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COMMUNICATION CHALLENGES FOR SUSTAINABILITY

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Introduction

The concept of "sustainability" dates back to ancient Greece, but recently the word has found new popularity and cachet. At times, it appears that "sustainability" is everywhere. Walmart has a Sustainability Index and BP has a Sustainability Review. DuPont and Coca-Cola employ a Chief Sustainability Officer, and the US golf industry embraces sustainability. More than 2,500 local governments from across the European Union have signed the charter of the Sustainable Cities and Towns Campaign. Sustainability offices operate on many college campuses, and numerous academic journals have "sustainability" in their titles. Some people call sustainability the new and improved environmentalism, while others claim that "sustainable" is attached to so many things that it's no more meaningful than the word "green."

Yet regardless of the word and how it's used, there is good reason to examine "sustainability" more closely. There is abundant scientific evidence that the way humanity currently lives on the Earth cannot be sustained. Phytoplankton, which account for about half the production of organic matter on Earth, are in great decline in the oceans, oceans that are becoming increasingly acidic. Greenhouse gas emissions increased by a record amount in 2010 to the highest carbon output in history: 30.6 gigatons. The Arctic has warmed over 4 degrees, melting vast expanses of ice. The planet has air pollution, species extinction, chemical contamination, topsoil erosion, deforestation, and a global population of almost 7 billion that increases by a quarter-million each day. Decades of scientific data tell us that the myth of unlimited resource use and consumption needs to be retired. Obviously, "sustainability" in some iteration is extremely important to our lives on this planet.

This chapter investigates "sustainability" from several angles. First, it examines the term itself. Because it has been defined in dozens of ways, "sustainability" can be strategically exploited and used to communicate very different things. Second, it examines how sustainability has been conceptualized and practiced by different types of organizations. Third, the chapter discusses "sustainability science," an umbrella term for an emerging "transdisciplinary" science that addresses coupled human-environment problems and practices. Finally, the chapter explores communication strategies and pitfalls for sustainability. Given the term's many uses, there is also a variety of positive and negative aspects to communicating about sustainability.

The Lexicon of Sustainability and its Rhetorical Uses

An instructive place to begin defining sustainability is breaking the word down into "sustain" and "ability."

The first dictionary definition for the verb "sustain" is to keep going, to continue or maintain. Therefore, something is sustained if it endures and carries on. A second definition has to do with providing sustenance, as in food sustaining life and providing service in the form of nourishment. A third definition is to bear or endure, such as in sustaining an injury. And a fourth definition gets its meaning from law and science: to corroborate, prove, or affirm. For example, when the judge "sustains" the lawyer's objection, she affirms it.

The first two definitions seem good fits for environmental protection and human survival: we want to endure as a species, which requires protecting all that sustains life on this planet. Interestingly, the fourth definition resonates with how popular language surrounding "sustainability" can be used to "affirm" or legitimate certain worldviews and ideologies and make the concept self-affirming and -reinforcing.

For example, in *Hot, Flat, and Crowded* (2008), *New York Times* columnist Thomas Friedman said the current approach to sustainability is one in which "everybody gets to play, everybody's a winner, nobody gets hurt, and nobody has to do anything hard...[and] that's not the definition of a revolution. That's the definition of a party" (p 252). Friedman and others question whether modest changes in things like energy efficiency or purchasing products labeled "sustainable" serve the *image* of sustainability more than they bring about the enormous changes needed for true sustainability. A variety of scholars has argued that sustainability readily accommodates (rather than challenges or changes) the existing languages of capitalism, colonialism, consumerism, and growth (Kendall, 2011; Peterson, 1997; Corbett, 2006).

The word "ability" can be defined two ways: one, being able to do something and having the capacity for it, and two, having the skill or talent (innate or learned) to do something. This too provides an interesting insight: humans may have the "capacity" to live sustainability, but our current "skills" are to live

*un*sustainably, and these skills may blind us (individually and collectively) to a different way of being on Earth. What many of us now possess (especially in the more developed world) is sustain-*in*ability.

For example, a recent advertisement for the US restaurant chain Red Lobster proclaimed "Endless Shrimp." Many of us in affluent, developed countries live according to this mentality, treating resources as though they are indeed endless—if not naturally, then with a bit of technology and engineering. As ocean stocks of shrimp are severely depleted, shrimp farming in southeast Asia has exploded, transforming biologically diverse mangrove swamps into mono-culture shrimp farms. This technology causes fouled water supplies, intrusion of salinity, decline of marine environments, human rights abuses, and a host of other impacts. Examples in the US of our skills at "living large" are increasingly large houses and large rented storage units.

A popular concept to measure and picture sustainability is an ecological or carbon footprint. A footprint is a tally of resources used by an individual (or organization, city, or country) that estimates the land area needed to support that person's lifestyle. For some web-based calculators, even if you live modestly and use little energy, your country's resource use determines your footprint. If you live in the US, it takes almost 24 acres of productive land to support you. The footprint in the UK is 14 acres; India's is 0.2 acres. Carbon footprints are helpful for awareness regarding lifestyle impacts on the environment, but the individual-level suggestions for reducing one's impact are insufficient without macro-level changes to make significant impacts on sustainability. According to Global Footprint Network researchers, we are living so far beyond our planet's means that September 27 in 2011 was Earth Overshoot Day, the day when "humanity's demand for ecological resources and services in a given year exceeds what the Earth can regenerate in that year" (www.footprintnetwork.org).

The most widely-cited definition of sustainability is not from the dictionary, but from a 1987 report by the United Nations World Commission on Environment and Development, commonly called the Brundtland Report. This commission was interested in global "sustainable development" which they defined as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 41).

This definition more than any other has shaped our current understanding and discussion of sustainability and deserves a closer look. What key words stand out? To whom does it refer? And, what importantly is left out?

The UN Commission wanted to move discussions of global development away from the tensions between the world's developed North and less-developed South. They recognized that environmental quality is of common interest to all countries, insofar as it greatly affects (if not exacerbates) conditions such as poverty, pollution, population growth, and industrial development. Therefore, they concluded, there are three pillars underlying future "sustainable" development that needed to be reconciled: environmental, social, and financial.

The Brundtland definition has a decidedly anthropocentric (human-centered) slant in discussing human "needs," and it is ambiguous as to what those "needs" are. Many less-developed countries do not now meet the needs of their citizens, while many developed countries not only meet most needs, but also a great many "wants." This definition also could be interpreted to mean that in meeting human needs, a variety of habitats, species, and ecosystems could be sacrificed.

But even for ecologists and environmental scientists, sustainability is a contested term. Generally, a sustainable ecosystem condition is one in which biodiversity, renewability, and resource productivity are maintained over time. The science of ecology has provided rich data about the elements and processes of healthy, functioning ecosystems, as well as the points beyond which those systems are no longer sustainable, in other words when they have reached their optimal or maximum "sustained yield." However, relying on existing ecological knowledge (which is still extremely limited) can legitimize exploitation: for example, setting a "sustained yield" harvest for one species of fish to the detriment of other important substocks of fish.

The Brundtland definition focuses on humans (and their future generations), which positions humans as somehow separate from the ecosystems they inhabit, and to which they are fundamentally and inextricably welded. This dualism—believing we are separate from the natural world—is a key stumbling block not only to defining sustainability, but also to being able to live it and to learn the skills to move beyond our well-honed sustain-inability.

The lack of a universal and unifying definition of the "human environment" makes "sustainability" open to interpretation and appropriation to serve certain ends. Communication scholars claim that the rhetorical strength of "sustainability" lies in its philosophical ambiguity and range (Peterson, 1997). The many contradictions encountered in the use of the word stem from the kinds of claims people make with the concept and in its interest. Depending on what people want sustainability to mean, they are able to strategically exploit its inherent flexibility.

Sustainability—as word and concept—requires us to integrate human-environment issues not just in the biological and physical sciences but also in the social sciences, humanities, and other fields. Understanding sustainability means considering all the contexts in which the term is used—justice, freedom, ethics, environmental policy—and at levels from the personal to the organizational to global. When any organization or individual talks about sustainability, it is important to ask, "Sustainability with regard to what? And in whose interest?"

Practicing Sustainability

If we need to consider so many disciplines and contexts for sustainability, how on earth are we able to *be* sustainable and truly practice it? It just seems so, well, BIG. One way is to think of the various levels of sustainability. Though a common focus is on individual actions (Paavola, 2001), another place to practice sustainability is at the organizational level.

Virtually every corporation, a fair number of municipal or country governments, as well as non-profit and trade associations have something on their websites about sustainability or "green" commitments. This widespread attention demonstrates the popularity and "mileage" of buying into sustainability, but does it truly demonstrate a commitment to sustainability?

Again, it depends on "sustainability in terms of what?" It also depends on how this broad concept is measured. Some organizations undertake self-reports and ratings that they claim represent actions towards sustainability. Increasingly, independent rating systems are springing up, some driven by socially responsible investing firms that believe sustainability scores may affect the price of stocks or bond ratings. Measurement systems vary widely but often include resource indicators like waste minimization, water conservation, paper reduction, and decreased greenhouse gas emissions and energy use. Some rating systems also include a variety of non-environmental indicators like taxes paid, safety, leadership, and ratio of CEO-to-employee pay.

Many sustainability accounting systems refer to a *triple bottom line*, such as "social, environmental, and financial." If you envision those elements as three overlapping circles in a Venn diagram, the part where the social and financial circles intersect could be called "social equity." Where the financial and environmental circles intersect is "eco-efficiency," and where social and environmental overlap, "sustainable environments." Where all three of those intersections overlap is where true "sustainability" resides.

A 2011 research report by MIT Sloan Management Review (Haanes, 2011) states that most companies defined sustainability in terms of the long-term viability of the company, its employees and customers, not in terms of climate change or environmental concerns, which ranked near the bottom. This fits the "social equity" overlap, and matches the "enduring" and "stable" definitions of the word "sustain," but it still manages to separate humans from the natural world and not consider them fundamentally a part of it.

The MIT report also found that "embracers," whose companies are shifting their business models toward sustainability, believe sustainability will open new markets, attract employees, and improve their public reputations. If you consider the conditions under which businesses operate, this strong survival instinct makes sense. Most businesses worldwide operate in capitalistic economies based on continual growth. The stock market and stockholders consider a company successful only when each year, more money is made (and more resources consumed, more products produced). This is not sustainable.

Nevertheless, the planet's people still need to eat, stay warm, and live somewhere (we won't even consider "wants" for now). One crucial step to using the earth's resources more sustainably is accurately "valuing" environmental resources. If you value something, you tend to treat it well and not waste it; you can do that individually, and the economic market system can also attach a

value. Some economists believe that "free-market environmentalism" (which depends solely on the marketplace to price the Earth's resources) is sufficient for valuing the environment. Many economists point out, however, that while the "invisible hand" of the marketplace is able to price a ream of paper or a bushel of corn, it is unable to account for (that is, attach a price to) other significant environmental costs.

One such cost is "externalities," or costs of production that are not paid by the producer, and that have an impact on others who were not involved in the economic transaction. For example, when a natural gas producer sells its product, the cost reflects the drilling, transportation, and delivery; it does not include attendant environmental impacts, such as air pollution near drilling sites and the health, social, and environmental costs that the product and its use create. Likewise, if a factory releases effluent into a river, the costs of that pollution are borne by others (human and non-human) downstream, not by the factory owner or even those who bought the factory's products. Pollution represents inefficiency, and wastes of all kinds are externalities that are not priced (and not valued) by the market.

Externalized costs can be significant and are crucial for determining sustainability. The Center for Investigative Reporting (cironline.org/reports/price-gas-2447) determined that a gallon of gas (3.8 litres of petrol) would cost upwards of US$15 if all external costs were included (instead of 2012 prices of about $3 per gallon). Another cost not priced by the marketplace is what scientists call "ecosystem services," discussed in the next section.

What some sustainability experts (and engineers and scientists) recommend to reduce externalities is "closing the circle," i.e., eliminating waste and inefficiencies, and even designing products and practices to more closely match processes in the natural world. "Biomimicry" studies nature's designs and functions and then imitates them to solve human problems. For example, studying how a leaf absorbs sunlight could help engineers design a better solar cell.

Some businesses have made great strides in reducing waste and improving efficiency. But to make true progress toward sustainability, significant changes are required in environmental accounting, policy, and governance. For example, sustainable societies cannot be built around or operate on nonrenewable fossil fuels (ancient solar energy, if you will). Yet our industries, cities, transportation, and food systems all developed around cheap, abundant supplies of fossil fuels. Part of their affordability is due to those externalities just discussed. Another reason they are cheap is large, long-standing government subsidies and tax credits, a marketplace perturbation that some economists question, particularly in a world with significant air pollution and climate change. To revamp fossil fuel-based systems toward more sustainable ones would require enormous amounts of political will, investment, and cultural cooperation.

Agriculture is another sector in need of a vast overhaul, according to sustainability experts (McConnell & Abel, 2008). Like energy, agriculture

receives large, select government subsidies that slow progress toward sustainability and are often harmful to the environment. To become more sustainable, substantial food supplies must be produced locally and ultimately be based on organic methods (McConnell & Abel, 2008; Montague, 2009). The growing worldwide demand for meat also must be addressed. Industrial-style meat production bears significant environmental costs (waste, pollution, hormones, and synthetic chemicals), and the vast acreage required includes biologically diverse habitats (such as rainforests) that have been converted to meat and grain production.

Sustainability in Higher Education

As an example, I will explore sustainability efforts in one type of organization: institutions of higher education. The history of sustainability on campuses and universities is brief, enthusiastic, and stretches around the globe. Three-quarters of sustainability officer positions at US campuses were created between 2003 and 2007. The Association for the Advancement of Sustainability in Higher Education was founded in 2006 and now has 800 colleges and universities as members, primarily in Canada, the US, and Mexico, though members also hail from beyond those borders. In the UK, the Environmental Association for Universities and Colleges has over 300 institutional members seeking to "embed" sustainability on campuses. In 2009, the International Alliance of Research Universities began a sustainability initiative, which includes universities in Australia, China, Japan, Indonesia and Europe.

Some attribute this growth to awareness of sustainability issues and to global inaction on climate change. Others say that sustainability offers college students a strong sense of personal involvement and self-efficacy: it focuses on humanity's use of natural resources, and it puts climate at the center of the discussion. Also, in the 1990s, more and more universities were promoting engaged learning and connection to community in several forms, through service learning classes, civically engaged research and service projects, and co-curricular activities in residence-life offices; sustainability efforts were a natural fit. One commentary in the *Chronicle of Higher Education* said sustainability on campus shifts the focus from environmentalism to the imagined future and needs of Earth itself, and it replaces the old focus on pollution dangers with the idea that Western society itself is profoundly at odds with the Earth (Wood, 2010).

A university functions much like a small city in terms of autonomy and resource use; in fact, my university calculated its footprint as the equivalent of 24,000 average US homes. Thus, a campus office of sustainability institutionalizes this practice (for both good and bad) amongst thousands of students, faculty, and staff, potentially affecting every facet of university operation. Sustainability offices work with campus stakeholders to identify operational and institutional changes, from transportation to food service, and may even develop plans for making their university's operations "carbon-neutral." On one campus, students

(working with faculty members) submit proposals to improve campus sustainability, from installing motion-sensors on hallway lights, to campus gardens, to retrofitting fans in labs. The competitive proposals are funded by a small levy on student tuition.

Only recently has there been much agreement on auditing and accounting methods for campus sustainability. Early rating systems and self-report surveys did not use particularly relevant nor valid assessments and contributed primarily to 'image'. In 2010, STARS was launched: the Sustainability Tracking, Assessment and Rating System is the first comprehensive, third-party-verified auditing and reporting system specifically for higher education. By 2012, over 300 universities had enrolled in STARS.

For all their growth and popularity, there is a lack of critical scholarly attention to campus sustainability efforts. One academic publication, the *International Journal of Sustainability in Higher Education*, has partially filled the gap, though it focuses largely on practice-oriented lessons and case studies.

Like all large organizations, universities face entrenched habits and routines when it comes to changing resource use and human relationships to the environment. They also encounter meager budgets to make needed upgrades and changes, particular at government-funded schools. Nevertheless, the enthusiasm of large groups of campus "sustainatopians," seeking to preserve the integrity and quality of human and natural environments, are converting thousands of young people to the hope and promise of sustainability.

Sustainability Science

If one searches a university library for journals with "sustainable" in the title, one finds plenty: *Journal of Sustainable Agriculture*, *Renewable and Sustainable Energy Reviews*, *Journal of Sustainable Forestry*, and *Journal of Sustainable Tourism*, to name a few. Sustainability is also discussed in many other journals, such as *Ecological Economics*, *Ecological Indicators*, and *Environmental Ethics*. A growing number of journal titles include "sustainability science," a subfield so robust that the US *Proceedings of the National Academy of Science* created a new section for it.

Sustainability science explores the provisioning (cf. the definition of "sustain") of humankind in a way that does not threaten the earth's support systems (Kates et al., 2001; Kates & Dasgupta, 2007). It views human and environmental subsystems as intimately linked, and it recognizes that the environment provides services required to maintain humankind, regardless of our awareness of them or the lack of economic value placed on them. This research community is closely aligned, as you might imagine, with global climate and environmental change research (Kastenhofer, Bechtold & Wilfing, 2011).

Sustainability science is particularly interested in questions of *vulnerability* and *resilience*, terms registered by Working Group II of the Intergovernmental Panel on Climate Change (IPCC). The concept of *vulnerability*, developed largely in the social sciences, is connected to environmental risks and hazards; within

sustainability science, vulnerability refers to the degree to which a coupled human-environment system (CHES) is likely to experience harm from exposure to a hazard. *Resilience* emerged from the ecological sciences and was expanded from solely ecosystem changes to include changes in the larger CHES—in other words, how much disturbance a system can absorb and still remain the same or function well (the "endure" definition of sustain). CHES is one of three "pivot points" to which sustainability science research pays attention (Turner, 2010). A second pivot point is environmental services, and the third is the tradeoffs between those services and human outcomes and uses.

The second pivot—environmental services (sometimes referred to as "natural capital")—is the direct benefits and life-supporting processes that come from the natural environment. Some services operate at the global level (like an atmosphere) and some are local or regional (like an aquifer or watershed, or a place to recreate or be renewed). Humans have long taken environmental services for granted, particularly those that are regulating (like climate and flood regulation) and supporting (like soil formation and nutrient recycling) (Daily et al., 2000). These crucial functions are not explicitly valued in most economic and socio-political systems.

The tradeoffs pivot point is relevant every time humans utilize earth materials for some particular outcome, whether to grow food or generate heat. Oftentimes, we endeavor to expand the limits or reduce the uncertainties of natural systems to produce material well-being for people, such as applying synthetic fertilizer to increase food production or damming rivers to produce electricity and irrigation water. However, the consequences of one activity cascade through the entire system and produce tradeoffs (Batterham, 2006). Creating a reservoir may improve crop production with a steady supply of water, but it will alter the original streamside habitat and environmental services provided by it.

Tradeoffs are generally calculated according to economic value or by comparing a physical measure, such as amount of crops produced. However, the economic measure falls short because, as mentioned above, many environmental services have no market value.

Vulnerability and resilience can be considered different but complementary approaches. When vulnerability focuses on a small number of human outcomes (such as hunger or housing) for which the environmental subsystem serves merely as a backdrop, the concept gives minimal attention to tradeoffs in environmental services. But when vulnerability and resilience are both fully applied to CHES, vulnerability serves to identify the weakest parts, and resilience identifies which characteristics will make systems more robust to disturbances.

Because sustainability science treats the human and environment subsystems as coupled, it endeavours to remain at the core of those three overlapping circles comprising sustainability. Though sustainability science can be considered a young discipline with much more research ahead, indicators and indices developed from its findings hold promise as valid and accurate ways to judge whether a practice labeled "sustainable" truly qualifies as such.

There are numerous challenges ahead for this discipline, not the least of which is the complexity of its coupled approach (Turner, 2010). In addition, research is needed in virtually all locations where human-environment activity takes place: though lessons from one region may apply to others, unique characteristics (such as habitat, species, climate) may differently affect the vulnerability and resilience of a particular area. Another challenge is that environmental change is already occurring so quickly in some regions (such as the Arctic) that researchers must continually revisit the drawing board.

Communication Challenges for Sustainability

Communicating a large, complex human-environmental issue—whether sustainability or global climate change—is an enormous challenge. Worldwide, only 45 percent of people in 111 countries surveyed by Gallup in April 2011 see global warming as a threat to themselves and their families. "Sustainability" does not even grab the attention of pollsters (Pugliese & Ray, 2011).

Though the tendency is to view climate change as solely about greenhouse gas emissions, it is very much about living unsustainably. It is important for communicators of both climate change and sustainability to convey that humans are not immune or separate from the ecosystems they inhabit and alter, and that ensuring the resilience of human-environment systems is necessary for our very survival (Meppem & Bourke, 1999). This is extremely difficult when urbanizing populations become more and more disconnected from, and lack knowledge about, the non-human world.

For some people, sustainability may sound more acceptable and "doable," more distant from climate change and environmentalism, and therefore palatable. That may be good news for communicators needing to reframe some well-worn messages. However, sustainability's inherent ambiguity and broad scope also make it an easy target for appropriation (Peterson, 1997) to a wide variety of projects, products, and organizations that are at best "sustainability-lite."

A similar fate befell the word "green." It was so overused and misused to denote "good for the environment" that the word lost its meaning and accuracy. The result was "green-washing," when an individual or organization boasted of some "green" action that was not an accurate portrayal or representation of the entire story or record. A well-known example was the Ford company boasting of a green "living roof" at one of its US auto plants that manufactured some of the worst gas-guzzlers in the industry. The roof was part of Ford's campaign "Greening the Blue Oval" to which the group CorpWatch gave a greenwashing award. Sustainability is likewise susceptible to having proponents over-advertise small or cosmetic actions and thus create "sustainable-washing."

The enormous scope of sustainability can be seen as both a positive and a negative for communicators. The immenseness of the challenge can be paralyzing, causing individuals to tune out, ignore, and lack the self-efficacy to act. When other issues top the list—wars and unrest, economic woes, political change—it is hard to keep individuals (and countries) focused and concerned about ongoing issues that seem to have more to do with distant places than their daily lives. Making an issue like sustainability more integral and linked to daily life is a constant communication challenge.

A negative consequence of a sustainability "craze" is that marketing and consumption have been increasingly tied to environmentally responsible behavior. Consumers are told they can shop their way to guilt-free sustainable lives by purchasing cloth shopping bags, fluorescent lightbulbs, and hybrid cars. While it is true that individuals are key in any significant social change, this rather "upperclass" approach puts an inappropriate burden—and blame—on consumers. Ethical shopping and green consumerism are strategies that are not scaled to the size of the challenge of sustainability, and consumerism comes with exceptionally high social and environmental costs. According to some scholars, pushing unsustainable consumption (as key to sustainability or to "help" the economy) has contributed to the global financial collapse, the "export" of pollution to less developed producer countries, and large trade deficits (Cohen, 2010).

Social change scholars know that achieving meaningful and substantive change (at any level, let alone global) is very difficult to achieve. One reason is that those who seek to maintain the current unsustainable system (because they benefit from it) will exert significant pressure to thwart fundamental change, a process sociologists call "social control" (Corbett, 1998). Scholars point to the widespread environmental activism of the 1960s and '70s to show how environmental challengers were often co-opted and accommodated, and many of the changes they desired never fully materialized (Corbett, 2006; DeLuca, 2005).

Another positive reframing of sustainability tells us that its very enormity means it must be a matter of shared responsibility. We cannot rely only on personal actions, nor just policy and legal solutions, nor solely actions by business. Action is needed at all levels, and all levels need accurate and persuasive communication.

Another positive is the possibility that sustainability will truly help humans think about themselves and their lives in terms of global systems, both social and ecological. Also, the very ambiguity of the word "sustainability" means it *can* be defined and tailored in ways that best fit different world cultures, customs, and practices according to their particular human-environment subsystems. There is no "one-size-fits-all" answer that will effect sustainability the world over.

Scholars maintain that sustainability science is a good match for the goals of "civic science," which include increasing public participation in the production and use of scientific knowledge (Bäckstrand, 2003). Scientists can identify tradeoffs in human-environment subsystems, but they need active participation from citizens, policy-makers, and stakeholders across disciplines to reach just, sustainable decisions. A civic science approach also is amenable to bringing in

place-based and indigenous knowledge as grounded perspectives to supplement traditional science.

A final positive note: there is currently a variety of enterprises around the globe working to make human lives more sustainable. In the US, there has been an explosion in backyard farms and poultry, participation in Community Supported Agriculture and farmers' markets. In the EU, local governments in over 40 countries have pledged to "local sustainability," which seeks to "mainstream" sustainability at the level of cities and towns (www.localsustainability.eu). The Sustainable Cities and Towns Campaign targets topics such as governance and management, natural common goods, traffic, health, and social justice (www.localsustainability.eu).

Another positive example is the Transition Initiative, a movement begun in the UK in 2006 that has spread to Australia, South Africa, Canada, and beyond (Griffiths, 2009). Like the EU campaigns, it seeks change at the middle level of *community*, where people feel connected and more empowered. Each transition unfolds at the direction of its community, as it trains citizens to self-organize and create initiatives that rebuild resilience and reduce CO_2 emissions. Transition communities have examined their food production, waste, energy use, and transport for ways to become more self-reliant.

At present, there are little survey data and limited communication research specific to sustainability, with the majority being case studies and rhetorical analyses of the term's use. However, there is now a solid body of theoretical research about climate change communication to add to an already robust literature about attitude and behavior change specific to science, environment, and health, as well as risk communication, media coverage, social marketing, and other areas. A sustainability communicator has many solid paths to follow.

For students and citizens of sustainability, perhaps one of the most constructive first steps is seeing ourselves as indeed connected to the extra-human world. As sustainable science scholars maintain, human-environment coupling and interaction take place every moment of every day. In a classroom or at the grocers, we are surrounded by nature: paper, minerals, cloth, embodied energy. We continually breathe an atmosphere, drink from a watershed, and participate in a climate. And for every bite of food and every product purchased, there is a tradeoff, a cascade of interactions and effects. This is a basic science lesson that is key to understanding, and living, sustainably.

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