CHAPTER 1

The Crisis of the Librarian

The greatest crisis we face, science fiction writer Robert Heinlein argued in the middle of the twentieth century,

is not Russia, not the Atom bomb, not corruption in government, not encroaching hunger, nor the morals of the young. It is a crisis in the organization and accessibility of human knowledge. We own an enormous ‘encyclopedia’ which isn’t even arranged alphabetically. Our ‘file cards’ are spilled on the floor, nor were they ever in order. The answers we want may be buried somewhere in the heap, but it might take a lifetime to locate two already known facts, place them side by side and derive a third fact, the one we urgently need. Call it the Crisis of the Librarian. (1952:21–22)

Given the many urgent planet-scale problems we face—global climate change, mass extinction, and persistent social conflict, to name just a few—it may seem strange to call the organization and accessibility of human knowledge our “greatest crisis.” If the world as we know it is ending, is it really appropriate to get all worked up about flaws in our information-organizing systems? Heinlein thought so.

He didn’t get everything right in his prognostications about the then-mythical year 2000, but he was uncannily alert to the crisis of knowledge. Before computer, internet, and portable wireless technologies came to define our way of life, there was already a widespread sense that something
was wrong. Despite the massive amounts of information and knowl-
edge humans have accumulated at ever-increasing rates, and despite our
growing abilities to manipulate physical and biological processes for our
own ends, we seem to be relatively incapable of dealing with complex
social problems, as evidenced by serial wars, ongoing violence, widespread
depression, and now, global environmental catastrophe.

Assuredly, the trouble is not that we don’t know enough. We know
more than ever about how Earth systems work and the havoc human
activities are wreaking in them. We have a pretty good sense of what’s
necessary to mitigate some of the worst outcomes for humanity and other
life forms. We have loads of data about really specific things too, like how
much carbon dioxide particular nations, activities, and appliances emit
each year on average, rates of increase in ocean acidity, which species
are likely to be directly and indirectly affected by certain environmental
changes, and so much more. In short, even with all the usual caveats
about scientific knowledge being provisional, we know an awful lot.

The current fragmentation of knowledge, however, makes it difficult
to even know what we know, much less act on it in meaningful ways.
In particular, we lack a clear sense of how to implement the changes we
know are needed. This simultaneous knowing and impotence is the real
tragedy, the ultimate crisis. If there is to be any hope of overcoming it,
we need a more workable system for organizing, accessing, and using
what we know. In a nutshell, that’s what this book is about. But before
we can move beyond the crisis of abundant yet disconnected specialized
knowledge, it’s helpful to have a sense of how we got here in the first
place.

Toward Specialization: A Brief History

From the earliest days of formal education, some way of dividing schol-
arly labor appears to have been indispensable. The curriculum in ancient
Greece, for instance, was organized into the language-oriented trivium
(consisting of grammar, logic, and rhetoric) and the math-focused
quadrivium (comprised of arithmetic, geometry, music, and astronomy).
By the late medieval era, these traditional Greek courses of study had
become preliminary for education in the professions of medicine, law,
and theology. Still, up to this point, the emphasis was on establishing
and using a general method of academic inquiry, rather than on discov-
ering new knowledge (Dirks 1996). This was to change in the coming
centuries.
The fifteenth, sixteenth, and seventeenth centuries brought major shifts in how people viewed the universe and sought knowledge about natural phenomena. Intense scientific activity and associated changes in social thought ushered in what is often called the Enlightenment era, a period of ongoing discovery spanning the mid-1700s to late 1800s. Especially significant was the establishment of a scientific method which prioritized empirical evidence, the role of mathematics, and the accumulation of new knowledge. As humanity’s store of scientific knowledge about the world grew, so did the need to organize it. Thus commenced a period of more intensive specialization in knowledge about particular aspects of reality.

The fact that specialization occurred is not surprising. Less inevitable, though, were the specific forms it took in the academy. One obvious manifestation of this increasing narrowness was the structure of academic disciplines, which gradually took shape within particular social and historical circumstances. Noteworthy among them were the professionalization of scholarly activity (which was formerly viewed as more of a natural gift or religious-like vocation) and the creation of institutional structures in the form of academic departments, journals, societies, and reward systems (Dirks 1996). This is particularly evident in the history of the American university.

Today it is nearly impossible for college students in the United States to imagine their schools without the departments and majors that seem so essential; they might be surprised to learn that this setup was far from normal in the nation’s young institutions. In 1765, for instance, the College of Philadelphia (now the University of Pennsylvania) became the first among the nation’s nine chartered universities and colleges, and most of the non-chartered ones, to institute the co-existence of more than one department when it added a medical school to the existing “collegiate.” It was not until 1825 that Harvard created departments, with great resistance from its faculty, and the University of Virginia opened with parallel curricula in seven different departments they called “colleges.”

Following the US Civil War and the combination of discouraging enrollment trends, a desire to remain competitive with European universities, and an increase in available surplus wealth, a period of deep reform in higher education began. Tensions ran high as a result of competing ideas about the purpose of American higher education. While some advocated a unity of knowledge and cultural standards through the liberal arts, others prioritized research and the development of general empirical methods for solving particular problems, and yet another faction viewed
practical public service through vocational training as the proper goal of higher education, one that would bridge the gap between lofty academic pursuits and “real life” (Vesey 1965). On top of these competing interests, educational reformers of all stripes had to contend with hostility to higher education from certain sectors. Industrial leaders and ill-educated Americans, in particular, had “little enthusiasm for the foreign, the abstract, or the esoteric” and expressed a general mistrust of bookishness and a skepticism about the material security that an education could bring (Vesey 1965:13).

The eventual success of universities and colleges in the United States came less from winning over an unsympathetic populace than from favorable political circumstances and strategic maneuvers through which promoters of education were able to incentivize the creation of universities across the states. Around 1890, as this period of intense reform was drawing to a close, it seemed that proponents of a unified academic culture, specialized research, and public service were peacefully coexisting, both within and between institutions. This tenuous harmony, however, would soon evaporate as education’s pendulum began to swing in a different direction.

The intellectual wholeness fought for by liberal arts advocates gave way to narrower elective courses of study. Interestingly, champions of research were also critical of this shift, arguing that it led to an excessive smattering, faulty preparation, and cultural amateurism. At the same time, science itself was becoming an object of contention. The word science went from referring to an organized body of information about a subject to an approach to knowledge-seeking that aspired to account for the entire universe. This shift inspired mistrust, especially by those who drew clear boundaries between Nature and Spirit. Ultimately, these tensions resulted in a series of fractures.

Psychology, with a new emphasis on scientific research, split off from the more idea-based philosophy. English was divided into different concentrations—one on culture, via literature, and the other on more empirical philological research. Sociology diverged from economics, which soon underwent its own internal division. Meanwhile, the very idea of topical specialization was reified into rigid academic divisions with the establishment of professionalized disciplinary training in graduate programs.

The first two decades of the twentieth century brought an intense splintering of new fields from existing disciplines. New departments
proliferated, departmental expansion became an end in itself, and competition for resources to support it became the norm. Prominent academics began to voice concerns about over-specialization and the loss of cohesion in higher education institutions (Moran, J. 2010). Universities soon “crystallized into a collection of divergent minds, usually ignoring each other, commonly talking past one another, and periodically enjoying the illusion of dialogue on ‘safe’ issues” (Vesey 1965:58).

Interestingly, this description of turn-of-the-twentieth-century higher education could easily be mistaken as contemporary. With increasing specialization being the dominant trend in higher education for the past hundred years, academics today still share the same concerns (Gaff and Ratcliff 1997). The only real difference is that, after moving for so many years in this general direction, we find ourselves much farther down the road.

**Fragmentation and the Knowledge Crisis Today**

In stark contrast to the early days of American higher education, when introducing a new special degree was considered radical, by the first decade of the twenty-first century the Digest of Education Statistics listed over 1000 different degrees that could be obtained in the United States at the bachelor’s, master’s, or PhD level—*not* including professional degrees like law or medicine or the many specialized associates degrees available. Within the 30 major headings the list is divided into, one finds further specialization in respective fields: 86 separate specialized degrees under business, for example, 96 in education, and 182 in health professions and related clinical sciences (Jacobs 2013:205). In terms of degrees offered, applied fields exhibit greater levels of specialization than the arts and sciences, but even within identical degrees in those fields, growing numbers of subdisciplines reflect high levels of specialization.

In my field of sociology, for example, the American Sociological Association (ASA) currently recognizes 52 subsections, representing the many specialties with which fellow PhDs might identify. This is up from two in 1959, five in 1961, and 44 in 2006. According to the ASA Section Manual, growth has been consistent, but especially intense in the past two decades. Other disciplines show similar trends. At the time of this writing, the American Political Science Association (APSA) is split into 47 sections and the American Psychological Association (APA) has 54 divisions. In many ways, this differentiating makes sense. There are, after
all, real constraints on the breadth of mastery one can achieve. Among them is the challenge of keeping up with the research in a given field, a challenge that has grown dramatically in recent years as information technologies have expanded availability and access.

Today, we are literally surrounded by information. It takes not only the familiar shape of letters and numbers imprinted on readable surfaces in any number of ingenious formats, but we are awash in a steady stream of waves bouncing here and there, transmitting the ones and zeros which are ultimately decoded by computers and appear to us as words, images, and sounds. As the encyclopedias and file cards Heinlein mentions have come to be replaced by search engines and databases, the magnitude of the knowledge crisis has only grown. In our so-called information age, the simple effort to learn something about a particular subject can quickly induce a sensation of drowning. Trying to find information today has been likened to attempting to drink from a fire hose. So as to not be overwhelmed by its volume, speed, and force, the torrent must be diverted into smaller courses, reducing it to a flow that the human organism can usefully assimilate. It is not surprising, then, that growing specialization accompanied the growth of information and knowledge.

By 1970, specialization was said to be “doubling every decade or two,” as measured by the multiplication of professional organizations, journals, courses within respective fields, and the classification terms used in abstracting and indexing services (Lasswell 1971:440). In fact, the growth rate of active peer-reviewed scholarly and scientific journals has been an almost constant 3.46% per year for most of the last three centuries (Mabe 2003:193), representing a doubling about every 20 years. In the decade between 2002 and 2011, the number of active, refereed, scholarly journals more than tripled, going from 16,925 in 2002 to 57,736 in 2011, while at the same time, the number of articles per journal and pages per article increased at even higher rates (Tenopir and King 2014:167).

All of this points to a massive explosion of scholarship that, in principle, academics might be expected to stay informed about. In practice, though, keeping up even within just one discipline became virtually impossible. In this context, specialization among and within disciplines can be seen as a useful tool for cordonning off one’s attention to allow focus on a particular slice of reality. This way of thinking about it sheds light on the meaning of the term “discipline”—as in a discipline of focus on this, but not that.

The problem is that, without a complementary effort to pull it all together and organize it in some way, disciplinary isolation only intensified. Boundaries were solidified and reinforced through specialized terminology and advanced training, exacerbating the fragmentation of
knowledge. Rather than a functional adaptation, the resulting disciplinary structure came to be increasingly viewed as a hindrance to communication across fields, the growth of genuine knowledge, and our ability to deal with complex problems. This “spread of specialized deafness,” as Kenneth Boulding put it, “means that someone who ought to know something that someone else knows isn’t able to find it out for lack of generalized ears” (1956:199). As a consequence, there was growing recognition of the problem of “undiscovered public knowledge”—knowledge, which in its fragmented state, remains unrealized because the necessary pieces of information have not been put together (Swanson 2001). This is precisely the situation Heinlein saw as “the greatest crisis facing us.”

One of its greatest dangers lies in the ways that the fragmentation of knowledge can misrepresent and distort reality. How we currently talk about the “natural sciences” and “social sciences,” for example, gives the impression that their subject matter—biophysical and human social phenomena, respectively—somehow exists separately. This has served to reinforce the modern western view of humanity as a phenomenon alongside or above nature, as opposed to in and of it. Further obscuring reality are the politics of academia, where jockeying for prestige and resources impels each discipline to promote its distinctive significance at the expense of understanding the relationship between its subject matter and that of other disciplines.

The resulting sense that economics and ecology, for instance, are merely different areas of inquiry obscures their interrelatedness in ways that do real harm. This separation lends itself to a view of “the economy” as an independently existing thing, encouraging us to think about the production and profits related to cars, computers, corn, and cancer treatments in abstract terms (e.g., Gross National Product) which ignore their biophysical contexts and socio-environmental consequences. From these critical observations of the ways that disciplinary isolation can misrepresent reality have come various efforts to set things right. Prominent among them was the push for interdisciplinarity.

**Re-uniting Knowledge**

In a 1993 MIT lecture, physicist John Armstrong colorfully reminded his audience that “God did not create the universe according to the departmental structure of our research universities.” Whatever the practical utility of disciplinary boundaries might be, he subsequently wrote,
“they lull us into forgetting that nature is interconnected and complex in ways we still only dimly perceive” (1994:118). The rise of interdisciplinarity reflects the desire to pursue a more unified form of knowledge which more closely resembles a unified Nature. More practically, though, it was also seen as an antidote to the fragmentation of knowledge wrought by over-specialization and the solution to “problems and issues that cannot be addressed or solved within the existing disciplines” (Moran, J. 2010:13–14). If the structure of the academy must be changed to accommodate reality, like-minded thinkers argued, then perhaps the structure itself is part of the problem (Caldwell 1983).

These concerns catalyzed the formation of a number of interdisciplinary fields—beginning with area studies, American studies, and comparative literature in the 1930s and 1940s and expanding into the multitude of new “interdisciplines” like molecular biology, cognitive science, and biomedical humanities in the early twenty-first century. The rapid expansion of interdisciplinarity represents “a major episode in the history of knowledge,” and the fact that the formation of new disciplinary combinations is no longer unusual is an indication that interdisciplinary studies serve a need that is not going away (Klein 2005:77). Among the other evidence of growth in interdisciplinary activity includes: the appearance of interdisciplinary initiatives on campuses (Borrego et al. 2014), the prevalence of interdisciplinarity in new journals (Jacobs 2013), the multiplication of funding opportunities aimed explicitly at promoting interdisciplinary research (Lyall et al. 2013), and the increasing frequency of work attempting to bridge the natural and social sciences (Braun and Schubert 2007). This last item has been especially prominent in efforts to understand human-environment relations in order to be better able to address problems of increasing concern.

Toward that end, the National Academy of Sciences declared interdisciplinarity to be an integral feature of scientific research. They cite the inherent complexity of nature and society, the desire to explore problems and questions not confined to a single discipline, the need to solve complex societal problems, and the motivation to develop new technologies as reasons for the shift (2005:30–39). Movement in this direction is also evident outside of the sciences proper. The emergence of sustainability (with its explicit focus on the need to harmonize environmental, social, and economic systems) as a priority for cities, businesses, and organizations; a growing emphasis on resilience, and the normalization of the concept of “socio-environmental” as a more accurate descriptor of the
interrelated social and biophysical subsystems that mutually influence one another are all examples. These developments are important for getting us out of the conceptual trap of thinking and speaking about environmental problems as if they were somehow separate from people and for reminding us that the problems observed are rooted in the relationships between human activities and biophysical systems.

Seeking Socio-Environmental Approaches to Socio-Environmental Problems

In the face of overwhelming evidence that human activities are endangering certain natural systems and thus jeopardizing human health, quality of life, and the long-term survival of our species, efforts to better understand the dynamic interdependence between biophysical and human social systems, practices, and behaviors have multiplied. In the 1960s and 1970s, novel environmental sub-disciplines, such as environmental psychology, environmental history, environmental philosophy, environmental sociology, and more were created to address the observed neglect of the environment in those fields. At the same time, arguments about the inadequacy of a discipline-centered approach were becoming ubiquitous in the literature.

These observations inspired attempts to re-imagine education and research along socio-environmental lines. Environmental sciences and studies, for instance, grew out of the “misfit between perceived need, experience, information, and the prevailing configuration of knowledge embodied in the disciplinary organization of academia” (Caldwell 1983:249). As the sense of this misfit expanded, so did environmental sciences and studies programs.

In the 1950s, Syracuse University was the first to institute an environmental studies program, awarding the first bachelor’s degree in Environmental Studies in 1956. In 1965, Middlebury College in Vermont created the second program in the United States. From two in 1965, the number of interdisciplinary environmental studies programs quickly multiplied, with 90% of them at the undergraduate level. The total grew to more than 500 in 1990, and then more than doubled over the next twenty years to 1200. This record, and the continuing creation of new programs, made environmental studies and sciences “one of the fastest-growing fields of undergraduate study in the country” (Maniates 2013:256).
Political scientist Harold Lasswell described the rapid development of interdisciplinary environmental studies as part of a “counter offensive” to the growing fragmentation of intellectual life and decreasing numbers of scholars attending to “the map of knowledge as a whole” (1971:439). Others noted that this fragmentation was evident even in places where the purported goal was to promote holistic knowledge. Wes Jackson, botanical geneticist and Chair of one of the United States’s first environmental studies programs, contends that the very existence of environmental studies highlights the failure of the liberal arts to muster the attention and cooperation needed to study big, complex, socio-environmental problems within standard departmental structures (Jackson 2013).

If the existence of environmental studies is an indicator of failings in higher education, then the inability to effectively integrate disciplinary knowledge reflects the failings, to date, of environmental studies. A 2010 assessment of college and university environmental studies and sciences programs concluded that they generally suffer from unclear goals, a dis-integrated disciplinary hodgepodge, and incoherent curricular smorgasbord (Clark et al. 2011). At a time when the need for dynamic interdisciplinary environmental programs has never been greater, “those who plan and deliver these programs appear to be selling their students and the planet short” (Maniates 2013:255).

Despite the best efforts of those of us teaching in environmental studies, effective integration has not been adequately achieved, and demands for a synthesis of relevant knowledge persist. Acknowledging that there is still a place for the separate study of physical, biological, and social systems, environmental psychologist Paul Stern (2013) argues that what is new and noteworthy is that “the space where it no longer makes sense to study the systems in mutual isolation has been growing at an accelerating rate.” It is this very change, he says, that has long incited demands for a new science which studies the relationships between social and biophysical systems. One such demand came in the form of a 1993 paper calling for a “second environmental science” of human-environment interactions (Stern 1993). To the chagrin of sociologist, Riley Dunlap, this call came 15 years after the founding of environmental sociology, intended to do just that. For him, Stern’s call and the fact that alternative approaches “like ‘coupled human-natural systems’ and ‘sustainability science’ and the like emerged without any seeming awareness of environmental sociology” reflect the silo nature of academia (Dunlap 2013).
Despite these developments and decades of intense efforts to integrate knowledge about the biophysical world with what we know about the human systems, activities, and behaviors which are part of and interact with it, researchers continue to churn out the same conclusion: we need to do better. In particular, the mantra goes, we continue to need a more effective integration of the social and natural sciences (Moran, E. 2010; Smith 2009; Stafford et al. 2010; Stock and Burton 2011; Tahir 2009; Victor 2015; Wei et al. 2015; Zax 2009). In taking a closer look at what we know about the planet, our current situation, and our prospects for the future, we can better appreciate why this integration is so very crucial.

**Thresholds and Trajectories**

As a result of generations of hard work observing, measuring, and gathering information from around the world, scientists have attained an impressive understanding of how non-human natural systems work and about the state of things within them, now and at various points in the past. More recently, they have also come to understand some of the key changes humans have brought about in these systems, from local to planetary scales. Especially significant are the critical tipping points we are now able to discern. Certain human activities have brought us to thresholds beyond which systems begin to behave differently, where the same activities set in motion mutually reinforcing feedback loops propelling a system onto a new course. The collapse of ocean fisheries, acceleration of melting ice sheets, upwelling of warmer ocean waters, methane release from thawing sea beds, climate volatility, extreme drought, fertilizer-induced shifts in lake ecologies, and the demise of tropical coral reef systems are all examples of troubling thresholds that have been well-studied (Rockström 2015). In all of those cases, anthropogenic impacts threaten the homeostasis of the systems on which humans, and countless other species, rely.

In order to create a more detailed picture of human-driven changes to Earth systems, a group of scientists assembled decades of data collected by the International Geosphere-Biosphere Programme—an initiative launched in 1987 “to coordinate international research on global-scale and regional-scale interactions between Earth’s biological, chemical and physical processes and their interactions with human systems” (IGBP 2016). This group examined trajectories of a number of key indicators between 1750 (the start of the industrial revolution) and 2000. Their
efforts produced what have become known as the “Great Acceleration” graphs, named for the dramatic acceleration in Earth system and socioeconomic trends around the middle of the twentieth century, subsequently updated with data through 2010 (see Figs. 1.1 and 1.2).

Most striking about these graphs is how well the post-industrial rise of key production and consumption activities tracks with indicators of dangerous trends in Earth systems. Observing this offers a planet-scale
view of what many socio-environmental researchers refer to as the “coupling” of socioeconomic systems and the overall “Earth System,” thanks largely to intense globalization of production and consumption practices. Related to this is an even more comprehensive threshold scientists have recently identified: the point at which humans became a force of change on par with the geo-chemical-physical forces which have thus far shaped the biosphere. This new epoch has been dubbed the Anthropocene.
The efforts which produced the “Great Acceleration” graphs not only provide evidence of this shift—showing that most Earth System indicators have moved “outside of the Holocene envelope of variability” observed over the past 12,000 years—but also pinpoint the onset of the Anthropocene as the mid-twentieth century. More precisely, they’ve designated Monday July 16, 1945, as the day we crossed that threshold (Steffen et al. 2015:12). In just over two generations—within the span of a single lifetime!—humanity has become a fast-acting force of planetary change. At the moment, the changes we’re bringing about do not bode well for humans or the countless millions of species with whom we share the Earth and on whom we depend. For this reason, the most prominent theme in socio-environmental literature today is: we can’t go on doing what we’re doing. Most analysts put it more bluntly, stating that “business as usual” spells almost certain disaster. This is especially apparent in the phenomenon of climate change.

Climate science shows that the continuation of current trends in carbon dioxide emissions will soon carry us across dangerous system thresholds, beyond which planetary warming will accelerate regardless of what we do, making much of the planet uninhabitable for humans and many other species (Anderson and Bows 2011; Hansen et al. 2013; Stern 2006). Additional dangers noted are threats to national security (Steinbruner et al. 2013) human health (CDC; WHO), and societal collapse (Conniff 2012; Kolbert 2005). While the details of these prognoses and the treatments prescribed are contested (not surprising, given the complexity of the problems and the degree of economic investment in “business as usual”), what is not legitimately arguable is that human organisms depend on a very particular range of biophysical conditions for their survival. Simple logic, then, suggests that there are definite limits to what we can get away with doing to the biosphere.

Clinging to the “dominant western worldview” (Buttel 1996), characterized by its failure to acknowledge the biophysical bases of human social life, are some who willfully ignore or contest the very idea of limits. For example, economist Julian Simon famously took issue with the notion of “finite,” wondering: “Why shouldn’t the boundaries of the system from which we derive resources continue to expand...just as they have expanded in the past?” (1981:49). But as the Great Acceleration Project and other studies emphasize time and again, the recent human past is an anomaly in the larger picture of human history and thus a poor indicator
of what future trends might look like. Looking back, we find our ecological limits consistently revealed in the collapse of societies who exhibited sustained disregard for them. Though aware of only a small fraction of the societies who have come and gone in this way, we now understand that societal collapse is more the rule than the exception (Tainter 1988).

As sociologist William Catton eloquently stated in his book *Overshoot*, “we are in no way protected from the consequences of our actions by remaining confused about the ecological meaning of our humanness, ignorant of ecological processes, and unmindful of the ecological aspects of history” (1982:vii). Though confusion and even ignorance are perhaps understandable, neither state alters the facts of our existence or the consequences of our actions. Allowing ourselves to remain in those states is pure folly, the kind that Blue Oyster Cult famously sang about in their 1977 hit song, Godzilla: “history shows again and again how nature points out the folly of men.”

Given the multitude of limits we are currently courting and surpassing, the end of the world as we know it has become a popular topic. Though no one can predict exactly how a collapse scenario would unfold, the recent boom in speculative fiction about the unraveling (and sometimes re-organization) of society has plenty of visions on offer. Collapse scenarios in this genre and its various flavors (e.g., dystopian fiction, “cli-fi,” and “prepper porn”) usually involve some combination of themes related to climate change, post-fossil fuel, political-economic upheaval, and massive epidemic-induced die-off. They seek not so much to predict the future, but to elucidate important features of the present that, if continued, are likely to result in some form of brave new world.

This kind of fixation on “the end” is itself not new. Every modern generation has believed itself to be at the precipice of transition, argues author Nathaniel Rich. But, he says, things really are different now. “There has never been a generation in the history of human civilization with more access to bad news than ours” (Rich 2013). Endless information about global warming, infectious disease, food safety, nuclear warheads, widespread poverty, cybersurveillance, natural disaster, and more is only a few taps away. “We’re information-saturated,” Rich continues, “and most of the information is ominous.” Among those paying attention, there is an anticipatory undercurrent of doom or radical social change or both. Dramatic flourishes aside, socio-environmental researchers confirm that these folks are onto something.
Turning Things Around

Analysts who understand the situation know that massive social changes are inevitable, for at least three main reasons: “the era of cheap and easy fossil fuels is over…climate stability is now a thing of the past…[and] we’ve reached the end of economic growth as we’ve known it in the U.S.” (Miller and Hopkins 2013:i). More specifically, with the understanding that excessive warming (i.e., a couple of degrees above the pre-industrial average) is likely to result in widespread food, water, weather, and sea level stresses, climate scientists urge that “a planned economic contraction to bring about the almost immediate and radical reductions [is] necessary” (Anderson and Bows 2011:41). Admittedly, these actions are outside the bounds of conventional politics in most countries. Yet the science repeatedly confirms that gradual or incremental changes, much less “business as usual,” are a path to catastrophe. Rather, “to slow down, let alone reverse, increasing carbon emissions and temperatures requires the total reorganization of social life” (Urry 2009:198) and a “revolution in the sense of massive social movements and alterations in how we run our economy and use energy and resources” (Foster 2012). Summing it up concisely, writer Brentin Mock (2015) says, “want to fix the climate? first, we have to change everything.”

The key takeaway here is that, ready or not, change is coming. On the one hand, doing nothing puts us on a path toward massive unplanned changes (especially in energy, climate, and economic systems), leaving us to react to crises as they unfold. On the other hand, making the necessary adjustments ahead of time in energy and economic systems to avert the worst of potential disasters entails sweeping changes of its own, albeit the kind made deliberately. Seeing this latter option as preferable, many researchers and concerned citizens have long advocated for proactive restructuring of key social systems to steer us away from widespread catastrophe, and toward greater resilience and more satisfying lives.

Generic prescriptions for such change abound. We are told, for instance, that “sustainability demands changes in human behavior” (Fischer et al. 2012:153), that “consumer cultures will have to be re-engineered” (Assadourian 2013:113), and that it will take “massive political will to counter the momentum of dangerous trends” (Raskin 2014:1). In short, there appears to be nearly unanimous agreement among socio-environmental researchers that a transition to sustainability “requires a social avalanche of unprecedented proportions” (Fischer et al. 2012:158).
The problem is that, while they have a lot to say about what should be done, they have much less to offer when it comes to the how. It is common for discussions like this to conclude by asking “who or what might start this avalanche?” (Fischer et al. 2012:157) and “who will change the world?” (Raskin 2014:6). With regard to a viable theory that can guide us in making the much-touted preemptive social transformation, sociologist Robert Brulle (2012) points out, “we really don’t have one.”

**The Need for a Synthesis of Knowledge**

In response to observations like these, others have noted that, in addition to ecological and social crises, we have a profound crisis in the dominant paradigms of environmental social science, which “can merely define a problem but offer no coherent and politically plausible program of action” (White 2012). Despite vibrant activity in the areas devoted to better understanding human-environment relations, we are still in the position of wondering how to best think about and study them, and increasingly asking how to actually do what it appears we must. Professor of sociology and human geography Karen O’Brien says, “we are still pretty much in the Dark Ages when it comes to taking in existing and emerging understandings of human development and social change.” The hope that people will adopt universal values to catalyze change at the scale and rate needed is unfounded in a situation where science admonishes humans for crossing dangerous thresholds, but provides no sense of how we should respond. Our own disciplinary barriers, she adds, get in the way of bringing together the knowledge we need for “navigating the world back into a safe operating space” (O’Brien 2015).

It has become clear, as Jacobs (2013) argues in his defense of disciplines, that interdisciplinarity is not synonymous with integration or synthesis. Despite half a century of concerted interdisciplinary development in socio-environmental studies, the need—among practitioners, teachers, and students alike—for theoretical integration persists (Proctor et al. 2013). The last decade has illustrated that “integrating research disciplines to deal with complex sustainability related problems is far from unproblematic,” and that there remains a wide and stubborn gap between the ideal of disciplinary integration and its achievement in reality (Stock and Burton 2011:1092).
Increasing fragmentation of, and competition among, a growing mix of disciplines and methods, along with the inability to effectively communicate across them, impedes the integration of the scientific work necessary for meaningfully addressing our increasingly urgent socio-environmental problems. And even if we could successfully integrate and apply all of the relevant knowledge we have, there’s no guarantee that we could turn things around. Then again, not trying pretty much guarantees that we won’t. What have we got to lose? The question then becomes: How can it be done?

Following his naming of the crisis of knowledge, Heinlein proposed that, in order to integrate knowledge in the ways necessary, “we need a new ‘specialist’ who is not a specialist but a synthesist” (1952:22). This is the idea explored in the next chapter. In examining the history of demands for a synthesis of knowledge, and some successful and failed attempts to meet them, we gain valuable insights into how to achieve the socio-environmental synthesis so desperately sought.

Notes
1. As new areas of study developed, so did a new vocabulary of terms to distinguish between varying degrees of disciplinary involvement, including, cross-disciplinary, multi-disciplinary, and trans-disciplinary, in addition to inter-disciplinary. For simplicity’s sake, I use the most common term, interdisciplinary, here to refer to diverse efforts to work across disciplinary lines. For present purposes, I tend to side with Rick Rylance in finding “this faintly theological hair-splitting unhelpful” (2015:314).
2. Interestingly, the drastic measures taken to prevent the spread of novel coronavirus (COVID-19) in 2019 and 2020 offer an important precedent showing that what was previously unthinkable—e.g., halting certain economic activities, curtailing freedom of travel, canceling major professional and collegiate athletic events, internationally coordinated efforts—is possible and can be achieved in a rather orderly and peaceful manner.

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