry, 1999, p. 67).

Addressing our embeddedness calls for deep spiritual realignment for all of us, especially religious and spiritual leaders. Merely admitting that religious institutions share some of the most harmful values of the dominant worldview (patriarchy, anthropocentrism, the ideology of election) or even acknowledging how they profit from the perpetuation of these values is not enough. Distrust of leaders, political, economic, as well as spiritual, is too deep to be mitigated by words alone. There is a need for leveling of excessive differences, for leadership to relinquish privileges, including privileged behaviors. In examining the connection between sanctity and authority, Rappaport (2000) notes that “in technologically simple societies authority is contingent upon sanctification,” which is measured as the extent to which the leader excels at the most sacred directives of that society (p. 446). For example, a Polynesian chief was given broad prerogatives as the result of his “high degree of sanctity” (p. 446)—generosity, attentiveness to the need of all the people, and maintenance of peace in the community—not because of the force of his control.

Although Rappaport (2000) attributes this phenomenon to technologically simple societies, it is evident in technologically complex societies also. For example, when the Vatican censured the Leadership Conference of Women Religious in 2010 and 2011, Vatican officials found their authority being called into question because they had failed to get their own house in order. Our collective reaction to hypocrisy is strong; we demand coherence between the

words and deeds of leaders, no less than from followers. So, for the cultural transformation called for by these abuses to occur, and for them to be deep and pervasive throughout human society, religious and spiritual leaders must commit themselves to an intellectual, moral and religious conversion that models changed behavior for their believers and all of us. It was the lifestyle of Mahatma Gandhi, as much as his teachings on non-violence, which inspired his followers and achieved his successes.

If our leaders cling to privilege, they have no basis for asking regular people to let go of their comforts either. The most compelling way human communities have embraced new beliefs and behaviors has been when the changes were made tangible in religious practices and modeled for them by spiritual leaders (Armstrong, 2007, p. xviii). Because “rituals, customs, and liturgical expressions speak to the heart in a profound way that cognitive knowledge cannot,” we need to engage these assets to help bring about the profound conversion necessary (Gardner, 2010, p. 27).

The Potential of Vowed Religious as Agents of Transformation

Vowed religious women and men who have been influenced by the work of Teilhard de Chardin (2003), Berry (1988), and Swimme (Swimme & Berry, 1992) are in the perfect position to take on this modeling and guidance role. They are already familiar with and committed to the new universe story. They are already moving toward greater coherence, authenticity, and ecological awareness and responsibility (LaChance & Carroll, 1994; Taylor, 2007).

With 30 to 40 years experience of working for social justice and peace, women religious in the United States were in an ideal position to see how ecological degradation affected the poor and marginalized most immediately. (Congregational Chapter, 2007). Their congregations are making connections between ecological justice, sustainability, and food sovereignty, and calling their members to take on the challenge of living on a planet in peril. Congregations with land and small farms have begun organic farms, Community Supported Agriculture (CSAs). Others have put their land into land trusts. Congregational centers, and the colleges, hospitals, and retreat centers they sponsor, have had energy audits, are switching to organic gardening and grounds care, restoring ponds and wet lands, and declaring their property sacred space for the use of all their neighbors (Taylor, 2007, pp. 1–2).

Updating their ministries and their relationship with their material resources in light of ecological needs has been accompanied by deeper questioning. Vowed women and men religious have asked themselves what difference a new understanding of the universe makes to their traditions, ministries, and lifestyles. Some are lecturing and writing on how information from contemporary science and concern for our environmental and social crises has the potential for deepening traditional understandings as well as calling us to deeper transformations. This dissertation is another effort within this lineage.

The conversion and renewal to which these women religious are calling themselves is a challenge to other religious and spiritual leaders to align their actions with the sacred cosmos-building principles of the universe. Spiritual and

religious leaders are the traditional teachers of spiritual practices and processes of conversion. We need their experience of teaching through sacred practice and ritual if we are to make the transitions that we, as a human community, need to make. Religious and spiritual leaders must be a part of the deep conversion called for, or their silence may be viewed as non-support, and, as such, they will be a force against the necessary change.

Because of the integrity of the women who went before them, the women religious of today have inherited a reputation and authority that they may not fully realize—nor fully use. I am not speaking about the respect of adults who went through Catholic school and who may defer out of conditioning. I am talking about a reputation for trustworthiness and integrity that seems to be found in the general public. In some unexpected circles, many Catholics and non-Catholics alike value what women religious say, and take seriously what they suggest. It is a power to be carefully considered.

Carol Zinn, SSJ, (personal communication, November 9, 2015) NGO representative for the Congregations of St. Joseph at the United Nations from 2001 to 2008, tells two stories that illustrate how women religious are regarded in the international community: When the Sisters of St. Joseph petitioned for general consultative status on the UN Economic and Social Council,¹² they needed to

¹² The United Nations Economic and Social Council (1999) states, “Organizations that are concerned with most of the activities of the Council and its subsidiary bodies and can demonstrate to the satisfaction of the Council that they have substantive and sustained contributions to make to the achievement of the objectives of the United Nations in fields set out in paragraph 1 above, and are closely involved with the economic and social life of the peoples of the areas they represent and whose membership, which should be considerable, is broadly representative of major segments of society in a large number of countries in different regions of the world shall be known as organizations in general consultative status” (para. 22).

prove that the Congregations of St. Joseph should have a ranking that would allow them to speak on all issues. It was the French Ambassador at the hearing who made the most powerful argument in **her** defense. Zinn relates that he stated that he knew of the Sisters of St Joseph as their Congregation was founded in his country; he was familiar with the good works they had done and continue to do, and that they should be given general consultative status. Note that this status is only given to groups who are acknowledged to have a breadth of expertise and whose expert advice will be valuable to the council. The French ambassador's testimony indicated his trust in the authority with which a Sister of St. Joseph speaks.

Zinn (Personal communication, November 9, 2015) tells the story of another UN representative speaking on behalf of women religious. This individual contrasted women religious in general with transnational corporations. He explained that although, like the corporations, women religious operate all over the world, they differ in that they are in the hard places, have been there for a very long time, do not leave when the going gets tough, do a lot with a little, and always come to the table with interests not their own. These perceived characteristics of women religious provide a type of social capital, or reputation for credibility, that few groups enjoy. It is also a responsibility. In addition to engendering trust in the people served, this social capital gives authority to public statements and actions and may translate into the ability to influence decisions and change people's thinking.

During this time of global crisis, when the credibility of political and economic leadership has eroded, women religious are in an influential position gained through their foremothers and present-day members whose daily lives continue to address the world's most challenging social and ecological issues. Women religious are among those most likely to understand the full dimensions of the crisis of our times and to advocate for a vision that will bring us into a sustainable future. With the authority that their experience gives them, they are in a distinctive position to model right relationships with Earth and its community of beings, and have that modeling bear fruit in the human community.

Leadership in the Shamanic Tradition

Is the leadership of vowed women or men religious different from what we recognize as traditional church leadership? I find the most insightful answer to this question in the claim of Diarmuid O'Murchu (1991) that religious life falls within the liminality of the shamanic tradition.¹³ There are three significant points of similarity between the two traditions that challenge the vowed religious of today to go deeper into this particular style of ministry.

First, both traditions share a similar place within the human community, a liminal or edge space made up of values and practices that make them both of this world and not of this world. Liminality itself suggests a prophetic lifestyle, lived at the edge of a society, calling the people to recover the values they cherish. The liminal lifestyle is one which engages a person in the reality of what is, while

¹³ Liminality refers to beings not easily categorized, existing on the edge or threshold of two states or groups. I refer to the *shamanic tradition* rather than *shamanism* to highlight the healing and rebalancing aspects of a shaman's life which I see as applicable to other religious leaders.

encouraging the community to greater integrity and responsiveness. In contrast to the classical priestly role which focuses on mediating the human/divine relationship, shamans focus on healthy interaction of the human community with the rest of the natural world and, through her contact with the spirit world, balances what might be out of kilter between the two communities. By grounding themselves in the shamanistic tradition vowed religious are challenged to see their personal spiritual practices as an essential ministry to a world in crisis, rebalancing within themselves first what might be out of balance between the human and Earth communities.

Second, both traditions take their nourishment and direction from altered states of consciousness. The shamanic journey into the “underworld” is undertaken to identify the source of illness or imbalance in an individual or community and heal it. Roger Walsh (2007) notes that shamans use their altered states of consciousness “for acquiring knowledge or power or for helping the people in their community” (p. 15). While not journeying in the same type of altered state, vowed religious similarly undertake practices of prayer and contemplation to deepen their commitment to the values and ministries of their tradition, to know and address the social conditions of their times (Pope Paul VI, 1965), and commit themselves to healing injustice and inequality. As vowed religious reincorporate a sense of living within the sacred order of the universe, deepen their understanding of what this means, and commit themselves to fostering its thriving, times of prayer can take on a different focus. Through communion with the sacred order of the universe during contemplation, vowed

religious can hear the cry of the Earth community, tap into its wisdom, and align themselves with it. While the traditions of vowed religious life and of shamans both emphasize personal spiritual work as a key to this healing role, the model of the shaman adds the dimension of healing the imbalance first within the shaman herself.

Third, both traditions emphasize the importance of modeling ideal behavior; however, there are significant differences between them. The vows that most religious take,¹⁴ referred to as the evangelical counsels or counsels of perfection, have been historically understood to be what Christians must do beyond the normal in order to “be perfect,” the embodiment of which was generally not deemed to be possible for most humans. The concept of perfection that traditional religious vows were erroneously said to embody is based on two of the anti-ecological aspects of Christianity that Boff (1979) names: the belief that nature is fallen, and that some groups are set apart by their unique relationship with the divine. Despite being refuted by the Second Vatican Council, this erroneous understanding of religious vows modeling extraordinary human behavior continues today, undermining the idea of following the lifestyle examples of vowed persons.

The shaman, on the other hand, lives the values that the whole society needs for its evolution, particularly values which balance whatever is out of balance between the human and Earth communities (O’Murchu, 1991, p 37). The

¹⁴ Vowed religious in institutes founded after St. Francis of Assisi generally take vows of poverty, celibacy, and obedience. Other institutes take a different combination of vows which may include vows of conversion or of stability.

expectation is that these are doable for all humans, and even necessary. By embodying the values that everyone needs to adopt in order to be in right relationship, the shaman is a prophetic but practical model of commitment to the order of the universe. If vowed religious understood their vows in a similar light, as values central for all people to practice in order to align with the divine order,¹⁵ their vowed witness could move the human community closer to harmony with that divine order. This understanding would also help clarify the contradictions inherent in the concept of vowed religious as “lay persons set apart by their vows” which has tended to associate them with the clerical state. The key difference signaled by the vowed state would be the choice of a liminal state, a type of “first responders” to our combined ecological, social and spiritual crises, people committed to living in right relationship with the divine order on a sacred Earth.

Regardless of whether vowed religious undertake to shift their understanding of their vowed life in this way, there remains a need for religious and spiritual leaders to provide leadership in living within the order of a sacred universe, both by modeling the values and behaviors the whole society needs to embrace and by seeking within themselves a spiritual balance between the human community and the larger Earth community. The shamanic lifestyle witnesses to how this is done by its own embodiment of the cosmogenetic principles. It models communion in the way it connects the health of the human community with its larger environmental context, and connects personal illness/health with communal illness/health, healing the individual in order to rebalance the human

¹⁵ See Chapter Three: Communion, on divine order as imitating the dynamics of the divine.

community with its larger context. The lifestyle of the shaman embodies the principles of identity and difference in its emphasis on developing unique powers, gifts, and skills in order to benefit the whole Earth community. By integrating the insights of the shamanic tradition with the lifestyle suggested by the cosmogenetic principles, religious and spiritual leaders may become not only carriers of a message needed for our times, but also the points at which transformation occurs. By grounding their lifestyle in the liminality of the shamanic tradition, these leaders root themselves in an ancient tradition of healing a people through healing their relationship with the more-than-human world (O'Murchu, 1991, p. 34). These aspects of the liminal tradition provide a vision that goes beyond an environmental goal of sustainability to modeling a changed relationship between human society and the Earth community.

Summary

Society expects religions to give leadership in contemporary ethical issues, and to promote the changes of attitudes, values, and ways of living necessary to live within a divine order. Yet, bearing the weight of their traditions, institutionalized religions will be slow to change. On the other hand, individual religious and spiritual leaders can move much more quickly and, directed by the spiritual hunger and need of a people embedded in a death-dealing culture, they can model and guide the changes all will need to make eventually. By addressing modern industrial culture's destructive values and behaviors as well as their own embeddedness in it, religious leaders can provide the clarity their believers need to disentangle their thinking from the destructive assumptions of our society. By

opening themselves to the revelatory and liberating insights of contemporary science on the cosmogenetic principles and by transforming their behavior in accordance with the sacred order of the universe, religious and spiritual leaders can model what a healthy lifestyle on this sacred planet looks like.

A small handful of spiritual leaders, influenced by the work of Thomas Berry and Brian Swimme (1992), are already seeking to remodel their lives on the new cosmology (LaChance & Carroll, 1994; Taylor, 2007). In light of the Shamanic tradition, their spiritual commitment to living according to the cosmogenetic principles could help balance and heal the human-Earth relationship, and their behavior could model the lifestyle that people in the United States need to adopt. In the next chapter we will explore what this group, influenced by viewing their religious vows in a cosmogenetic context, might do to model a new worldview.

CHAPTER 5: LIVING THE VALUES THAT WE NEED TO SURVIVE

I first began thinking about the ideas in this chapter when I was asked to address, for a vow symposium in 1999, how the emerging new story of the universe challenged the living of religious vows. Inspired by my Congregation's question about the implications of our commitment for the people of God (Carondelet, 1997), and by O'Murchu's (1991) idea of religious life in the shamanic tradition, I focused on what was out of balance between the human community and the rest of the Earth community, and suggested that the vows could address these imbalances if they were influenced by the cosmogenetic principles. At that time I concentrated on how each of the vows could be deepened by being lived in the context of one of the principles.

Because the material was so dense, and because the ideas were obviously only the beginning of a search for coherence, I distributed my notes freely to those who asked, hoping that others could continue to reflect on the connections we could make between religious vows and contemporary science.

Then, in the summer of 2003, the Sisters of Providence at St. Mary of the Woods, Indiana, asked me to go further in my thinking to address the new universe story, religious vows, and justice. They had studied and discussed the notes I had distributed, and asked that I now speak to whether the vows could effect, or bring about, justice. Their request indicated the seriousness with which some religious women take the new universe story and their desire to find coherence between this story, their vowed life, and their ministerial goals. With them I reflected on how each of the cosmogenetic principles challenges each of

the vows to be lived in such a way as to bring about right relationship with the material world, other humans, and the divine.

Since that time I have only become more convinced that if religious vows are lived in a cosmogenetic manner, they would model living beyond anthropocentrism, attempts to control difference, and dualisms, especially of human and nature, and sacred and profane—the attitudes that are at the root of so much of our destructive behavior as a society. If religious vows modeled respect for all beings (identity), hospitality to difference (differentiation), and interdependence (communion) they would demonstrate the values that this society needs to change if it is to become a vibrant member of the Earth community.

The Importance of Our God Image

Vowed commitment is one way to connect everyday behavior with belief. Religious vows are inspired by a particular image of the divine and commit one to embody that particular divine ideal in deeds. For Christians, the divine ideal is most often the life and ministry of Jesus and the focus of the ministry of vowed religious is to continue his mission on Earth. It is this desire to continue Jesus's mission that has made them most visible in ministries with people who are poor, disadvantaged, or oppressed.

One of the images of the divine currently gaining popularity among vowed religious women is the image of God as Creator, inspiring them to broaden their ministries and concerns to include the whole Earth community. Congregational Chapters are calling their members to put respect for creation into daily practice by simplifying their lifestyles “through specific measurable actions regarding

water, climate change, food, consumption, and waste” (Sisters of St. Joseph of Carondelet, 2013, p. 6). They are challenging themselves to change their personal habits and behaviors, “adopting new policies and guidelines for institutions, and advocating with corporations and government leaders to reverence Earth and sustain life” (Sisters of Mercy, 2014, para. 1). They are committing themselves to become conscious of their own harmful practices and “choose to live in ways that will respectfully and compassionately connect us with all God’s creation” (Dowling, 2012, p. 1). These declarations reflect a growing ecological awareness and commitment to live in a way that respects God’s creation. What would a cosmogenetic awareness and spirituality look like?

When, at the end of Chapter Three, I offered the cosmogenetic principles as the foundation of an alternative worldview, I proposed that the image of the divine suggested by a cosmogenetic lens is similar to the Christian image of Trinity. What the cosmogenetic principles might offer is a glimpse of the internal dynamics of Trinity and a hint of how that divine activity is connected to the act of on-going creation.

The understanding of Trinity as three distinct identities in one God, held by theologians such as Karl Rahner (1986), Denis Edwards (1999), Paul Collins (2008), Elizabeth Johnson (2007), and Beatrice Bruteau (1997), includes the three elements of identity, differentiation, and communion: there are three distinct identities with distinct differences joined in communion. The cosmogenetic principles make available a way of thinking about the three-in-one that usually confounds rationality. For example, while the idea of three-and-one is

challenging to the rational mind, three-and-one is common in an ecosystem where identity, differentiation, and communion must be present and work together to build stable sustainable structures. The fact that an ecosystem is generative when identity, differentiation, and communion are in dynamic relationship suggests how the dynamic relationships among the Trinity give birth to creation.

In traditional interpretations of Trinity, the three “persons”¹⁶ are explain as a progression, with the Creator as first actor, the Son or created expression as the second actor, with the Spirit created third. The first two are often explained as in binary “opposition,” with the third person produced from the love between them, or bringing balance between them. Such explanations raise questions about true equality, since to be equal, all must be both actor and acted upon. If one Trinitarian person is described as coming before and producing the others, an immediate hierarchy of importance is implied, regardless of insisting that the three persons are equal.

In our experience of natural systems, the progression we find is from unity to diversity, rather than from one identity to the next. Contemporary science describes our cosmic origins as a singularity (the one) flaring forth into many forces then elements then galaxies, stars, planets, and life. Unity is the matrix which centrates or coalesces into identities which become more and more distinct. A Trinity understood through this lens does not need a progression to produce three distinct identities—they could emerge simultaneously. In this cosmos-building paradigm a third person is not contingent on the other identities, but

¹⁶ “Persons” is a contested term for the three in the Trinity although in common usage.

equal with them in being contingent on the relationship between them, that is, on the first communion.

Trinity seen through the lens of cosmogenesis supports the centrality of communion, even as it lifts up, in a way that traditional interpretations do not, the values of identity, and on-going differentiation as equally important to the divine dynamic. Maintaining these three elements in ever-changing interaction is the work of the God who gives birth to creation.

Can we fall in love with this vision of the divine and its way of being? To what actions would we be inspired if we adopted the values of a God who creates in this way? If one were committed to the identity-differentiation-communion dynamic in imitation of the Mystery at the heart of creation, how would one be inspired to live? What would a person's daily actions look like? And, would the living of this commitment lead to renewal of the Earth community?

With the cosmogenetic principles as guidance, this chapter will explore how religious vows might look if they were focused on replicating the divine dynamics at work from within the material and nonmaterial dimensions of reality. I will briefly note how an understanding of the meaning and practice of religious vows has been evolving, examine some contemporary suggestions for living vows in harmony with a re-sacralized view of the natural world, and suggest that vows lived in a cosmogenetic context might be the next step in their evolution. These suggestions are in no way a complete system, but rather are offered for exploration by those with religious vows: might aligning with the divine dynamic at work from within creation. This section might best be understood as a request

for dialogue about the growing edge of religious vows as witness to behaviors that all of us in the United State need to adopt in order to thrive as a vibrant part of the Earth community.

Witnessing to the Sacred Dimension of Matter: Rethinking Poverty

As our sense of an ecological spirituality has grown in the last 60 or so years, vowed religious writers have addressed themselves to the challenges that this new perspective addresses to the living of religious vows. The vow of poverty has been influenced historically by societal assumptions of a radical split between what was sacred and what was profane, by a conceptual split between spiritual and material dimensions of matter, and since the Enlightenment, a disenchanted world. Vowed religious were encouraged to view personal ownership of material things as a distraction from the spiritual world, and were, therefore, protected from this danger by holding in common with emphasis on simplicity and frugality.

The new universe story and a growing sense of living in a sacred world have provided a new context and perspective on what it means to live a dedicated life. The threat of environmental and social degradation has spurred Diarmuid O'Murchu (2005) to connect the vow of poverty to justice making and collaboration, suggesting that the vow be a vow for mutual sustainability (p. 210). In her reflections, Elaine Prevallet (1995), SL, sets her discussion of poverty within the context of the cosmic law of reciprocity, suggesting a vow of community of goods that would both recall us to the truth of our existence and commit us to live this reality "intentionally and purposefully" (p. 33). Similarly,

when Maureen Wild, SC, declared her vow of poverty, she set her simple living within the limits of the Earth-life process (Taylor, 2007, p. 64). Miriam Therese MacGillis (n.d.), OP, advocates a “that kind of simplicity, that kind of clarity and depth of relationship within the community of the whole in order to be able to reduce our dependence on consumption” (tape 3, p. 23) and take a “positive stance of mutuality with the community of life” (tape 3, p. 24).

Each of these contemporary treatments of poverty expands the traditional horizon of the vow from simplicity and sharing within a particular, immediate community to the wider context of the larger Earth community, an important step. However, they also have in common the assumption that the vow of poverty is primarily focused on our use of things. I would like to see a vow that commits to changed attitudes toward all we encounter in the material world, that witnesses to alternatives to anthropocentrism, dualism, and dedifferentiation.

I believe that a fuller understanding of the cosmos-building principles will push us to the radical actions that our society needs to see modeled: to be converted (a) from illusions of human superiority to respect for the identity and contribution of each entity, (b) from overvaluations of sameness to acknowledgement of the importance of differentiation, (c) and from belief in separation and independence to acceptance of radical interdependence. These spiritual, moral, and intellectual conversions to a divine order characterized by identity, differentiation, and communion suggest that the understandings and living of religious vows also change.

Commitment to identity, differentiation, and communion will ask us to move from careful stewardship of Earth to actual partnering with Earth's dynamics and processes. It will urge us not only to be careful in our use and sharing of material things but also to honor the identity and uniqueness of each entity, striving for relationships that are mutual. It will challenge us to deepen the commitment of body, mind, and spirit to the divine, as well as to undertake spiritual practices that are specific to our particular resistances and addictions. These actions do not transcend what went before, but urge us to align our vowed practice with new perceptions of our world, its needs, and the divine action that sustains it.

Poverty in a Cosmogenetic Context

The subject matter of the vow of poverty has evolved from referring to the things that a vowed person or the community uses to include care for all material things, whether within one's particular sphere or not. A cosmogenetic understanding goes a step further, urging us to commit to mutually-enhancing relationships with all material things, including other humans.

First, by calling us to acknowledge the interior of every being, the principle of identity requires that we acknowledge the interior dimension of every entity, and respect the intrinsic value of each. A vowed person guided by identity would forgo interactions that treat other things or persons as objects and forgo judgments based on usefulness to her. She would treat everything—material things and people—as subjects with their own value. She would honor the right

of each entity to its fulfillment, to its place in the larger community, and to have its limits respected.

Second, if living according to the value of differentiation, a vowed person would treat difference as if it was essential to the optimal functioning of the whole and adopt behaviors that would enhance the ability of entities to continue differentiating. A person committed to valuing differentiation would release hierarchies of value that privilege humans.

Third, if one lived according to the value of communion, her vowed behavior would affirm radical interdependence through actions that advanced the optimal functioning of the interdependent Earth community, that justly negotiated competing rights, and that took responsibility for the effects of her actions on all others within the system.

In the following, I expand on each of these.

The challenge of identity.

Honoring the identity of things and people requires active attention to their interior, hidden dimension, to their self-organizing ability, their interactions, dynamics, and capacity for self-manifestation. If we are to embody this aspect of cosmos-building, our task is to look for ways to recognize the subjective nature of every entity and to demonstrate recognition and respect beyond the norm in an extractive, consumer culture.

Since subjects are ones who act independently in response to their environment, we support their identity by observing and respecting their interactions as indicative of their choices and preferences. Brian Swimme

(personal communication, November 9, 2015) recounts asking Jane Goodall about the cosmology of chimpanzees. She responded with a story in which the chimpanzees she was traveling began to exhibit more and more excited behavior as they traveled. She began to hear the roar of water, and when they reached a waterfall the chimpanzees responded by doing back flips. Their behavior indicated their relationship with this place, that it was important to them and a cause for celebration.

Acknowledging subjectivity also involves recognizing that a subject or actor has intrinsic value. Acknowledging this precludes defining something only in terms of its usefulness to another, as resources for humans, for example. This point presents a dilemma for us if we continue to consider our value to be higher than that of the Earth on which we depend. If, on the other hand, we acknowledge both our dependence and the value of that on which we depend, we grant authority and independent value to each entity. It is actors who are capable of communicating the value they place on a waterfall by doing back flips.

A third aspect of recognizing the subjectivity of a being includes accepting that it has a right to the conditions which will allow its fulfillment. For the land, this translates into the right to retain the features, composition, and flow of energy that support its unique ecosystem and to be free of interruption, disruption, and destruction of its character.¹⁷ In action this would include protecting the needs of living beings for habitat and their preferred communities, as well as for food and

¹⁷ Although there is danger in rights language because of its dualistic premise, at this writing there is no other effective way to protect the needs of the more-than-human world within our legal system.

water which retain their life-giving properties. By using only cleaning products that are biodegradable, or by only buying food grow organically, we protect the needs of our ecosystems for clear flow of energy in the systems on which we depend. We honor the need of all to thrive.

When identity becomes a moral standard, vowed behavior attends to the interior of every entity and makes radical choices in order to support the integrity of each being. Most behaviors recommended by the desire to live sustainability, to conserve wildness, and celebrate Earth's wonders, would be included in this vowed practice, but the motivation is to honor the value and potential of each identity. It may be more radical (in the sense of being rooted in this principle) because it attends to everything, the things we use, the people we meet, and even the stuff of one's daily life—the chairs, table, blankets, and iPad that may be constant companions. Sensitive to the hidden dimensions of all things and to the cost of everything to the planet of everything, we live so as to enhance the ability of each to make its unique gift to the whole. Vowed practice seeks to honor the creative dynamic in the long history of evolutionary changes and innovations, of collaborations and struggles, and of the push of energy hidden beneath the surface of everything. Waste is unacceptable because it fails to honor the ways in which each being is contributing to the life and productivity of the whole community.

If I become skilled at imagining the identity, history, and future of everything in my daily life, it is likely that I will fill less landfills, have a smaller lifestyle footprint, and make a positive contribution to healing and supporting the integrity of creation. This investment in the integrity, intrinsic worth, and

subjectivity of specific beings will reduce my tendency to ask material goods to satisfy my needs for stability, belonging, or worth, and encourage me to limit my demands on them.

Embracing and enhancing difference.

As an entity deepens its identity, it differentiates itself from the other beings around it. Precipitated by interactions with its environment and over time, an entity adjusts its structure, internal dynamics, and relationships for optimal functioning within that system. It negotiates a place within the community surrounding it and becomes functionally important to its lifecycles. Vowed practice to meet each entity as a subject, includes accepting and embracing these differences which are evidence of its choices and preferences in light of the larger whole of which it is a part.

Respecting difference means recognizing and honoring different the needs and limitations of each entity. By virtue of its specificity, each sovereign entity has physical, mental, and emotional limitations. It is what it is and not what we wish it to be. This means that one does not pressure water to absorb more than it is able to cleanse of impurities, nor pressure soil to relentlessly produce for us. As I deepen my respect for the sacramental dimension of everything in my world, I am more likely to realize that everything needs a Sabbath in which to re-center and renew the depths of its being. We must learn to place limits on what we ask of other beings, and learn to give back in reciprocity. We need to learn the gifts and limitations of the entities which make up the communities to which we belong.

Our difficulties with difference are often the evidence of an unconscious ranking of others according to a subjective value system which places us on the top of the hierarchy. If others are important only as they relate to us, then we can see no reason to be concerned about extinctions of species or cultures. Valuing differentiation as an essential part of the evolutionary process, on the other hand, asks us to let go of hierarchies of value that place humans, or my group of humans, at the top of all categories. We need to adopt practices that honor the place of each entity in the community, respecting each entity for itself and not as it relates to us.

We can tend to fear what is different and see the other as a threat to our values or our way of life. The Hebrew Scriptures instruct us to receive the stranger as honored guest, because that person might be a messenger from God. In light of what we have learned about Identity, this is literally the case not only with other people, but also with the other entities of our world. Each entity reveals some part of the nature of the One who made it and can reveal to us parts of ourselves that we might reject. This is not only good psychology, but is aligned with the insights of contemporary physics and biology. A good cosmogenetic practice is to attend to the differences as indications of the division of labor required for the healthy functioning of this system—in other words, to look for the value of the difference for its community.

Focusing on the essential role played by differentiation in evolution suggests that we do whatever we can to maintain and enhance differences, not modify them to produce sameness. While standardization makes control easier, it

does not honor the ways things have adapted themselves to provide for maximum flow-through of energy in its system. By welcoming, embracing, and even enhancing differences to the extent that the system can hold, we participate in the on-going building of stable systems rather than the disruption of systems.

Again, these practices are not necessarily new, but they have a different motivation and goal—that of supporting and participating in the right of each entity to control its own evolution. Differentiation is the result of the self-articulation and self-manifestation of entities in dynamic interaction with their neighbors (Swimme & Berry, 1992, p. 75). Vowed practice which honors differentiation requires that we accept differences as evidence of a certain wise relationship reached by an entity and its community. In order to do this we may need to abandon the attitudes of superiority to the rest of the natural world that falsely bolster our sense of worth and of separateness that endangers the optimal functioning of the whole community.

Honoring the communion dynamic.

Communion is the condition which provides for dynamic connections among entities to support the deepening of their identity and their on-going differentiation. When there is communion among entities, that is, where there is interdependence, a diversity of entities and relationships, and system organization, the universe can operate most creatively and resiliently. Vowed practice aligned with the condition of communion requires adopting behaviors that safeguard the interdependent relationships and interactions of our Earth community, such as protecting the organization of Earth's systems, and fostering diversity and a

variety of relationships. It also means collaborating with others in the community for these purposes, deepening relationships that exist and developing new ones.

The first challenge to living communion is accepting the reality of humans being interdependent with, rather than independent of, the other members of the Earth community. Interdependence means acknowledging that our survival depends upon a host of others are dependent upon us. It means knowing who those others are and acting to so as to protect the health and thriving of all within the web of connections. It involves knowing how my choices of food, clothing, shelter, and energy use affect water and air pollution, climate disruption, disruption of food chains, migratory and reproductive cycles, and taking responsibility for them. Taking interdependence seriously means knowing whose labor supports my survival and ensuring that that they do not suffer by the relationship but are mutually enhanced.

Interdependence requires that we know our place within the Earth community and take only what we need in nourishment, water, shelter, and habitat. It involves convincing ourselves that what we do matters and affects an almost limitless number of other living and non-living beings. We need to become skilled at following the links in the processes that contribute to our survival, that bring us the food we eat, the clothes we wear, and the energy we use. Where did the material come from? Is the land around it being protected and restored? Who worked on it? Are they paid a living wage, working decent hours, in healthy conditions? What of Earth's scarce resources are used to bring the product to you?

Vowed practice that recognizes the reality of interdependence lets go of false perception of independence and the superiority of the human, and lives in reciprocity with all those in our web of support.

Second, commitment to the value of communion suggests that we learn protect the organization of Earth's systems, information that the sciences of ecology, chaos, and complexity is making available to us. We need to learn how to share and protect the commons—those things like air, water, soil, whose quality is affected by many actors (my transportation, food, clothing, and home heating choices, as well as those of industry and commerce). If each of the entities in the system to which I belong has the right to the conditions which contribute to its fulfillment, how do I balance and negotiate between our competing needs?

An honest appraisal of what humans use and consume reveals that we can make fewer demands and still thrive. As individuals and as a society, we need to be unafraid to evaluate and adjust the stresses that we put on Earth's life-support systems toward more sustainable and efficient ways of moving energy. Earth literacy can help us become aware of the ways that water and air move most effectively through a system so that we can safeguard it. It can help us understand the cost of disrupting the complex webs of cause and effect in an area, its natural food systems, and the synchronized timing of migration and reproduction cycles and encourage us to make alternative choices. Being literate about how our planet is organized is essential to creating protections from our over-use and restoring systems to optimal functioning.

Third, valuing communion means fostering the diversity and variety of relationships that are essential to the optimal functioning of any community. We align with this reality by making space on all levels of our lives for a multiplicity of relationships with a variety of people and beings. We have already spoken of the value of diversity in the previous section. The point here is to recognize its place in the healthy functioning of the whole. For the flow of energy to be coordinated and maximized, our community needs every entity to fully flourish.

If we are to honor diversity as part of the challenge of communion, we will learn to fairly negotiate the rights of all the entities who are in communion. By this I mean recognizing that the health of the whole on which all depend must be insured first, and that all rights do not belong to the human. Vowed practice to honor communion is careful in all decision making processes, making room for the needs of all entities involved so that a healthy, functioning whole is available for all.

Fourth, valuing communion includes deepening relationships that exist within the community and developing new ones. It means being attentive to interactions and considering the rights and needs of others when seek to have our needs met. Sometimes this will mean repairing damaged systems, ecosystems, or relationships in order to support the free flow of energy throughout the system. Carolyn Merchant (2005) suggests a partnership ethic characterized by “equity between the human and nonhuman communities” (p. 84) should typify human/Earth relationships. Since this ethic recommends working toward what is

beneficial for all parties, it “has potential for resolving some [of our] difficult environmental and cultural problems” (p. 87).

Deena Metzger (1999) describes another possibility when she tells of her experience with elephants in Zimbabwe. She had long believed that “We must find ways to sit in council with animals and the natural world, with those other intelligences who are so deeply threatened by imprisonment, slavery, consumption, and extinction” (p. 14). With this intention in mind, Metzger visited Chobe National Park where there were known to be large elephant populations. She took offerings of fruit elephants are said to like. She knelt in their presence and apologized for what we do when we confine and observe a species like them. And she chanted aloud an ancient Kabbalistic chant that had been her spiritual practice for years. Her chant attracted a large bull elephant about three-quarters of a mile away who walked with clear “focused, deliberate, determined, conscious, aware intention” toward them (p. 15). When he arrived at their truck, she again spoke from her heart about what they both shared in being a holocausted people, and how she desired to form an alliance with them, “so that we can, together, accomplish something on behalf of the Earth” (p. 15). And then she was silent and listened.

Metzger (1999) continues, saying that then the elephant walked until he was about four feet from her and looked her in the eye. They stayed locked in this mutual regard for about 10 minutes, doing what she believed was *trespasso*, a meditation practice of looking into the eyes of another, attempting to be as naked as possible. He moved to another place and did this again twice more, each for

the same length of time, before he moved off. Her companions were convinced that the elephants knew she had come as an ambassador, and one said, “They sent their ambassador and you have made a covenant with each other” (p. 16).

Believing that the experience was over, Metzger (1999) and her companions set out to reach the gate before the park closed, only to be stopped by “waves upon waves of elephants” crossing the road (p. 16). As they drive slowly toward the gate, they are passing between rows of elephants lined up for about a quarter of a mile, as if for a parade. “They are bowing their heads and flapping their ears at us. And we are bowing and waving and saying, ‘Thank you. And bless you. And thank you. And bless you’” (p. 16). It was the feast of the Epiphany, she says, and “Thankfully, we had the wisdom to recognize and do *gasho* before the sacred” (p. 16).

What impresses me about Metzger’s (1999) experience is that there seem to be specific, replicable steps she took to prepare for and participate in the experience. She had a regular spiritual practice, she went with clear intention, she placed herself where an encounter could happen, she made an offering, she spoke from the heart, and then she was silent. We might look on these as steps we need to take if we are to make ourselves available for new partnerships and new alliances in our Earth community. If communion is a “matrix of interconnections between centers” (Rolston, 2012, p. 166), we will need to develop practical steps to relate center-to-center, as communion suggests.

Summary

Recalling O'Murchu's (1991) conviction that religious life is part of the shamanic tradition, and that the shaman's work is to balance what is unequal between the human community and the rest of the Earth community, what values does this society need to see modeled with regard to the material world? We might view the primary area of imbalance to be the objectification of the natural world which leads to desire to control it and make it serve human needs.

Vowed behavior which is committed to mutually-enhancing relationships directly addresses tendencies to objectify the material world by valuing every entity, encouraging its further differentiation, and holding all in communion. It is guided by a desire to align with sacred dynamics at work in the material world as an outgrowth of its devotion to the Trinity active in creation.

Seeking Guidance: Rethinking Obedience

In the previous section, we looked at how these principles challenge us to live differently with the material world. We turn now to how the cosmogenetic principles challenge us to live with the non-material world, that is, with that inner dimension of every entity which establishes its identity and organizes and maintains itself in purposeful interactions with its environment. With regard to the human, this includes those capacities which are hard to measure and control, such as intuition, imagination, morals, values, and psychic awareness.

This area may prove most challenging, given our society's ambivalence about things which cannot be quantified. We need to integrate the understanding that both the visible, material world and the invisible, spiritual world are

continually bathing us in an on-going revelation of the dream of the Source of the universe. We need our spiritual and religious leaders to liberate the concept of “God’s will” from religious wars, power struggles, and autocratic abuse of power to reintroduce it as describing the fullest unfolding of every entity and community. We need to the modeling of leaders who willingly entrust themselves to the sacred dynamics of the universe, trusting that the dream of fulfillment is hidden within these dynamics.

For vowed religious, following the will of God is of such high value that they take a vow to formalize its methods. Historically this has been practiced by following directives coming through a superior in the community. This particular understanding and practicing the vow was consistent with a view of God as Father, with a radical split between what was sacred and what profane, and with religious views suspicious of free will. For apostolic orders of religious, the structure of directives from the top imitated forms of military command that were popular at the time of their foundation, which could organize and deploy work forces to optimal effect.

In the last 50 years, the model of obedience evolved from top down authority to group discernment processes for internal and ministerial questions, and then to group discernment that listened to the cry of the poor. This evolution had less to do with growing environmental devastation than with movements in society of women questioned patriarchy and hierarchical rule, the rise of non-dual philosophies and spiritualities, and the Christian teaching that “action on behalf of justice and participation in the transformation of the world [are] a constitutive

dimension of the preaching of the Gospel” (World Synod of Catholic Bishops, 1971, p. 6). Most recently, awareness of ecological concerns among religious has prompted inclusion of the whole of creation in concerns for justice.

Contemporary efforts to rethink vows in terms of ecological spirituality are varied in emphasis, all of them offering important insights. Diarmuid O’Murchu (1991) references Adrian Van Kaam who frames the practice of obedience as an extension of an animal instinctive survival skill of listening to its environment and behaving in accordance with what it learns from this listening. (p. 145). He suggests that obedience be reformulated into a vow for receptivity to capitalize on this instinct. Elaine Prevallet, SL, places the practice of obedience in the larger ecological/social world, characterizing it as the work of cooperation and finding our proper niche as humans. She focuses on stewardship of personal power for the wellbeing of the whole (Taylor, 2007, p. 67). Miriam Therese MacGillis (n.d.) sees obedience within the context of the creative impulse of the universe with “each atom of the universe submitting in obedience to the differentiation of the other, allowing the transformation to become the next stage of creativity” (tape 4, p. 2). The vow then is “to listen to the community... to listen to life... to its cries, its needs, and then to evoke and activate creative energy in order to transform (tape 4, p. 4). Each of these authors has expanded the listen-and-obey understanding of the vow of obedience to encompass the action of a God who is speaking through all of creation.

Obedience in a Cosmogenetic Context

The insight of the cosmogenetic principles that the whole of the natural world is revelatory urges us to rethink the vow of obedience so as to align one's self with the evolutionary dynamic of the Trinity. Vowed religious desiring to live obedience in a cosmogenetic context would seek spiritual guidance from all dimensions of creation and seek to enhance their ability to hear all dimensions.

The challenge of identity.

Vowed practice of obedience that is attuned to the principle of identity would cultivate awareness of the psychic dimension of individual entities through a traditional practice such as contemplation which does not impose anything on the subject being contemplated, but which is open to its unique communication. The Buddhist practice of benevolent glancing is such a practice. It is a way of respecting another for whom and what they are, with all their brilliance, flaws, and sorrows. We are seeking mutually enhancing spiritual relations as well as physical relations. To do that we need to see the other in ways we have not before.

Cosmogenetic obedience would cultivate an awareness of how important it is to this being that we respect its identity, difference, and place within the community so that it may continue its development. In order to be open to the wisdom of each, it would entail encouraging that the voice of every entity be heard, requiring one to wait, listen, and be with that being or person. For some humans it would include making regular time and space for their own insights to arise.

Vowed practice honoring identity assumes that each subject can be communed with and learned from. The experience of intimacy that geneticist Barbara McClintock had with maize chromosomes is available to all those who approach other species as students to teachers. McClintock was elated by her experience and said, “When you have that joy, you do the right experiments. You let the material tell you where to go, and it tells you at every step of the way what the next has to be because you are integrating with an overall brand new pattern in mind” (as cited in E. F. Keller, 1983, p. 125)

Embracing and enhancing difference.

Because the wisdom of the universe can come to us through any entity, a person wishing to live in a cosmogenetic way would learn to consider the perspective of all entities and systems that will be affected by our actions. Conscious of the fact that diversity is often the essential ingredient in whether a system evolves or collapses (Goerner, 1999, pp. 143–144), she would insure that a wide range of diversity is always present. Obedience in a cosmogenetic context would make sure that whenever decisions are being made, that all affected entities are represented at the decision-making table. Practically speaking, that would mean having someone speak “in the name of” the atmosphere, the water, the animals, and the ecosystem as well as in the name of the people who will be affected.

For example, if we are deciding to replace an aging car, who speaks for all those affected by the production and operational collateral damage—the plants and animals, the air, water, and soil, as well as the human communities involved?

Practices such as these make concrete the fact that our actions will have consequences and we need to become skilled in anticipating and mitigating them.

While this practice is mainly to be sure that we consider those parts of the Earth community that do not have human voices, it is equally as important to be sure that all human voices are heard. Conscious of the privilege that one may enjoy by race, class, or color, a person vowing to live obedience in a cosmogenetic context would make sure that the voices and needs of those on the margins of society whose needs are often ignored or dismissed are well represented in any decisions, preferably by being actually present at the decision-making.

A final thought on diversity and hearing all the voices: We recognize that some people require more time than others to think things over. David Orr (2011) reminds us that “we are drowning in a sea of unintegrated information . . . because we have mistaken volume and speed of information for substance and clarity” (p. 25). Words, decisions, information all need their own time to sink into us like a good rain and be transformed into wisdom. Thoughts need to ripen. A cosmogenetic practice of obedience would make room for the different needs of people and beings, as well as for time for ideas to be assimilated and ripen in us.

Honoring the communion dynamic.

The vowed practice of cosmogenetic obedience would attend to the quality of relationships within the community through preserving, strengthening, and repairing the bonds of the relationships. She would cultivate space within herself to carry a sense of the whole, to be available for communion whenever it happens.

She would see attention to the vitality of the web of connections as an important part of her devotion, in order to keep the energy of creation flowing through the community.

In terms of preserving and strengthening bonds within the community, there are specific actions that one can take. Since 2007, my congregation has discerned that our desire to deepen our charism of unity and reconciliation is best expressed by striving for communion. In reflecting on the times when we had indeed felt in communion in our lives, we realized that these moments had occurred when we left a door open in some way—when we varied routine, were in a new place, were weak or vulnerable, when we let go, or accepted an interruption. Similar to O’Murchu’s (1999) idea of receptivity (p. 49), a vowed practice that listens deeply to the pulse of the group would include a commitment to such actions to provide opportunities for communion.

A cosmogenetic context would also suggest attention to the ways everything is linked on a deeper level than the physical. In Chapter Three we reflected on limbic resonance, that capacity of the limbic brain that aids “in detecting and analyzing the internal state of other mammals” (Lewis et al., 2000, p. 62). I doubt that this is a skill that many humans know about, let alone cultivate. Still, if we are to attend to the quality of communion this is an area that must be noted. Vowed practice that desires to be open to all divine messages would be receptive to the messages received overtly and covertly, and attentive to registering the internal state of the individuals and community around one.

In terms of repairing and reconciling, a world full of conflict awaits some sacred intervention. Even a casual look at the state of the world shows the difficulties we are having with cultural difference. In light of the centrality of the values of differentiation and communion, and considering the high level of tension around such conflicts, it would seem that vowed commitment that focuses on cultural mutual respect is seriously needed.

In 2000, a newspaper clip told of the giant sable antelope of Angola fleeing “toward Angola’s active war zone from their last remaining sanctuary in the Cangandala National Park.” Wildlife experts were puzzled as to why the rare antelope migrated 125 miles into such a bloody area. The news clip concluded with the sentence that “the antelope, with its distinctive twisted horn, is a symbol of the country” (Newman, 2000, para. 6). I have also puzzled over this story, wondering if this animal, a symbol of the country, for some reason sought to interrupt the conflict that had been devastating their land for 25 years. Did something on a limbic level urge them to disrupt the conflict? Or did it disturb them to such a degree that their own self-preservation instincts were overridden? If we were to put our minds to exploring the potential for limbic receptivity, I wonder what capacities for communion we would discover in ourselves and in other species.

A final area to consider when we think of seeking guidance for living well within an evolutionary community is the importance of rituals, used for centuries to restore and maintain the sacred order. They not only focus and build up the human community, I believe that they have the power, through limbic resonance

and entrainment, to synchronize and strengthen the web of connections with the rest of the natural world. They are an investment in the realm of that which cannot be measured but whose effects we nevertheless experience. A vowed commitment to maintain the sacred order would include such rituals to strengthen one's own commitment, the bonds of connection between the human community and the rest of the Earth community, and to honor and praise the order which enfolds us.

Summary

In light of the shamanic tradition of balancing what is unequal between the human community and the rest of the Earth community, a vow of obedience within a cosmogenetic context would address itself to recovering respect for what is non-material. Our society over-values measurability and control and the under values organic growth, intuition, imagination, and dreams. As a society, we are uncomfortable dealing with what is outside our control. It seems that a vow to listen to the subtle messages of values and inspiration witnesses to the importance of this non-material realm, and to the belief that the Source of this universe continues to provide direction from deep within each of the entities and communities of the planet. We just need to commit ourselves to discernment.

A vow of obedience in light of cosmogenesis might best be understood as a commitment to spirit-guided discernment with the Earth community and responsible co-creation. By this I mean actively seeking wisdom and guidance from the intuitive, non-quantifiable, spiritual dimensions of the universe. I say with the Earth community because I believe we are being asked to not only

consider the whole Earth community in our deliberations and action, but are to partner in the discernment process.

In the final piece of a new commitment I use the words *responsible co-creation* advisedly. While there is much enthusiasm in some circles about humans being co-creators as if it is a new thing, I want to acknowledge that every entity is involved in this process all the time. What is needed is for the human community to be conscious of its effects on the larger Earth community and to co-create responsibly.

Cultivating Subjectivity: Celibacy and Spiritual Practice

A final area of consideration of how religious vows might be lived in a cosmogenetic manner is the vow of celibacy, the vow of total self-gift to God. This vow has been considered “the determining characteristic of religious life,” (Schneiders, 1986, p. 69) since both the practice of poverty/careful use of creation, and of obedience/doing God’s will are behaviors recommended to everyone. While the understanding of this vow as total commitment to God has not changed over the years, the understanding of how it is practiced has benefited by the insights of psychology about healthy interpersonal relationships.

In recent years there has been a confusing array of suggestions about how to understand this vow. Schneiders (1986) discussed celibacy as a discipline which liberates one from affective attachments other than God and even from history by not adding another lineage to the human family (p. 63). O’Murchu (2005), on the other hand, connects celibacy with the archetypal value of emotional and affective relationships and the need for community, suggesting that

it be a vow for relatedness, although from his explanation he seems to be describing a vow of right relating (pp. 195–196). Prevallet relates this vow to our generative, creative energies and suggests that it is an effort toward the preservation and enhancement of the Earth community—“a moral commitment to ease ecosystem stresses caused by a burgeoning human population” (Prevallet, 1995, p. 35). MacGillis (n.d.) connects chastity with interiority (identity), seeing it as an inner discipline that fosters the capacity to see beyond appearances to the sacredness of all things (tape 3, p. 31). While the suggestions seem everywhere on a continuum, MacGillis’s idea about fostering a needed capacity is similar to the ideas I will be pursuing.

Celibacy in a Cosmological Context

Celibacy has two distinct elements, one of dedication and the other of discipline. Little attention is given to the element of dedication in most contemporary works on celibacy, most likely because it is such a personal area, and because the object of devotion is assumed to be the traditional understandings of God. However, the topic becomes significant when we consider that a new dimension of divine interaction is emerging in our awareness. The cosmogenetic principles give a more intimate view of the internal dynamics of the Trinitarian image, as well as a way to understand the preferences of God. The idea of three persons/identities with radical differences in one God suggests the need for radical respect for the identity and on-going differentiation of each entity. The phrase *God is love* is deepened by recognizing the pervasiveness of communion within creation, how it happens, and why we need to participate in its happening.

What effect might understanding God as more active, intimate, and pervasive within creation have on the practice of a person totally dedicated to God?

It would also seem that striving for a total gift of self to the divine operating within the dynamics of everything would call forth a high measure of attentiveness to the way identity, differentiation, and communion are functioning within a vowed persons sphere of influence. Just as the desire to continue the mission of Jesus has motivated the ministry of vowed religious for centuries, the desire to continue the intimate work of the Creator might lead to ministries that insure optimal conditions for on-going creation.

With regard to the discipline of celibacy, what do the cosmogenetic principles suggest about the behaviors necessary to achieve a total gift of self to a Creator involved in on-going creation?

It might be that in addition to the spiritual discipline of celibacy, a person vowed to the above work would need spiritual practices that will deepen her own identity as a being-in-communion. In a world addicted to comfort and immediate gratification and used to anesthetizing itself to pain, celibacy alone might not achieve a complete gift of the self. Those who wish to consecrate body and soul completely to the divine must consider a range of spiritual practices that will strengthen them to be present to the sacred suffering in a world of social and environmental crises. Their vows would include spiritual practices that foster not only purity of heart (celibacy), but also clarity of insight, and courage to address personal and communal addictive and destructive behaviors.

What personal practices honor a world suffused with a divine dynamic that is birthing potent individual entities differentiating themselves within a fertile matrix? What actions would characterize a commitment to increase the flow of energy within a vowed person and contribute to the flow of energy through the communities of which she is a part? How would she keep herself available for the on-going revelations produced by the evolutions constantly taking place around her? Such a vow might be one of on-going conversion to the unfolding of a sacred universe within her and others.

Deepening one's own identity.

The heart of vowed commitment is spiritual practices that lead to her holiness, a person vowed within a cosmogenetic understanding needs to assess, address, and enhance his or her readiness to enter into conversations with both the material and non-material worlds, and to work with them in the healing and evolution of a vibrant Earth community. Identity suggests that she live from the conviction that the energy of the universe is centered in her as much as in all other entities. If she is to act with integrity, she will encourage that energy to evolve in her and through her to others. She will commit to deepening her awareness of her own within where she carries the blueprint for her own potential. She will cultivate the awareness that by following this inner guidance she is participating in the on-going unfolding of the universe.

To fully commit oneself to the God who creates through identity, differentiation, and communion, a person would undertake the intellectual, moral, and spiritual conversions that go beyond beliefs of humans as separate from,

superior to, and in charge of the natural world. She would need to adjust her moral compass from the primacy of human and their concerns to the primacy of the Earth community characterized by diversity and interdependence. She would need to be inspired by and committed to a vision of a God who generates from within each entity, guiding its unfolding by a sacred dynamic that honors communion, differentiation, and identity. Within a cosmogenetic worldview, a person with religious vows would therefore seek to know the ways of matter, including its inner depths, and desire to live within its optimum functioning. She would develop a respectful attitude toward the inner guidance system of all entities, whether particular beings or ecosystems, weather patterns or ocean currents. She would recognize and learn from the wisdom of each.

Commitment to on-going conversion includes facing the a person's particular gifts, as well as the ways that one flees from her own unfolding or from feelings of fear and hopelessness engendered by the precarious state of our planet and the human community. A person can flee through any number of addictive practices that are numbing but to face them takes a warrior. The spiritual practice of Shambhala warriors is to sit with your head level and facing forward. You do not tilt your chin up, for you are not better than others. You do not tilt your chin down, because you are not less than others. You keep your chin level and face forward, facing the good and bad of yourself and accepting it and your place within the community of Earth (Trungpa, 1986, p. 16).

Embracing differentiation.

Differentiation suggests that one assess how she is addressing her particular needs at this particular time. Since her unfolding will be like no other, she will require a unique set of spiritual practices to address her particular avoidances, weaknesses, and addictions. Looking at particular needs suggests that one commit to a variety of spiritual practices that will free her from unconscious actions that impede her total self-gift and that liberate her for more radical listening and response. Here we might take inspiration from the practices of the early Christian Fathers and Mothers.

In *Fullness of Life*, Margaret Miles (1981) explains that the martyrs provided two gifts for the early Christian community. Faced with their own deaths, they found the courage and clarity to speak out clearly on the realities present in their society (p. 35). After the time of the martyrs, the early church missed these gifts and some undertook practices of isolation, silence, fasting, celibacy, and prayer in order to recover them. Those who undertook radical practice of these behaviors such as extreme isolation from society, practiced extreme forms of fasting, sleep deprivation, and mortification were generally unavailable to help their religious community. In fact, Miles believes their practices anesthetized them, rather like overuse of alcohol, drugs, and other numbing practices do for us today.

On the other hand, those who were more moderate in their practice were more available to advise their religious communities, having achieved some clarity about the state of the world, and were more courageous in confronting

false values. Miles (1981) explains that the variety of spiritual practices undertaken by these more moderate desert Mothers and Fathers had certain distinguishing characteristics. First, assuming the connection between body and soul, actions that change the state of the body will also change the state of the soul (p. 159). Second, any actions undertaken need to be equally good for body and soul, in other words, not harming the body at the expense of the soul. Third, these practices should be temporary and designed to locate and correct particular debilitating addictions. And fourth, some ascetical practices remain perennially useful, if used in moderation (p. 160).

Taking Miles's (1981) advice, a vowed person wishing to be totally available to participate in on-going creation might consider fasting, from one meal, or for several days, from TV, social media, binge watching of the news, or anything that one does in excess. The goal is to free one's self from any things that dull awareness; food, games, reading, conversations, noise, constant activity, daydreaming—anything that a person might use to anesthetize one from pain (emotional or physical) or deaden one's awareness of things that can precipitate change. Such a person would develop a variety of spiritual practices, such as meditation, contemplation, sitting practice, and spiritual reading. She would also undertake practices involving the body, like breathing and posture practices, Vipassina and mindfulness practices, and physical exercise.

The variety of her practices might suggest that a vowed person open herself to the difficult information that she might otherwise avoid, such as listening to and praying the evening news, reading about environmental

devastation and issues of hunger, food sovereignty, and issues of world health. A desire to practice the cosmogenetic principles in all her actions might encourage her to become informed and vote on policy issues, as well as boycott, and demonstrate in support of the voiceless. She might learn what she can do to mitigate climate chaos, invest in alternative energies, become informed on GMOs and organic foods and other timely but complex issues.

The Shambhala practice mentioned above can also be helpful to face the difficult and the overwhelming, waking up to reality and accepting that things are as they are (Trungpa, 1986, pp. 16–17). Things are not better than the reports, nor completely hopeless; they are what they are. We can use the body position of head level, facing forward to becoming willing to learn the dimension of the crises, the solutions, and what is asked of us. We can use it to accept responsibility for our part in destructive practices and to commit to making necessary changes within myself and my behaviors.

In addition to facing difficult things, a vowed person might include in her variety of spiritual practices activities that renew her commitment to an unfolding universe. She can practice what Jane Wagner (1990) calls “awe-robics,” a practice of regular awe and wonder at the amazing universe that will continually put us in right relationship with what is evolving (p. 206). Much of what is awe-producing is endangered. A person living a vowed commitment within a cosmogenetic context would let her affection guide her to practices of preservation of what is amazing and beautiful, and of recovery of optimal

functioning. She would use her imagination and dream dreams of what could be and what is coming to be.

Another physical spiritual practice in addition to the posture and breathing practices of yoga and Tai Chi is a movement meditation called The Seven Point Empowerment. It is a series of movements that use the self as the balancing point for energy flowing from Earth and sky, given to the people and needs of those in one of the cardinal directions, received back and then passed on to the people and needs of the next direction.

The gift of differentiation to the spiritual and ascetical practices of vowed persons is a reminder of that a variety of practices, targeted to specific goals, are necessary to prepare one's self to enter into full communion with the material and non-material worlds.

Attending to communion.

The principle of communion reminds us that “as part of this world, you contain the whole of it” (Macy, 2007, p. 18). We have what Buddhists call a “larger self” which consists of all that flows through us—the water, air, soil—and all that is interdependent with us. A vowed person would honor this reality by cultivating attention to the health of one's whole, larger self, and by accepting one's proper place within the Earth community. She would use her spiritual practices to develop a sense of being connected to the wonder and wounded-ness of all in the Earth community, no matter how uncomfortable it might make her.

A person living in communion would develop a curiosity about what is connected to everything she touches, and what will it be connected to when it

leaves her hands; she will use her imagination to give her a fuller sense of the ways she is connected to the joys of new mothers, the pain of children in war, the endangered polar bear. She would learn to become spacious to the good and the bad that runs through her and all people, fully immerse her elves in what communion means. She would strive to reverence all the web of my connections, working to protect and preserve it as a part of my “self-interest,” an enlightened self-interest. She would develop her instinct for self-preservation into an instinct for the preservation of all species and ecosystems.

The Tonglen practice is a way of welcoming difficult, unwanted feelings and/or people and situations. I believe it is a singularly cosmogenetic practice because it does not seek to transform difficult things into their opposites (thereby rejecting them) but seeks to open a large enough space within you and those affected so that the difficult can be lived with (Chödrön, 2007). I believe that this can make us available for communion, as spoken of by Teilhard de Chardin (2003) and Beatrice Bruteau (1997)—the capacity to be connected from within.

Summary

The goal of this attention to self is the development of a capacity for on-going conversion to the unfolding of a sacred universe within herself and others. A vowed person desiring full participation in bringing about a vibrant Earth community resplendent with the dynamics of creation will need practices such as these which help her to be connected from within; to become more hospitable to this Earth community with its diversity, joys, and pains; and to become a viable and positive contributor to the Earth community. I believe that by modeling

practices designed to further intellectual, moral, and spiritual conversion, vowed persons show what a reinvented human who is partner/contributor, rather than controller/dominator, looks like.

Vows That Demonstrate Needed Values

Conscious embodiment of the cosmogenetic principles responds to the original intent of religious vows: to live out of a sacred worldview, committed to a deep relationship with the divine, and in service to a sacred community.

Drawing on the shamanic tradition allows vowed religious to see the value of their traditional service while consciously expanding their understanding of the societal role of their vowed commitment. They are challenged to balance within themselves whatever is out of balance, whether within the human community or between the human community and the rest of the Earth community. Their vows then become “a covenant with the Earth community to protect, defend and foster” not just life, but the whole Earth community of beings (MacGillis, n.d., tape 5, p. 7).

Vowed practice of the cosmogenetic principles represents a direct ministerial response to the urgencies of today. This way of viewing religious vows—as modeling the values all of our society needs to adopt—challenges the traditional idea that religious vows are ideals that very few are expected to reach. Vowed practice that makes radical choices may at first seem unrealistic to many, even though the behaviors are necessary to our survival. That’s why we need someone to go first, to be inspired by a vision of the dynamics at work, and to model working in harmony with those dynamics so that all of us may act

ourselves out of dangerous impasses and into a more viable lifestyle. Vowed spiritual practices based on the cosmogenetic principles may not only have the potential to address today's eco/social needs, but also be essential to their solution. Vows then become what David Whyte (2004) refers to in his poem *All the True Vows*: they are promises that "it will kill you to break" (p. 25).

I am not recommending new names for each of the vows, but rather new ways of being that take the insights of identity, differentiation, and communion as standards for moral and ethical behavior within the material, spiritual, and personal worlds. In adherence to the principle of communion, what is needed next is for those affected by a cosmogenetic understanding about their vows to reflect on this challenge, to discuss it, live with it, and come to ways of integrating these conditions of creation in their own lived experience. I think that the true dimensions of these practices will only be realized over time and that new ways of naming religious vows, if any, will evolve through practice.

Vowed religious are the right people to provide leadership in this transformation of consciousness. They have motive, to foster a world of communion, that honors the Sacred and serves the needs of the poorest; they have the opportunity, the social capital that they have accrued from years of faithfulness to the interests of poorest and to the sacred; they have the means, the skills of professional teachers and healers, analysts of social injustice and social activists. The only thing which could work against them is their unconsciousness adherence to the dominant worldview and a fear of loss of security. Is there desire? We shall have to wait and see.

CHAPTER 6: VALUES FOR A VIBRANT EARTH COMMUNITY

The question of how we, as a culture, shall find on-going guidance for living well on this planet is vital to our future. As we become aware that violations of the cosmogenetic principles contribute to the ecological, social, and spiritual crises in which we find ourselves, it is logical that more conscious implementation of these principles must become a central aspect of addressing these crises. The fact that the principles have proven to be the conditions present in the development of stable, sustainable structures and systems in the natural world, and have been valued for centuries in our wisdom traditions, suggests that we move forward with them as guidance. Implementation of them may provide us with our best chance for over all, quality survival.

The alternative consciousness that is foundational to the cosmogenetic approach has at least three central concepts. First, it affirms and builds on the fact that our primary context and guide is a universe engaged in cosmogenesis. Second, it focuses human attention on learning from and aligning with the way the universe has successfully brought Earth to optimum fertility. Third, this consciousness asserts that the cosmogenetic principles can be comprehensive guides for human behavior within a universe that is still developing.

If we, citizens of a dominant world culture, were to live in such a manner, we would take an important step toward the evolution of a new humanity characterized by profound interdependence and consciously aligned with the forces of on-going creation. With the cosmogenetic principles as what Ken Wilber calls the orienting generalizations (as cited in Crittenden, 1997, p. ix) of

the human community, we redefine the human as part of, and subject to, the relationships of the Earth community.

Cosmogenesis is Central to a Vibrant Earth Community

What I am recommending in this dissertation is that the human community adopts the cosmos-building principles of identity, differentiation, and communion as the criteria for all personal, social, economic, and governmental decisions and actions. Using these as standards for moral and ethical behavior we have a greater chance of successfully meeting the challenges of our ecological and social crises and returning the Earth community to vibrancy.

A deep sense of communion can heal our sense of isolation as we humans settle into our place within a developing Earth community. Adhering to the value of communion also assures that we take into account the interdependence of human and Earth systems and the value of each being for the health of the system. By embodying communion in working to restore and protect the integral functioning of all life and cultural systems, we will seek to optimize the flow of energy within social and ecosystems, and work to provide the conditions necessary for the emergence of new structures, properties, and potentials.

A deep sense of the value of on-going differentiation can heal our fear of difference in others and our fixation on stasis, control, and uniformity—values that would affect not only Earth systems and local civil society, but also relations between nations, tribes, and cultural groups. Adhering to the value of differentiation would encourage us to protect diversity in both human and more-than-human communities and to think in terms of negotiating the rights that each

being has to the conditions that foster its evolution. Differentiation not only boosts the resilience of systems to handle crises, but provides conditions for beings to make use of fluctuations and differences to forge new paths.

A deep sense of the value of each identity, human and non-human, can heal our autism in regards to the rest of the Earth community. Adhering to the value of identity encourages us to approach the Earth and its beings as teachers, to protect the entry point of energy into our Earth community, and to guarantee that the creative potential of every being is allowed to develop, self-organize, and enter into new collaborations. A human community where each being is supported toward its full potential is a collaborative member of an evolving Earth community.

The principles are already foundational to some of the recommendations being made for our way forward, but more importantly, they point out where our dreams fall short of the actions that are needed for humans to evolve into life-giving members of the Earth community. For example, Gus Speth (2012), former dean of Yale School of Forestry and Environmental Studies, recommends that the American dream of the pursuit of happiness needs to be understood as

The growth of human solidarity, real democracy, and devotion to the public good; where the average American is empowered to achieve his or her human potential; where the benefits of economic activity are widely and equitably shared; where the environment is sustained for current and future generations; and where the virtues of simple living, community self-reliance, good fellowship, and respect for nature predominate. (Step 3, para. 3)

These goals of solidarity, democracy, and the public good do concretize the principle of cosmogenetic communion within human experience, but if they

are to contribute to the resolution of our ecological, social, and spiritual crises and the foster a vibrant Earth community, they need to also position the human community within the healthy functioning of the larger Earth community. It is only by including the Earth in our concepts of solidarity, democracy, and the common good, that we have the potential to build strong, stable relationships among us as humans, and between humans and the rest of the Earth community.

In addition, we need more than the respect for nature that Speth (2012) recommends. We need an authentic partnership between the human and more-than-human community which draws on the wisdom and energy of the dynamics of the universe to address our crises. The principle of communion suggests that we build upon a foundational sense of interdependence of the human with the rest of the Earth community, respect the importance of each individual being, and assure diversity and the negotiation of rights within the interlocking systems. Such steps would simultaneously empower the development of the potential of each citizen and non-human being, share benefits widely and equitably, and sustain the Earth community for future generations. In general, satisfying the cosmos-building conditions of the universe in all of our actions optimizes the flow of energy within the whole Earth community, not only bringing us closer to the goals that so many believe to be essential to a vibrant future, but also providing the standards most likely to be helpful in achieving other goals as well.

One example sums up for me what we can hope for when identity, differentiation, and communion are working in concert within a community. It is the story of Catherine Sneed (2000) and the revival of Hunter's Point in San

Francisco, California. In reading *The Grapes of Wrath* during a long illness, Catherine realized that the at-risk youth with whom she worked at San Francisco County Jail needed a connection to the land if they were to heal and recover hope. When she returned to work, she worked with corrections officials to start a prison garden to help at-risk youth to put their hands in the dirt and grow things. Her project brought together a diverse group of people—the young people, the police, and the people of the neighborhood. The project began to provide fresh food for the neglected Hunter's Point area, strengthened the community as a whole, and generated off-shoots like a neighborhood bee-keeping project. In addition finding a new self-respect in providing fresh food to their community, the young people in her horticulture program became more self-confident, able young people. The program has increased cohesion among the community, built on multiple collaborations, and fostered a new investment in each other.

I find this program exhibiting the characteristics that we need to encourage in a new emerging humanity. First, it embeds our recovery out of crisis within the natural functioning of the Earth community, assuming that the connection between humans and Earth is essential to the health of both. Second, it recognizes and fosters profound interdependence within the human community—at risk youth, police, and residents—at Hunters Point, as well as between this particular human community and the soil which grounds it. Third, it counts on the diversity of gifts among the community, encouraging each young person to develop his/her own relationship with the plants he or she tends. Fourth, it encourages in youth-at-risk a desire to make a positive contribution to their community and gives them

a sense of accomplishment. And fifth, it inspires new collaborations that have the potential to change the whole character of the neighborhood. Respect for each being, dependence on the diversity of the group, and the forging of new and stronger connections has led to increased vibrancy in the community. Is this not what we need for all of our communities?

Religious and Spiritual Leaders as Transformers

The human community is already in a conversion process: Thanks to our scientific community we are going beyond what we knew of the world and how we thought it worked to understanding it in terms of interdependent ecological and systems behavior. We have been going beyond the habits of thought which have been our personal horizon to a larger and more accurate understanding of reality.

Thanks to the reflections of many, we are learning what these new insights mean: that the creative activity of the universe is centered in entities which are in communion, that dynamic communion among them catalyzes the on-going development of difference essential to the community, and that to align with this flow of creative energy is the highest good we can imagine for ourselves and our planet in crisis. These insights must guide our choices if we and our Earth are to thrive. They must become our new moral imperatives.

The methodology of critical theory reminds us of a key component in transition to a new worldview: who shall carry the message? What particular group will commit to midwifing the birth of a cosmogenetic worldview? In terms of Bernard Lonergan's schema of conversion, who shall help us to fall in love

with a new vision of a universe that creates through differentiating, self-manifesting beings in interdependent relationship? Catherine Sneed (2000) fell in love with the vision of at-risk young people healing on the land and it motivated her to move through all of the resistances to her ideas. How will we become similarly motivated to go beyond our current beliefs and practices into new ethical behaviors?

Our spiritual and religious leaders have begun to respond. The gentle nudges found in liturgies and prayer services to care for creation are a beginning, but I believe that there is rich potential, as yet untapped, that will help orient us toward the larger spiritual truth of a cosmogenetic universe. Recovery of devotion to God as Creator has begun to be newly inspirational and challenging, but I believe that the image of Trinity enhanced by understanding of the dynamics of creativity will lead us to an even deeper place.

Spiritual and religious leaders can help with this deeper conversion in at least four specific ways: by envisioning a cosmology that incorporates contemporary science and yet honors their specific spiritual traditions, by helping their members through a process of conversion to this more expansive, inclusive vision, by making of their rituals a celebration of this integrated worldview, and by modeling the daily behaviors that this vision implies. They can help us to go beyond what we have believed to be sacred, valuable, and worthy of respect, beyond what we have understood as moral obligations, and beyond what we have thought about the way things work to a vision that incorporates the on-going revelation of the sacred that we are receiving. We need them to do the meaning

making of the science that will help us negotiate the ecological, social, and spiritual crises; to make the moral connections; to inspire us, and touch our hearts. We need them to reinterpret the divines order for us in terms of today's knowledge, to reawaken in us a desire to participate in the sacred act of creation, and to collaborate with forces greater than our own. We also need to have the vision be presented to us often an in such a compelling way as to help us integrate the changes and sacrifices we will need to make. As ones deeply embedded in a consumer culture, we would be helped by constant reminders of how divine dynamics differ from consumer capitalism, and by reassurances that these practices are the most effective for building an integral, vibrant Earth community.

The first task is that of envisioning a functioning cosmology that combines contemporary science and spiritual insight, providing us with an image of the universe, its Source, and the role of the human in a cosmos-building perspective. Much is being done in churches to help members understand the sacredness of creation: the papal encyclical *Laudato Si'* is a shining example (Pope Francis, 2015). What more is needed is to understand and conform to the sacred dynamics that are continuing to build this sacred creation. We need our spiritual and religious leaders to help us revision the sacred order of the universe in a way that bypasses the roadblocks of the academic science and religion dialogs yet incorporates what contemporary science can teach us about how the universe continues to create.

A functional, in difference to a dysfunctional, cosmology must be built on the proven world-creating methods of the universe. Reimagining the universe as a

sacred, dynamically interacting community of self-organizing beings centralizes cosmos-building dynamics.

Reimagining the source of the universe as the creative impulse working within these dynamics helps motivate us to imitation of these dynamics. The pervasiveness of the cosmogenetic principles suggests that the Source of the universe is a non-invasive source of energy to become. This Source is creative by providing and sustaining the conditions that foster the development of stable, sustainable structures. It is intimate in the impulses of all creation to collaborate toward greater complexity and consciousness.

Reimagining the human, not as above and in charge of creation, but as codependent with the Earth community encourages us to honor our spiritual responsibility toward the larger Earth community—a responsibility to go beyond limiting beliefs and images and adopt more appropriate behaviors toward our neighbors. We need our spiritual and religious leaders “to do what they do so well, namely articulate an inspiring moral vision for human-Earth relations” (Tucker, 2003, p. 82).

Second, we need our spiritual and religious leaders to help us through a process of conversion to this more salvific cosmology. In terms of Lonergan’s (1972) schema of conversion, their insights and leadership can help us to fall in love with and commit to a universe that is a manifestation of the dynamics of the Trinity, a sacred, dynamically interacting community of self-organizing beings, and to desire to model ourselves on its dynamics. They can help us to develop a new moral sense consistent with a cosmogenetic worldview, to examine the

psychological motivations and rewards of living our current U.S. lifestyle in light of a new divine order, and to commit ourselves to live within the principles of a sacred universe. Spiritual insight and strength are needed to help us understand that the high value we place on things like efficiency, comfort, and independence are distortions of our survival instinct and place unethical demands on the rest of the Earth community. Our spiritual leaders can help us harness the strength of this instinct to value the rewards that are essential for our survival, values like fitting in and harmonizing with the seasons, soils, elements, and beings of an interdependent Earth community, with a cosmological sense of the survival of the planet and its life-systems.

In particular, we, as citizens of the United States, need to change the goals, motivations, and moral thinking of our citizenry. We need to relinquish dreams of economic and cultural domination of our neighbors in favor of becoming life-enhancing members of the larger Earth community, contributing to healing and restoration of the damage U.S. policies have caused to the healthy functioning of life systems worldwide. As a nation with enormous influence on the governmental policies and cultural practices on other nations, our shift to living within the cosmos-building order of the universe would go a long way toward easing and addressing the ecological, social, and spiritual crises within the Earth community. The practical steps for this shift in moral alignment would be achieved by adopting as our own the values that guide the ordering of the universe, the principles of respect for the identity of all beings, and the fostering of on-going differentiation and communion among them. Only such a radically

different dream and practice has the potential to motivate the radical changes in behavior that could actually change our course.

Third, religious and spiritual leaders can harness the power of ritual, used for centuries to keep the sacred order of the universe before the minds and hearts of human communities. Rituals have traditionally introduced religious communities to the central tenets of new religious beliefs, motivating the community to the behaviors that would maintain this vision of the sacred order. They not only focus and build up the commitment of the particular human community, but they have the power, through limbic resonance and entrainment, to synchronize and strengthen the web of connections with all those adopting the new traditions. In this instance, where the new beliefs harmonize with the operative dynamics of the natural world, ritual actions can entrain us with the powerful forces of ongoing creation. Rituals are an investment in that non-material realm which cannot be measured, but which engages our hearts and determines our resolve.

Rituals, symbols, and customs, and liturgical expressions can bypass intellectual gatekeepers and speak to the heart in profound ways. Repeated actions of a sacred nature that recall us to our partnership with God as Creator, with Earth as our sacred community, and to the depth of the invitation to on-going evolution can create a community of support for these new understandings and conduct.

Fourth, our religious and spiritual leaders would help the human community tremendously by modeling a commitment to the principles of cosmos-

building: mutually-enhancing relationships with all things and people, spirit-guided discernment with the Earth community, and on-going conversion to the unfolding of a sacred universe within the self and others. As the impulse to align our behaviors with the on-going activity of creation is rising up among us, it would help the human community to see the sacred path being lived out amidst the challenges of our consumer capitalist culture.

Vowed religious people are in a key position to provide leadership in this modeling. For the past 20 years at least, they have been responding to the urge to update their vows and bring them into alignment with a broader cosmological context. They are exhibiting a hunger to come into alliance with the rich revelations of our scientists, and with a provocative sense of a God intimately involved with all this, to address the overwhelming number of threats to life. Vowed religious desire that their vows directly address our consumer capitalist, empire-oriented, human-centered culture by providing viable alternatives. Reformulation of religious vows in terms of the behaviors that the human community needs to adopt in order to take its proper place within the Earth community provides a way to satisfy these desires to make a difference at this time, to a world in crisis. Vows lived in a cosmos-building manner have the potential to model living in a sacred manner within a sacred universe, even as it would deepen our commitment to the God-Who-Creates, whom we honor and praise in the sacred order which enfolds us.

Many vowed religious are already primed toward this conversion. I see their desire for coherence between the new intellectual and spiritual

understandings and their vowed practice as a major creative push to a new level of complexity. I believe that this articulation of vows in a cosmogenetic context is one effort toward that coherence, but I also believe that it now requires engagement by the community of those who are seeking this coherence: as with the introduction of any new entity into an ecosystem, the dialogue between the ideas and the community will determine the evolution.

One of the reasons that I believed vowed commitment is needed to model behavior aligned with the cosmogenetic principles is because it sounds so utopian and unrealistic. If we forget for a moment that these cosmogenetic principles are essential for all of our development, we can quickly fall into doubt/denial, bargaining, or rage, rather than admit that the mess we are in is reinforced by our own behavior. We need to see the witness of ones for whom this commitment is fueled by a sacred vision that holds them to the course. We need some to go before us. Like the shaman, living the values that the society needs to survive, we need our modern shamans to model that such actions are possible and fruitful.

One of the advantages that this cosmogenetic model has over other utopian visions is the evidence that the universe is bent this way; it uses these conditions and gets results. The only thing that could stand in the way of steadfastly adopting the cosmogenetic principles as the standards for human behavior is the conviction that we humans know better. We can and need to be converted from this false belief.

The most compelling way human communities have embraced new beliefs and behaviors has been by (a) making the changes tangible in religious practices,

(b) the modeling transformed behavior by spiritual leaders, and (c) incorporating the new beliefs into ritual. Ecological awareness is already changing weekly worship services in some denominations. What is needed is for this to not only increase, but to deepen into cosmos-building awareness.

What More Needs to be Done

In addition to the contribution that our religious and spiritual leaders can make toward teaching and modeling conversion to a sacred, evolving universe, integration of the new paradigm would also be helped by artful expression. Songs and theatrical productions can present the new insights in ways that remain with people long after. In the words of Brazilian archbishop Dom Hélder Câmara, “When we are dreaming alone it is only a dream. When we are dreaming with others, it is the beginning of reality” (Lewis, 2015). To picture for ourselves a new way of being through art and performance makes new perspectives more real and possible.

A second area that could benefit from follow up and expansion of ideas would be the development of theology around what the cosmogenetic principles suggest about the nature and activity of God as Creator/Cosmos Builder.

Third, I believe that embodiment of the cosmogenetic principles contributes to what Thomas Berry (1999) spoke of as the reinvention of the human (p. 159). Reimagining ourselves as one species among others gives the human community a new perspective on the world. Every component of human society needs to be reinterpreted in this light. More needs to be done on re-

visioning human identity, as well as our relationship with the rest of the Earth community.

At a conference on radical compassion at Naropa University in October, 2014, compassion was defined as radical when it moved beyond niceness or charity to become “the very foundation of all our actions, the signature of our society” (Naropa University, 2014, para. 2). Similarly, we are being called to a radical interdependence with the beings and processes of the cosmos. If radical interdependence becomes the foundation of all our actions, we will be tapping into the creative energy of the universe to address the challenges of our combined crises, finding new partners with whom to collaborate, and living into a vibrant future for the whole Earth community.

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