Introduction: The Fabric of Life

In the beginning is the relation.
—Martin Buber, *I and Thou*

Consider the unnerving features of contemporary life: global climate change, massive species extinctions, acute shortages of freshwater and other natural resources, growing food insecurity, impoverishment and economic devastation, increasing disparities between rich and poor, political instability and alienation, rising numbers of failed states, the juggernaut of genetically modified environments and unprecedented technological transformations. Nearly 7 billion human beings are trying to make ends meet on a finite planet, and these numbers will grow substantially before they begin to decline. An increasing portion of this population is committed to the individual and collective pursuit of endless and accelerating economic growth and technological mastery. The effects of all this enterprise are world changing. Threats to prosperity—indeed, to civilization itself—surround us.

These threats are not distant prospects. They have a direct impact on us today, and we have an impact on them. Each day our choices bear on the sustainability of our lifestyles, communities, and planet. There are no shortages of dilemmas: paper or plastic bags at the grocery checkout; cloth or disposable diapers for our babies; e-readers or paperback books; blue-collar jobs or wilderness preservation; open immigration or tighter borders; nuclear power in the face of rapid climate change or the slow development of renewable forms of energy, such as wind farms that may kill large numbers of bats and birds. The decisions we make as consumers and citizens will have significant consequences. Yet clear answers to the multiple dilemmas we face each day remain elusive and much in dispute by experts.

In the pages that follow, I argue that there are two fundamental reasons for the growing list of dilemmas we encounter in the pursuit of sustainability. First, our globalizing world is increasingly characterized by webs of interdependence. Never before have so many people, activities, and events been so closely connected. Second, and as a consequence of these expanding and deepening interdependencies, the law of unintended consequences has asserted its jurisdiction not only in the domain of ecology but across various fields of inquiry and facets of life.

The growth of social, political, technological, and economic interdependence around the planet, commonly known as globalization, has been well documented over the past four decades.[1] It is not in doubt. Since the era of the New Deal, social scientists have also charted the unintended consequences of economic and social policy. With the rise of environmental concerns in the 1970s, and increasingly in recent years, natural scientists have documented the unintended effects of human enterprise on ecosystems. Still, an interdisciplinary account of expanding and deepening global interdependencies across diverse fields of inquiry and facets of life is lacking, as is an account of the chief effect of these complex connections: the growing jurisdiction of the law of unintended consequences. *Indra's Net and the Midas Touch* provides such an account.

As webs of interdependence increase in size and complexity, so does our incapacity to control the effects of our actions. Some fields of inquiry and endeavor can, and occasionally do, find reassurance in this intimidating reality. Others are prone to ignore or deny it. What is needed in this context is the cultivation of a certain sensibility, set of values, knowledge, and know-how within and across diverse disciplines. The human ability to understand and navigate the web of life is, at one and the same time, a practical skill, an intellectual capacity, a moral disposition, and a form of mindfulness. I call this much-needed capacity *ecosophic awareness*.[2]

In many respects, ecosophic awareness resembles what the ancient Greeks called *phronesis*: practical wisdom that is also known as prudence. It was understood to constitute both a moral and an intellectual virtue. Practical wisdom is a way of understanding that produces a better way of acting and a way of acting that stimulates deeper understanding. It resembles the concept of *prajna* or wisdom within the Buddhist tradition. *Prajna* allows one to understand the cyclical processes of *karma* (that is, action) and act appropriately in the face of interdependent actions and effects. It

also allows a deep and transformative understanding of the nondualistic nature of reality. This nondualism ultimately grounds the processes of *karma*. For Buddhists, wisdom allows an appreciation of the interconnection and inseparability of actions and effects, as well as an appreciation of the interconnection and inseparability of the beings that produce and are produced by these actions and effects. Although I draw on both Western and Eastern traditions, this book is neither designed nor intended as an account of ancient Greek philosophy, Buddhist thought, or any other canon. Rather, it employs the term *ecosophic awareness* to designate a sensibility fit for the daunting challenges and deep complexities of this century.

Ecosophic awareness might best be defined as a sage appreciation of the ubiquity of interdependence combined with the disposition toward contextually responsive engagement. It provides the intellectual and moral foundation for efforts to sustain the web of life in a world of unintended consequences. My use of the term is meant to call to mind its etymology.

The word *ecology* (*oekologie*) was coined in 1873 by the German zoologist Ernst Haeckel. It referred then, as it does now, to the study (*logos* means word, reason, or discourse) of the interactive relations of plants and animals in their natural habitats. The *eco-* in *ecology* comes from the Greek term *oikos*, which designated a household or dwelling place. The dwelling places of concern to ecologists are the various habitats that are used, maintained, and transformed by the organisms that occupy them. Ecologists are concerned with relationships of interdependence. In fact, the first uses of the term *interdependence* in reference to natural phenomena occurred in the 1870s and 1880s just as ecology was developing as a discipline.[3] To the extent that ecologists focus on particular organisms, they do so insofar as these organisms live within, contribute to, and depend on vast and intricate biophysical networks. Relationships are primary and fundamental. As Theodore Roszak succinctly states, "Ecology is the study of connectedness."[4]

To be *oikos*-sophic, then, is to be prudently engaged with the nested habitats of complex interdependence that constitute the web of life. In moral and political life, no less than in ecological systems, nothing issues from a single cause, generates a single effect, or has a single meaning. To be *oikos*-sophic is to understand that there are no solitary causes or effects.

Navigating the world skillfully means responding to context, engaging with contingency, and anticipating unintended consequences. Ecosophic awareness signifies attentiveness and responsiveness to a world in flux. It fosters adaptation to a constantly changing environment.

The term *awareness* recalls the seventh element of the Buddha's eightfold path to enlightenment. Variously designated as right mindfulness, right memory, right attention, or right awareness, the penultimate element of the noble eightfold path is the practice of staying open to, bringing to attention, and remembering the phenomena that affect mind and body. It also entails bringing to attention the thoughts, beliefs, and motivations that cause us to act on, or react to, our world. The practice of right awareness is said to produce wisdom. For my purposes, it designates an attentiveness to relationships that fosters prudent interactions. These relationships are both external to what we normally designate as the self and constitutive of it.

Ecosophic awareness is a mindful attention to relations of interdependence and a hopeful investment in them. Hopefulness is not faith or blind optimism. Rather, it is the capacity to perceive one's world as pregnant with possibilities. To be hopefully engaged in relationships of interdependence means to embrace our roles as midwives of the future. That is a very expansive claim, and one that I affirm as the mandate for sustainability.

The alternative to defining sustainability so expansively is to understand it primarily as a technological solution to a technological problem. This is perhaps its most common interpretation. Here sustainability entails gaining increased efficiency in the use of natural resources and greater foresight in the execution of economic enterprise. If burning fossil fuels that release greenhouse gases is the problem, then green, renewable energy is the sustainable solution. If absence of market regulations is the problem, instituting better economic incentive and disincentive structures is the solution. Understanding sustainability in this manner, primarily as a feat of physical and socioeconomic engineering, is a mistake. To portray sustainability merely as a technological effort—even one that deftly balances environmental preservation with economic development and social welfare—is as shortsighted as it is misguided.

To be sure, we need to engineer green solutions to many threatening problems. Greater efficiencies and better planning are all for the good. But the promise of sustainability is found elsewhere. It pushes us beyond

purely technological frames of mind. Sustainability encourages a profound engagement with the human condition. It prompts us—for very practical reasons—to fully explore humanity's role in the web of life. My argument is that the discourses and practices of sustainability encourage us to understand, appreciate, and engage our ethical, technological, economic, political, and psychological lives, as well as the ecological and (meta)physical habitats within which we fashion these lives—as nested realms of complex interdependence.

The ancient wisdom traditions first gave voice to the notion of an interdependent world and the practical wisdom required to navigate it. But such inspiring explorations of what I call ecosophic awareness have been periodic and dispersed. Sadly, human history is defined as much by stubborn blindness to the reality of interdependence as adept recognition. And today, for the first time in the history of the species, the unintended consequences of actions stemming from such blindness threaten civilization itself.

Mindful, hopeful engagement with the nested realms of complex interdependence that define the human condition in this century is our most pressing need. The promise of sustainability, beyond any technological solutions it produces for the very real problems we face, is the fostering of ecosophic awareness. Such awareness allows us to become midwives of the future: to safeguard, guide, and witness the interdependent phenomena of being and becoming. My belief is that we will neither achieve more sustainable societies nor understand the nature of our current challenges if we do not explore and embrace the breadth and depth of our interdependencies. Consequently I take readers to places that other books on sustainability seldom, if ever, venture.

Sustainability in a Changing World

Sustainability may be defined as the quest for ever-greater resilience in an interdependent world. The resilience of an ecological system is its capacity to maintain the number and overall pattern of its relationships (regularized interactions between species) in the face of exogenous shocks and internal shifts. More broadly, resilience is the capacity of a social, cultural, or biological system to adapt to and recover from disturbances and change that threaten to undermine its crucial relationships and values. A resilient

system persists in time and space. But it is not static. Indeed, resilience is precisely the capacity of a system to adapt to a world in flux without falling apart.

The ancient (Western) Roman Empire came undone in the fifth century as Germanic tribes and troops took control of the Italian peninsula while far-off lands that Rome formerly ruled claimed their independence. The ancient Aztec Empire ended with the Spanish conquest in the sixteenth century. The Roman and Aztec empires were not sufficiently resilient to withstand military, political, social, and environmental shocks that eventually caused them to collapse. That is not to say that all Romans or Aztecs were killed with the collapse of their empires, that Latin and Nahuatl immediately ceased to be spoken languages, or that certain features of Roman and Aztec culture and government did not survive. However, political, military, and cultural relationships and values that were deemed crucial to these empires failed to persist.

To be resilient, a society or culture must sufficiently adapt to changing circumstances so as not to collapse. At the same time, it must maintain its core relationships and values, lest it cease to be identifiable as *that* particular social or cultural system. In cases where radical change is required to ensure survival, the transformation may be so extensive as to constitute not the adaptation of an existing system but the emergence of a new one. Much depends on the rate of change. Given a long enough span of time, significant change can be accommodated while retaining the threads of continuity. Indeed, one might argue that an overlap in time among a sufficient number of relationships or values, rather than the persistence of any particular (set of) core relationships or values, is what constitutes a resilient system.

The ancient Greek sage Heraclitus (whom we will revisit in later chapters) famously announced that you could never step in the same river twice. A river is in constant flux. Its total volume of water fluctuates owing to weather and season, its banks are constantly eroding and being rebuilt, its underwater contours and currents are protean, its organic inhabitants are forever in movement. Yet the river endures. Of course, rivers are not eternal. They are born and die in geological, if not human, time frames. Still, a river may achieve resilience—but only by way of continuity in the face of incessant change. Societies are like rivers: they can be sustained only if rates of change do not undermine fundamental relationships.

One is reminded of the paradox of Theseus's ship. According to Plutarch, when Theseus returned to ancient Athens from the island of Crete after defeating the bull-headed Minotaur, his ship was preserved as a monument to his heroism. As rot set in over the years, one plank after the other was replaced until none of the original planks remained. The Greek philosophers, as was their wont, debated whether the original ship had been preserved or a wholly new one constructed. At any particular point in time, the ship looked very much the same. But over time, there was nothing substantive of the original vessel that remained. Only the form, not the matter, was preserved.

We might have the same debate about our species and planetary habitat. If we preserve the human race and its home on earth over the next millennium by genetically engineering most life forms on the planet and turning ourselves into cyborgs, beings more mechanical and electronic than organic, would that constitute resilience? Some might argue that so much change with so little continuity is not an example of resilience but the creation of a new and different world. Still, the earth's biosphere—sustained in some shape or form for 3.5 billion years—has undergone tremendous change. For most of this period, the earth was a pretty uninteresting place, zoologically speaking. The oldest multicellular animals—certain sponges, coral, and jellyfish—are less than 1 billion years old. Continuous fossil records of clearly identifiable species, such as the horseshoe crab, go back only 400 million years. But even in the past half-billion years, the level of "turnover" has been remarkable. Over 99 percent of all the species that ever existed on the planet are now extinct. If the earth's biosphere is our model for resilience, then resilience and radical change seem quite compatible.

No component of any living system is everlasting. For that matter, no living system is everlasting. Astrophysicists and astronomers inform us that the earth itself will one day perish in fire when the star we call the sun expands into a Red Giant. In about 5 billion years, our life-giving sun will have increased its radius 200-fold, effectively engulfing the first three planets of the solar system. Long before that, in about 1 billion years, our oceans will start to evaporate, marking the beginning of the end of earth as a biological haven. Soon enough, cosmologically speaking, our planetary home will become a lifeless, desiccated satellite orbiting a fiercely growing star. Then it will melt into a large piece of molten rock. To persist

in the long term, its denizens will have to colonize other planets or solar systems.

Notwithstanding popular notions that we must "save the earth," the hard truth is that our planet is time bound. We cannot save the earth anymore than we can destroy it. In its 4.5-billion-year history, the planet has undergone more change, and more drastic change, than humankind could ever induce on its own. The future will be no different from the past in this regard. That is a difficult thought. But we need not become mired in philosophical musings about impermanence or lose ourselves within geological or cosmological time frames. Surely sustaining a web of life that allows for diverse, resilient ecosystems and thriving human societies for the foreseeable future is a task worthy of our greatest efforts.

What is usually meant when people speak of "saving the planet" is preserving the anthropocene—the period of the past 10,000 years of earth history that gave rise to human agriculture and, subsequently, to urbanism and all the trappings of culture. When environmentally oriented people say they want to save the earth, what they really want to save is a high quality of civilized life without at the same time destroying the other species and landscapes that currently share the planet. After all, *sustainability* is not simply a descriptive term for the continuity of a biological system. It is a normative term that describes a good to be sought in the here and now and for the foreseeable future. Sustainability refers to a certain sort of resilience—the resilience we can and should achieve in our time for our own sakes, for the welfare of our progeny, and for the benefit of the other species that make up the web of life. Importantly, sustainability pertains not just to ecological survival but to social, economic, and cultural welfare. A sustainable society integrates the four goods that human beings need to pursue in a balanced fashion to achieve resilience: ecological health and diversity, economic security and opportunity, social equity and empowerment, and cultural creativity and learning.

In an interdependent world, the synergistic pursuit of these four goods maximizes the likelihood that civilization can be sustained in the long term. Specifically, the claim is this: societies that well balance the pursuit of economic prosperity with social justice and environmental caretaking while ensuring intellectual and cultural development will prove resilient. This claim requires empirical validation. There is already good evidence

for it, and experiments to validate it further are the most reasonable and prudent we can pursue.

The Way Forward

Unless you are a teenager with very good genes, within four-score years you most certainly will be dead. Take a moment to ingest this fact. Nothing that you do in your life, however inspiring, can help you avoid this inevitable conclusion. Soon enough, all of us will be little more than memories. To be sure, many will have left concrete legacies: children and grandchildren, inventions, institutions, inspiring words and actions. These influences and achievements may endure for generations, even centuries. Still, for most of us, one of the most enduring legacies we leave behind will be our contribution to the depletion of the planet's natural resources.

In an average lifetime, individuals like you and me will have consumed—directly by what we eat, drink, buy, and throw away, and indirectly by way of the inefficiencies of industrial production that chew up natural resources to generate the goods we demand—millions of pounds of the planet per person. Owing to the inefficiencies of the system, only 6 percent of these materials end up in the actual products we use, with the rest discarded in processes of production. Over a lifetime, the average American generates more than 130,000 pounds of trash directly, and a great deal more than that indirectly, by way of his or her participation in an industrial economy.[5] Most troubling, however, are not the mountains of trash we create but the vast depletion of natural resources that our consumption and waste represent. Some of these depletions are never to be remedied, as occurs whenever another species goes extinct. As troubling is the depletion of the planet's capacity to absorb the by-products of human productivity. In a lifetime, the average American will have deposited 320,000 pounds of carbon dioxide into the atmosphere, five times the global average.[6] As we have now become painfully aware, the planet's capacity to absorb these greenhouse gases without large-scale alterations of climate has already been exceeded. We will not be around in four score years to feel the effects of our actions. But our great-grandchildren certainly will. They may know us best by neither personal stories passed through the generations nor inventions and achievements that have endured the

test of time, but by way of the massive ecological debt and devastation they inherit from us.

Some months ago, I was listening to a podcast on climate change. It featured the CEO of a large corporation who, environmentally speaking, had recently found religion. He was now engaged in an effort to model sustainable business practices at his place of work and carry the good word to fellow executive officers. The transformative moment for the CEO had occurred, innocently enough and without warning, while he was sitting around the dinner table with his family. The mealtime conversation drifted to the topic of global warming, an issue his son had learned about that morning in middle school. Dutifully, the parents offered a nonalarmist but frank assessment of the scope of the problem. After carefully listening to the adults and her older sibling weigh in on the topic, the seven-year-old daughter asked a question that would eventually rock a corporation. "Daddy," the little girl queried, "what are you doing to keep the world from getting too hot?"

The father was stymied. Somehow an extended monologue on the challenges facing businesses in a competitive global marketplace seemed irrelevant. After a long pause and a forkful of steaming peas that resisted swallowing, the CEO sheepishly responded: "Not enough, sweetie. Not enough." That admission was the beginning of a personal, and corporate, transformation.

We might all answer the child's question in like fashion. Today virtually everything we consume or construct taxes the planet's resources and constrains the future of our progeny. To the extent that we directly or indirectly play a role in economies fired by fossil fuels, we cannot avoid aiding and abetting what future generations might deem environmental crimes. These days *mea culpa* goes without saying.

Locked in—as most of us are—to a global marketplace of goods and services, and participating in a global village of communication and interaction, it is difficult, if not impossible, to monitor the multiple ways in which our personal lifestyles, our consumer choices, our business and professional enterprises, and our political actions have an impact on the natural and social world. Figuring out how to make each of these innumerable deeds—or even the lion's share of them—promote rather than undermine sustainability is a daunting challenge. At times, it seems more the prerogative of a deity than a mandate for mortals.

Part of the problem is that thinking through the ramifications of our actions is difficult. The chain of causation is simply too long and twisted. If we attempt to specify the social and environmental effects of action a on b and b on c, we are likely to lose focus before we get to f or g, let alone z. Indeed, the challenge is more profound. Living as we do in networks of interdependence, action a does not simply produce effect b. It also produces side effect b^1 or, more likely, side effects b^1, c^1, and d^1. Each of these side effects in turn serves as cause for another series of effects and then side effects. Like a stone thrown in a pond, the repercussions of our actions ripple out like waves in all directions. Each of these waves, when encountering an obstacle in its path, produces a new set of waves radiating with altered frequencies and amplitudes. The mind reels at the possibilities. Even the impact of the least of our actions is beyond our capacity to compute or comprehend. The imperative to live sustainably within the vast and intricate web of interdependent relationships that constitutes our world would appear to require knowledge verging on omniscience and power just shy of omnipotence.

In this respect, sustainability is like fine sand. It is easy enough to hold in a loosely cupped hand, and it can be used to build enduring structures. But the more one tightens one's grip, the more it slips through one's fingers. As an ideal, sustainability is easy enough to grasp. As a principle and vision, it can be employed to build lasting communities and ecologies. When we attempt to squeeze it too tightly, however, with the intent of crafting comprehensive policies and permanent prescriptions, it escapes our grasp. The mark of education and culture, Aristotle observed, is the pursuit of only as much precision in a subject as its nature permits. Sustainability permits neither precise prognosis nor rigid policy. It is a dance with uncertainty.

As a subject for study, sustainability is inherently interdisciplinary. It requires navigating connections and managing interactions between diverse human enterprises. We live in an increasingly specialized world where a professional must know more and more about less and less simply to keep abreast of the accelerating developments within her field of expertise. Yet our world is in great need of cross-disciplinary inquiry and integrated practice. Sustainability requires synthesis. It demands the creative engagement with an ever-broadening community of stakeholders and the

adaptive management of dynamic relationships, interdependent sets of issues, and unintended consequences.

To say that sustainability is a dance with uncertainty is not to sanction the cultivation or exploitation of ignorance. (The systematic effort by sections of the fossil fuel industry and its political allies to undermine public understanding of the science of climate change is perhaps the most egregious example.) There is enough uncertainty and ignorance in the world to go around. The last thing we need are self-serving campaigns of misinformation aimed at sowing doubt and passivity. And to say that sustainability does not truck stubborn formulations and permanent prescriptions is not to sanction empty commitments or lukewarm efforts. Not at all. The point is simply that sustainability is not a theoretical enterprise aimed at closure; it is an iterated practical exercise. Though well grounded in principles, sustainability—like justice, liberty, or any other ideal—does most of its work through the contested exploration of its meaning and the tentative yet concrete embodiments of its pursuit. Like justice and liberty, sustainability is a fruit of Tantalus. It forever escapes our grasp and, for that very reason, extends our reach.

Although essentially contested in its meanings and impossible to attain in any absolute or unchanging form, sustainability presents itself as an imperative. Clearly business as usual is not an option, at least not if we value civilization and the diversity of life. At the current rate of demographic increase, economic growth, and technological expansion, we would need to colonize many more planets to maintain our current trajectory of consuming, disrupting, or despoiling clean air, freshwater, arable land, fossil resources, wilderness, biodiversity, and a stable climate. And if our current practices are any indication, these newly colonized planets, like the one we now call home, would be marked by astounding levels of inequity and injustice. But if we cannot carry out business or our personal lives as usual in the face of such monumental concerns, then what should be done?

Many books available today attempt to answer this crucial query by endorsing a particular public policy or supplying a wish list of technological innovations. *Indra's Net and the Midas Touch* is not one of them. It does not identify specific policies to adopt or specific things to build or buy. This book does not supply the silver bullets that people understandably hope to gather at political rostrums, discover in laboratories, or pluck off

store shelves. In the arena of sustainability, there are no silver bullets. Remedies touted as such inevitably ricochet.

The point is not to abandon hope. Quite the contrary. Hope is our greatest resource in these troubling times. But the hope we claim and cultivate must come from decidedly new ways of thinking and acting. My intent is to provide a means for readers to reorient their lives from the vantage point of a new set of nested habitats. From this sobering yet invigorating vantage point, we can understand why sustainability will not arrive on our doorsteps like a package. It will not be found in a particular plan or product. Rather, it can be experienced only as action grounded in awareness and as a new way of seeing that arises from a new way of doing.

In Antoine de Saint-Exupéry's *The Little Prince*, the stranded pilot is asked by the boy to draw a sheep. None of the attempted sketches pleases the little prince. Finally, the pilot draws a parallelogram, announcing it as the box in which the sheep is sleeping. The little prince is delighted. Like the artistically challenged pilot, I cannot produce a detailed picture of a sustainable future replete with green guidelines and gadgets. Instead, I offer an account of the kind of thinking and behavior that got us into our current predicament. In turn, and more important, I explore the sensibilities and practices required to chart a course to more hopeful seas.

The Habitats of Contemporary Life

An *oikos* is a habitat or dwelling place, a spatial realm characterized by a network of relationships. In this book, I expand the meaning of *oikos* to include the many distinct, albeit interconnected, networks of relationships that we inhabit today. Our habitats, in this respect, are not limited to geographical locales. They may include any system of interconnected associations characterized by identifiable actors, dynamic patterns of interaction, and established, if ever transforming, meanings. An *oikos* is a nested realm of complex interdependence.

We often speak of the "world of art" or the "realm of law." We are referring to a system of interconnected associations—aesthetic or legal in this case—characterized by specific actors, modes of interaction, and meanings. This book examines eight such habitats, eight swatches of the fabric of life. They are the distinct yet interconnected domains of ecology, ethics, technology, economics, politics, psychology, physics, and metaphysics. These

fields of inquiry and facets of life do not exhaust the contemporary landscape. I leave out the aesthetic and legal realms, as well as the disciplines of medicine, chemistry, mathematics, communications and media, and many others. But the habitats addressed in the following chapters most powerfully display the growing interdependencies of contemporary life.

The first chapter investigates ecology. Ecology pertains to the study of ecosystems, the networks of relations maintained and transformed by populations of diverse species in the common pursuit of sustenance, physiological growth, and reproduction. There are many distinct ecosystems on the planet, though with the possible exception of deep-sea vents, remote islands, or oases of life surrounded by impassable physical barriers of sand or stone, such communities of life are never wholly self-enclosed. Increasingly, the planet's ecosystems are interconnected by global phenomena such as climate change and the transportation and dissemination of pollution and species. Ultimately ecology is the study of the biosphere, the combination of the planet's ecosystems. The realm of ecology is the dwelling place of biological life. Safeguarding this *oikos* is the central task of sustainability.

Chapter 2 explores the realm of ethics—the network of values and norms we establish with our fellow men and women, and, potentially, the values and norms we assume regarding other species. These may take the form of abstract principles and standardized rules of social conduct or more diffuse regimes of comportment—often labeled virtues—that contribute to the "good life." Ethics is a place of rights and responsibilities, reciprocity and obligation, character development and personal conduct. At base, ethics refers to the principled practices we develop to sustain the communities that sustain us. To exist in the moral realm is to be occupied with the rules, modes of behavior, and understandings that facilitate well-governed, just, and beneficial communities. Sustainability is an ethical sensibility and commitment—arguably the ethical sensibility and commitment most in need of cultivation today.

Technology is the topic of chapter 3. Technology pertains to tool-making, machine-building, and, in its most advanced form, the crafting of artificial forms of intelligence and life. While the technology of our prehistoric forebears was very limited and relatively sparse—a few wooden clubs and spears, a flint for making fire, a stone axe—the world of contemporary humans is largely defined by tools, machines, and other engineered

processes and products. Indeed, it is difficult to imagine our lives apart from the technological capacities and artifacts that we develop and deploy at an accelerating rate. Technology has made its indelible mark on the world and on the human species itself. It increases our ability to achieve concrete goals with ever-greater efficiency while simultaneously heightening the peril of unintended consequences. Characterized by the manipulation and mastery of the world through innovation and craft, technology both threatens the sustainability of civilization and defines its development.

Chapter 4 focuses on economics, the world of market relationships. The economic realm is a place of production and exchange—the making, buying, selling, and bartering of goods and services. Notwithstanding the dictum of caveat emptor, that the buyer must beware, relationships within the economic realm typically rely on social trust. This trust is grounded in common practices, in the rules of fair play, and in laws established by political regimes to govern market transactions. Notwithstanding such ethical and political foundations and the affective bonds, norms, and cooperative pursuits that develop through them, economic relations are driven by the engine of self-interest. The way we collectively organize the pursuit of self-interest bears directly on the public benefits and ills that economic life produces. Economic pursuits divorced from ecosophic awareness threaten the very fabric of life today.

The arena of politics occupies us in chapter 5. Politics is the place where power is publicly generated and used to define and pursue public goods. A crucial public good is a healthy environment. Another public good within democracies is power itself. To be sustainable, a democratic political system must foster an equitable sharing of power as a public good and a means to the equitable sharing of other goods (as well as responsibilities and risks). The relationship of democratic politics to sustainability is one of the most intriguing and important topics of concern today. Understanding the fundamental interdependencies of political life, and the meaning of freedom within these public relationships, may inspire us to conceive anew the challenge of sustainability.

Chapter 6 addresses psychology—the realm of the mind, self, or soul. The *psyche*, which is what the ancient Greeks called the soul, is an inner dwelling place, and like any other habitat, it is a place of relationships. As self-conscious creatures, human beings establish relationships with

themselves. But the self is not a simple dyad. Each of us, as Walt Whitman famously stated, is a multitude. Psychological health depends on the proper development of the soul's distinct parts and their proper integration. Psychological health is related to ecological and social health. What we do in and to the world outside largely depends on the state of our inner worlds. Our external relationships reflect and have an impact on the network of connections within. Sustaining the world and sustaining our souls are synergistic endeavors.

The fields of physics and metaphysics are combined in chapter 8. Physics and metaphysics explore and situate us within our cosmic dwelling place. Physics pertains to the empirical world of matter, energy, and their patterns of generation and transformation. Metaphysics, though it does not reckon with empirical observation or experiment, is equally concerned with universal laws and relationships. Eternal questions, such as the ultimate nature of being, are its mainstay. Contemporary physics explains normal cause-and-effect relationships in our universe but also finds evidence of more encompassing and pervasive forms of interdependence. At a quantum level, physics presents us with seemingly nonmaterial forces at play. Experimental evidence today suggests a level of connectedness in the cosmos that ancient metaphysicians first hypothesized. It is through the realms of physics and metaphysics that we glimpse the full breadth and depth of interdependence and the cosmological context of unintended consequences.

A few decades ago, it was fair to say that an ecological "view of existence" and an appreciation of interdependence were "alien to Western ways of looking at things."[7] Today it infuses a wide array of our disciplines and practices. Yet these domains of knowledge and practice, historically and now, often acknowledge specific aspects or features of interdependence only to disregard its pervasive presence and profound implications. The chapters that follow highlight the growing recognition of interdependence within eight fields of inquiry and facets of life. They also address the tendencies within these habitats to ignore the full depth and breadth of interdependence and its implications.

It may be obvious why and how ecology, ethics, technology, economics, and politics find their place in a book dedicated to better understanding and caring for the web of life. These topics are standard fare in research and writing concerned with sustainability. But why would readers

interested in sustainability—people rightfully concerned about climate change, worried about overpopulation and resource depletion, pained by the extinction of species, intrigued by the opportunities for renewable energy, and committed to social empowerment in a divided world—grapple with chapters devoted to psychology, physics, and metaphysics? What does sustainability have to do with the structure of the human psyche and the composition of the cosmos? The answer to this question highlights the radical claim of *Indra's Net and the Midas Touch*.

Today *sustainability* is dangerously close to becoming a moniker for the engineering of a particular sort of world. Yet it is precisely humanity's increasing predilection for world making, and our increasing power to do so, that threatens its sustainability. To become at home in a self and a world never fully of our making or within our control is the core challenge of sustainability. Meeting this challenge takes us on a voyage into a mysterious universe and our multifarious souls.

Indra's Net

In the early Pali scriptures of India, one finds the doctrine of *paticca samuppada,* which means dependent co-arising or interconnected origination. The notion is that all physical and mental phenomena come into existence and develop as interdependent relationships. Nāgārjuna (c. 150–250 C.E.), the founder of Mahayana Buddhism, denied the existence of isolated entities bearing essential natures. He argued that all beings were "empty" of separate, distinct essences. Within Mahayana Buddhism, the Avatamsaka tradition developed Nāgārjuna's notion of śūnyatā or fundamental emptiness along with the understanding that relationships of interdependence were the stuff of which the universe was made. The common tendency to perceive the world in terms of independent entities was identified as the cause of suffering (*duhkha*).

In the sixth century, the Hua-yen school of Chinese Buddhism (which flourished in the T'ang dynasty) addressed the nature of interconnectedness. Hua-yen was a philosophically oriented school that explored the metaphysics of the (meditative) practices of Ch'an Buddhism (Zen in Japan). It took its inspiration from the Avatamsaka sutra or Flower Garland scripture, originally written in Sanskrit but translated and completed in Chinese. The sutra described the universe as "one great scheme of

interdependency."[8] A favorite topic of the Hua-yen school is the story of Indra's net.

Indra is the lord of heaven and the king of the Vedic deities. Over his palace on Mount Meru, the *axis mundi* of Vedic cosmology, hangs a net that stretches infinitely in all directions. At each node of the net, where the heavenly strands intersect, hangs a jewel. Stretching across the unending breadth of the universe, the jewels are infinite in number. They are also infinite in composition. Each facet of each jewel reflects all the other jewels hanging from the net.

The brilliant jewels presenting an infinite cavalcade of reflections are stunning, but they have no independent essence. The jewels of Indra's net are not enduring substances. Rather, each jewel is manifested only as a reflection of all the other jewels. Each gem owes its existence to the network of reflections to which it contributes.[9]

The story of Indra's net is meant to illustrate the interdependence and interpenetration of phenomena. All the strands of the net are connected. Loosen one, and all are loosened. Sever one, and the whole is weakened. This is the meaning of interdependence. Like the filaments of Indra's cosmic net, the jewels hanging from its vertices are all interconnected. In turn, they also mirror each other. Indeed, they are constituted—brought into reality, as it were—through this reflective relationship. Here the part is not only connected to the whole by way of multiple linkages. The part actually includes the whole. Each jewel contains (the reflections of) all the other jewels and is, in turn, contained by them. This is the meaning of interpenetration.

Interpenetration might be thought of as an intensified, deepened form of interdependence. Interdependence refers to things existing in connection. Interpenetration asserts that connectedness itself (rather than things existing in connection) constitutes the most fundamental reality. When we focus on connections rather than things, we discover that the parts (the things connected) reflect and sustain the whole (the network of relationships) as much as the whole reflects and sustains its parts.

The tale of the jewel net of Indra strikingly foreshadows contemporary ecological thought, which is equally focused on relationships of interdependence rather than isolated organisms or entities. It presents us with a "cosmic ecology."[10] But this ancient tale of connectivity prefigures more than ecological discourse. The chapters of this book explore fields of

inquiry whose subject matters are increasingly grounded in an appreciation and awareness of the pervasiveness of interdependence. *Indra's Net and the Midas Touch* provides evidence for and understanding of the heightened connectedness within and across distinct realms of contemporary life, with the intent of broadening and deepening the burgeoning prospects and practices of sustainability.

When portrayed as the required remedy for our dire straits, as the only alternative to catastrophe, sustainability can be a bitter pill. It portends sacrifice. To be sure, becoming attuned to the interdependence and interpenetration of all things fosters restraint and prudence. But it also stimulates creativity and community. The manifold relationships of which the fabric of life is woven need not immobilize us. Our attentive participation in them allows us to travel the path of sustainability with hope. Awareness of the breadth and depth of our connectedness is a profound responsibility, and a blessing beyond measure.