

Environmental Psychology and Sustainable Development: Expansion, Maturation, and Challenges

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In this summary article, some advances of, the potential for, and challenges faced by environmental psychology as a contributor to sustainability science are outlined. In its first 40 years, it has evolved from a discipline primarily—but never solely—concerned with proximate architecture to one that adds concern with larger-scale issues, particularly sustainability. This growth of interest has in turn led to increased interest within it in public policy, technology, cooperation with other disciplines, multilevel analyses of problems, the ingestion of new ideas, and concern with the health of the biotic and ecological world. Some challenges are that the central proponents of “sustainability science” itself have not acknowledged environmental psychology as a potential contributor, the field is comparatively young, that it needs to explore biotic and ecological issues more, needs to help discriminate facts from nonfacts about environmental problems, and needs to warn sustainability science about the daunting task of overcoming environmental numbness and self-interest in individuals. Nevertheless, there is hope: sustainability scientists, including environmental psychologists, may be Adam Smith’s “invisible hand.”

*I met a traveler from an antique land
Who said: Two vast and trunkless legs of stone
Stand in the desert. Near them, on the sand,
Half sunk, a shattered visage lies, whose frown,
And wrinkled lip, and sneer of cold command,
Tell that its sculptor well those passions read,
Which yet survive, stamped on these lifeless things,
The hand that mocked them, and the heart that fed,
And on the pedestal these words appear:
“My name is Ozymandias, King of Kings:*

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Look upon my works, ye Mighty, and despair!"
Nothing beside remains. Round the decay
Of that colossal wreck, boundless and bare
The lone and level sands stretch far away.

Percy Bysshe Shelley, 1818

Shelley's famous poem usually is interpreted as decrying the folly of arrogance about one's accomplishments. Today one also may read his lines in environmental terms. Those "boundless and bare/lone and level sands" drowned not only the huge statue of Ozymandias (who is presumed to be, in the current nomenclature, Rameses II), but entire ancient cities in North Africa. According to Fairfield Osborn (1948), whose book, *Our Plundered Planet*, may have been the first to sound the alarm about environmental degradation (14 years before Rachel Carson's more-famous *Silent Spring*), those cities were built on agriculture; they once were the fertile "garden of the Roman Empire" (p. 111). Almost 60 years ago, Osborn was documenting the same kind of widespread destruction as the new United Nations Environment Program's atlas, "*One Planet, Many People*" (June, 2005). Without using the word, sustainability was the theme of Osborn's groundbreaking book. As he concluded, after documenting the widespread destruction of the natural environment that he could already see in the 1940s, long before all that has occurred in the last six decades, we "must temper [our] demands . . . and conserve the natural living resources of this earth in a manner that alone can provide for the continuation of . . . civilization" (p. 201). Given what has happened since Osborn issued his warning, as documented in the UN atlas, one must wonder whether humans today are any more ready to establish a sustainable planet than the ancients who left the sea of sand that drowned their cities.

Environmental psychology began in earnest in the late 1960s with the recognition that the physical context of human behavior is important. This was important within psychology, because until then the physical setting had largely been ignored. Nevertheless, many early efforts seem, from this vantage point 40 years on, to have lacked a sense of urgency or *gravitas*. Many studies, including some of my own, were innocently conducted in an atmosphere of playful intellectual curiosity, at the proximate level, rather than with any desperation at the state of the world. Fairfield Osborn's important book seems to have escaped notice by psychologists, but something happened in the middle 1980s, perhaps spurred by the cumulative cries from Rachel Carson (1962), Greenpeace, beginning in the early 1970s, and the Brundtland Report (WCED, 1987). For some environmental psychologists those cries changed everything. Problems at much larger scales came into sharper focus. Instead of trying to understand territoriality in the office or values as they influence the perception of landscapes, the goals of some became trying to understand and solve resource dilemmas, traffic problems, urban blight, and crimes against nature.

The articles in this special issue serve as a collective document of this trend. Environmental psychology has always laid claim to a rather broad palette, but these

articles demonstrate the recent growth of the field as it applies to sustainability. For example, as will become clear, the very idea of sustainability has been expanded beyond resource management (see also Vlek & Steg's introduction to the present issue).

Seven Themes that Have Been Developed

Seven themes that have always been part of environmental psychology have been expanded enormously in recent years, and these may be identified in this new set of articles: (1) interest in public policy, (2) a concern with technology, (3) connection with other disciplines, (4) multilevel analyses, (5) the incorporation of new ideas, (6) a focus on sustainability, and (7) scientific interest in the biotic and ecological world.

First, early studies in environmental psychology often—but certainly not always—were apolitical. The new environmental psychologists, as represented by the authors in this special issue, are sustainability- and policy-oriented. Their position is reminiscent of conclusions about risk perception from the many studies directed by Paul Slovic (e.g., 1996), which have repeatedly demonstrated that experts and laypersons do not assess environmental issues in the same way, but that lay assessments are no less important than expert assessments. The perspectives and involvement of everyday citizens must be an essential part of policy making; laypersons, in general, are more likely to be those who live and work in and with the results of policies, and their views, although usually less empirical and number-based than those of experts and policymakers, often are rooted in greater local experience; see also Bonnes, Uzzell, Carrus, and Kelay (this issue). To be fair, this trend has been increasing in most jurisdictions at least since the 1960s, and usually is at least a *pro forma* part of decision making in many places. However, serious failures still exist, and advocacy of greater funding for environmental psychology to understand the public participation process and to facilitate it in particular situations is an important policy goal in itself.

Miedema (this issue) emphasizes the objective aspects of noise, while not neglecting the role of nonacoustical factors. The intriguing idea of creating noise maps reminds one of the pioneering work in the 1960s of the soundscape ideas of Schafer and colleagues (e.g., Schafer, 1968, 1969), who railed against noise pollution and have tried for almost 40 years to protect and preserve traditional and quieter urban sounds. This has been sustainability in its conservationist mode, battling against the seemingly ever-rising volume of noise and the destruction or drowning of traditional sounds (such as bird songs, nonelectronic foghorns, and church bells) by the ever-upwardly mobile economic engine (which inevitably seems to require more noise). The advances described by Miedema are those in which annoyance curves are actually measured and plotted. One suspects that such graphs and figures, even based, as they are, on subjective assessments, will be more effective with policymakers than will the more artistic *cris du coeur* of a

composer like Schafer. Annoyance curves look more like science (which they are, of course).

In another example, Gärling and Schuitema (this issue) survey research on policy measures designed to manage traffic. They classify such measures as coercive and noncoercive. Although many would favor the use of noncoercive measures on ethical grounds, the evidence suggests that, unfortunately, coercive methods work better. However, drivers tend to be self-interested and they tend also to be voters. Thus, coercive measures that can be evaded, will be. Voters often will reject coercive measures, again presumably out of self-interest, without devoting much concern to the common good. Politicians may be cool to coercive measures, because they have an eye on the next election. The role of environmental psychology in this conundrum is to conduct research aimed at understanding which kinds of coercive measures, presented in which manner, and implemented according to which schedule, might be accepted by voting drivers. One thinks of the slow but steady, and generally effective, antismoking campaigns of the last several decades. There is hope, but understanding the average driving voter requires quality research by environmental psychologists.

Environmental psychologists share an interest in modeling with scientists in some other disciplines. By turning the policy issue upside down, some are examining the effects of policy strategies, rather than conducting studies that are meant to inform policy. Jager and Mosler (this issue) are among those who use models to understand the outcomes of different policy choices. This form of active modeling offers the attractive advantage of trying out various policies before they are implemented and understanding why they might or might not work, thereby potentially avoiding expensive mistakes in policy making. As Jager and Mosler point out, modeling can also be used to train policymakers. The very act of modeling encourages the idea that many policy alternatives exist, when often only a few may occur to a policymaker.

Rather than using active modeling with simulated actors, other environmental psychologists have proposed comprehensive models as heuristic frameworks in which the goal is to stimulate research in field or experimental settings with actual individuals. The growth of extended models (e.g., Bamberg & Schmidt, 2003; Heath & Gifford, 2002, 2006, among others) that began with Schwartz's norm-activation theory (Schwartz & Howard, 1981) and Ajzen's (1991) theory of planned behavior, toward models with more variables that better explain behavior and behavior intentions are examples of this. My own efforts in this area include attempts to build a general model of social dilemmas (Gifford, 2002a, in press), which may be the key metaphor for sustainability. In this model, geophysical conditions and policies combine with technological, interpersonal, and individual factors to influence sustainability-related decision making by individuals and organizations, which in turn influences outcomes for the decision makers, the larger community, the resource in question, and the ecology connected to the resource.

Second, technology is a concern of many environmental psychologists; it is the 200 kilogram gorilla that cannot be ignored, and it evokes very mixed feelings. Some view technology with suspicion, while others subscribe to the optimistic belief that it can help achieve the goals of sustainability. Technology was called “the new social disease” in an early special issue of this Journal (Frank, 1966). Fairfield Osborn, the prophet, also was skeptical. Speaking of soil and agriculture issues, he said, “Technologists may outdo themselves in the creation of artificial substitutes for natural subsistence, and new areas . . . may be adapted for human use, but even such . . . developments cannot be expected to offset the terrific attack upon the natural life-giving elements of the earth” (1948, p. 201). This suspicion may be justified when the marriage has been hastily arranged or imperfectly consummated. Besides failing to replicate natural conditions, some technology in use during our daily lives is associated with noise (Miedema, this issue), pollution of the air, water, and land, and contributions to global warming, not to mention very serious consequences to the welfare of humans and other animals. For example, about 1.2 million people (and many more millions of animals) are killed *each year* by cars (World Health Organization, 2003), not to mention the many others killed by machinery, poisons, and other products of technology. This does not include the enormous numbers of injuries, and gradual or delayed health effects (e.g., cancer) that are less clearly or directly attributable to technology and its products. However, estimates have been made for some causes: for example, air pollution kills about 800,000 people *each year* (Kenworthy & Laube, 2002), and of course most air pollution is caused by technology in one form or another.

Of course, technology has another side to it and, as Midden, Kaiser, and McCalley (this issue) clearly show, environmental psychology must deal with technology because it is very unlikely to go away. It will not disappear because, despite the deaths, injuries, and health problems technology causes, it undoubtedly has improved the quality of life for millions of other people, particularly when one thinks in terms of decades and centuries past. Assuming that individuals have the motivation and appropriate skills, technology in the service of energy conservation, for example, certainly can contribute to environmental sustainability. Many new technologies with the capacity to enhance sustainability are introduced every year (the skeptic may wish to point out that these announcements usually receive more attention than does the harm caused by technology). However, Midden et al.’s quite valid point is that the mere introduction of some new technology does not guarantee that it will be accepted and used by citizens. Thus, policies aimed at facilitating the use by citizens of salutary technology must be encouraged, and the basis for such policies lies with research by environmental psychologists, whose job it is to understand why and when technology is accepted or not by citizens.

Third, collaborations between pioneers in environmental psychology and researchers from other disciplines, such as geography and architecture, have existed from the field’s earliest days. The collaborations between Robert Sommer,

Humphry Osmond, and Kiyo Izumi in the 1950s (Sommer, 1983), or between Raymond Studer and David Stea (1966) in the 1960s come to mind. However, now, as may be seen (e.g., Schoot Uiterkamp & Vlek, this issue), fruitful collaborative work is being done in sustainability research, including some collaborations that represent new bridges. This trend has been influenced, one suspects, by policies at national and international grant agencies that, for better or worse, virtually require interdisciplinary collaboration.

Still, most observers would agree that it can be fruitful for research teams that are able to grapple successfully with the inevitable differences in disciplinary cultures. Schoot Uiterkamp and Vlek's article describes five instances of collaborations and is particularly valuable for its advice about the practicalities of engaging in multidisciplinary studies. One suspects that, in terms of influencing policy, collaborative efforts not only have face credibility based on the very breadth of their approach, but also success legitimately based on the increased validity of policy suggestions that emerge from studying a given problem with multiple valuable perspectives.

Fourth, environmental psychology has expanded from the proximate level, with a focus on individuals and small groups, often in laboratory settings, to the serious consideration of sustainability at larger levels of analysis, and in areas of life beyond resource management. For example, the selection by Van den Berg, Hartig, and Staats (this issue) expands the concept of sustainability to the urban level. In extending the notion of sustainability from its resource-oriented base to quality-of-life considerations, Van den Berg et al. argue for policies that would bring nature into cities as a way to achieve a balance between the seemingly unstoppable and rapid urbanization of the world, and the mental and physical health benefits of being-in-nature. Environmental psychologists thus challenge urban planners and city governments to find ways to increase the amount of greenery in urban designs, as they also seek to increase economic benefits, improve transportation efficiency, and provide affordable housing. Others have gone further, investigating the psychological aspects of global warming (e.g., Heath & Gifford, 2006; Nilsson, 2004) or the looming global water shortages (Gifford, 2002a).

Bonnes et al. (this issue) combine and expand upon the themes raised by Van den Berg et al. Once again the level of analysis is urban, and the topic is expert and lay perspectives on natural elements of cities. Bonnes et al. remind researchers that before assessments made by any person (expert or not) are considered, the criteria upon which those assessments are based must be considered. Different criteria can easily cause disagreements not only between experts and laypersons, but also within those two groups. The neglect or manipulation of criteria can cause assessments to veer off into inappropriate territory, which may then lead in turn to unsustainable policy decisions. No one would claim that assessments by members of the public always reflect sustainability (cf. Gärling & Schuitema, this issue, on the self-interest of car drivers, described earlier, for example), yet the voice of

the people must be heard. The role of the environmental psychologist in public policy can be three-fold: helping to educate the public where that is appropriate and necessary, using the vast experience of psychology in general for gathering policy-supporting information from citizens through interviews and surveys, and serving as mediator between the sometimes less-than-articulate public and the sometimes over-confident, arrogant expert or policymaker.

Fifth, one sees an expansion of environmental psychology through the inclusion of theoretical perspectives from other disciplines. For example, the article by Lindenberg and Steg (this issue) urges the consideration by environmental psychologists of goal-framing theory, which was developed in part from a sociological perspective. In proposing that sustainability-related decisions are made from a mix of multiple hedonic, gain, and normative goal frames, Lindenberg and Steg remind us that social-cognitive influences are important for sustainability science, despite being ignored in some quarters (e.g., Clark & Dickson, 2003). As should be clear by now, humanity cannot move far toward the dream of sustainability without understanding how individual citizens think and understanding their motivations and goals. However, given that this is not clear in all quarters, environmental psychologists have the separate task of educating experts in other fields, as well as policymakers, about this reality.

Gattig and Hendrickx (this issue) bring perspectives from economics and behavioral decision theory into the mix. Discounting the tendency to reduce the importance of an outcome with greater “distance” (temporally, socially, geographically, and probabilistically), is seen to be an important component of thinking about sustainability-related thinking. Fortunately, environmental problems appear to be less subject to discounting than some other matters. Although they incorporate some concepts from economics, Gattig and Hendrickx demonstrate why using those concepts in the same way that traditional economists do could lead to ineffective policies. “Rational” discount rates are not the same as those of the public, which, to its credit, seems to discount environmental impacts less than in other domains.

Sixth, although sustainability originally referred to resources in the minds of some environmental psychologists (including that of this writer), and that research continues at the theoretical level (e.g., Jager & Mosler, this issue), others are acknowledging and accepting the broader concept of sustainability outlined in the Brundtland Report (WCED, 1987). The WCED definition of sustainability may be utopian, but that is not to say that it should be ignored in the pursuit of goals to which most humans would subscribe. One invaluable advance in the WCED definition of utopia is that, unlike virtually all previous utopian visions, it includes resource costs and conservation among its goals. An important contribution of this special issue is its convincing expansion of the sustainability construct to include quality of life. This is particularly clear in the articles by Van den Berg et al., Miedema, and Bonnes et al. in this issue.

Seventh, and finally, some environmental psychologists have proposed that the field expand this focus on sustainability to problems in the nonhuman biological world (e.g., biodiversity and zoos, Plous, 1993; or endangered species, Cvetkovich & Winter, 2003) and larger ecological problems, such as global warming (Heath & Gifford, 2006; Nilsson, 2004), or the looming world water crisis (Gifford, 2002a). Some environmental psychologists who perceive these as the most important problems have felt strongly enough to try to establish a subdiscipline, conservation psychology (Saunders & Myers, 2003), which shows their determination to evolve and expand toward problems they perceive as urgent. Because sustainability certainly includes issues related to flora and fauna, research and theory on the nonhuman world might have been included in this issue, had there been space for it.

Growth and Maturation

With expansion in these seven themes that bear on sustainability, environmental psychology has evolved and matured. If the field is to have the kind of effects on the real world that it has always sought, it must move toward a more serious engagement with policymakers. Green and green-leaning politicians now exist in much larger numbers in many countries, and these legislators both want and need quantified, substantiated information that they can use to enact more enlightened legislation. Because much in the way of needed change will occur (or not) at the level of individual citizens, environmental psychology is essential. Environmental psychologists may serve as the key link between individuals—their traditional level of analysis—and policymakers, in the sense that they can help evaluate the acceptability of the proposed structural changes, as well as assess the impact of these changes on the behavior, well-being, stress, and quality of life of individuals.

This increasingly mature environmental psychology is ready to supply studies that “make a difference” in the real world (cf. Gifford, 2002b for a survey of some classic exemplars from earlier forms of environmental psychology). This special issue offers many samples of this new, sustainability- and policy-oriented maturity.

One form of maturity that may be observed is the growth in influence of sustainability research outside North America, particularly in western Europe. This special issue is a testament to the growing leadership of theoreticians and researchers in the Netherlands, Germany, France, Spain, Italy, and the UK. Although some western Europeans (e.g., Tommy Gärling, Terence Lee, and David Canter) have been active in environmental psychology from the very start, one senses that in terms of numbers and new approaches, there is an important shift in the balance from the days when, in this Journal’s pioneering consideration of environmental psychology (1966, volume 12, number 4), every author worked in the United States, and sustainability received almost no mention.

One senses that sustainability research by environmental psychologists in the United States currently is relatively less vibrant, perhaps dampened by funding

realities that do not strongly support sustainability research. This may be partly influenced by the U.S. failure to adopt the Kyoto accords, whereas the European countries have all adopted the accords and are much more willing to find ways to reduce CO₂ emissions. (Canada, it should be noted, is an exception to the U.S. trend; it has adopted the Kyoto accord, and has relatively good support for environmental research).

This maturity in the form of an international awakening has spread far beyond Western Europe. As editor of the *Journal of Environmental Psychology*, I now receive numerous submissions from the Middle and Far East, South America, and Eastern Europe. This is demonstrated in the striking figures (at least to someone trained in the United States at the beginning of environmental psychology), that in 2005 only 34% of submissions to *JEP* came from the United States, and so far in 2006 the percentage has slipped to 24. Authors from 34 countries submitted papers to the journal over this 2-year period.

Thus far, one might think that all is unadulterated progress (except for the relative lack of interest in the United States). Unfortunately, this is not so. Several challenges remain to darken the picture painted above.

Challenges to Further Progress

First, “sustainability science” has been defined by some authors (e.g., Clark & Dickson, 2003) without any reference to the level of analysis employed by most environmental psychologists. Most authors in this issue would strongly assert that understanding sustainability and solving its problems require consideration of individual and social attitudinal and behavioral factors. Admittedly, there is an apparent contradiction in calling for sharp theories (i.e., theories that spawn clear and falsifiable hypotheses) and the kind of thinking that brings together at least some of the vast range of concepts implied by the nebulous territory invoked by the term “sustainability.” As I have noted elsewhere (Gifford, 2002c), the field is so young compared to biology and physics that it can be forgiven for not yet having spawned its own Darwin or Einstein, but we need such giants. Certainly, many environmental psychologists have begun to discuss sustainability and to begin its study from a behavioral science point of view (e.g., many of the authors in the present issue). For example, about 100 articles exist today in *Psychological Abstracts* that have *sustainab** in the title and *environment** as a keyword). Nevertheless, a scan of these articles reveals the vast majority to be calls for research and action, or small studies in some defined context. My sense is that no theory on the scale of, or with anything like the impact of, say Festinger’s notion of cognitive dissonance or Maslow’s hierarchy of needs, has yet been proposed in the environmental psychology of sustainability.

However, this is understandable. The second challenge is comparative youth. Compared to older disciplines, such as economics and biology, environmental

psychology is an infant. If Adam Smith's classic *The Wealth of Nations* (1776) may be said to represent the birth of modern economics, then economics is almost 200 years older than environmental psychology. The age gap is even greater for other disciplinary players in the sustainability arena, such as political science or biology, when one considers that important thought in those fields, such that of Plato and Aristotle, goes back many centuries. Nevertheless, environmental psychology could use such a giant, particularly to deal with the vast and nebulous territory covered by the term "sustainability."

Third, environmental psychology has not yet worked hard enough on the problem of habitat destruction and great reduction of nonhuman animal and plant species at the hands of our species, which certainly is a central element of sustainability. This is reflected in the lack of attention to this problem not only in the articles for this special issue, but also in the general environmental psychology literature. But in many places at the edge of the ever-growing collective human territory on the planet, animals and plants are succumbing to development, as the new UNEP atlas (2005) amply demonstrates. My research group recently studied human interactions with large wild animals in a national park (Gifford, Wade, & Jackson, 2006). Many negative encounters are caused in part by humans venturing further into space held recently by other animals. Despite some unfortunate, literal biting-back on the part of the animals—between drafts of this paper, a woman was killed by a grizzly bear in the Rocky Mountains—there is never any question which species eventually wins the battle for territory. They shoot the bears, and by the hundreds.

A fourth challenge is to determine what is truly accurate ecological knowledge, which sometimes differs from what laypersons and even professionals believe to be true. The gathering of this factual knowledge generally is the province of natural scientists, but environmental psychologists have at least two roles to play in this evolution of knowledge. The first is to stay abreast of it, and not to endorse claims that "the sky is falling" in places where it is not, but to be well informed about areas in which the sky *is* falling. The second lies in understanding the impact on people of both inaccurate and accurate claims. Complicating this matter of "the truth" about whether the sky is falling is that distinct differences between disciplines exist. For example, many economists believe that Julian Simon (1981) was essentially correct when he claimed that those in panic about short-term environmental problems ignore the long-term trends, from which he deduced that "with increases in income and population have come less severe shortages, lower costs, and an increased availability of resources, including a cleaner environment . . . [with] no convincing economic reason why these trends . . . should not continue indefinitely" (p. 345; K. van Kooten, personal communication, September 15, 2005). Economics, as a discipline, currently has much more credibility with policymakers than psychology, and environmental psychology remains psychology's younger sibling. Thus, despite assertions that environmental psychology is maturing, policymakers, at least in many countries, do not seem to have noticed.

Some policymakers think they know the direction in which future events are leading, and attempt in good faith to direct attitudes and behavior in a direction that appears “best” on sustainability grounds. But the future, including the environmental future, is not always predictable, and what seemed like a good idea at the time—such as freeways cutting through the middle of cities, or huge dams—do not look like such good ideas now. In a more current example, a minority of experts argues against the vast majority that global warming is not, or at least not universally, the disaster-in-waiting that many assume it is (e.g., Richard Lindzen, professor of meteorology at MIT, in remarks to the U.S. Senate Environment and Public Works Committee, May 2, 2001). Who will be shown to be correct, a hundred years from now? Even in terms of the present, intuition about sustainability best practices can be wrong. For example, some people believe that paper coffee cups are environmentally superior to plastic foam cups, but it is not so, when the full production cycles of the two are compared (Hocking, 1994).

Finally, a sustainability science that includes environmental psychology still faces at least two important human nature barriers. The first is mindlessness, or what might be more charitably described as limited processing theory (Dawes, 1980), the limited ability to attend to multiple aspects of one’s life space. A long time ago I conducted a little study that fell, in the spirit of those times, squarely into the proximate, curiosity-driven, non-policy-oriented, non-urgent, architectural domain (Gifford, 1976). University students who were forced to navigate a path through some classroom desks that had been deliberately arranged to be difficult to squeeze through as they entered and left a classroom were almost completely unaware of their own struggles. Their attention was largely allocated to thinking about the laboratory assignment they were conducting, and probably other social matters. I called this phenomenon “environmental numbness.” This notion probably can be extended from early environmental psychology to the current version that includes sustainability. If so, it would mean that most people most of the time simply are not thinking at all about sustainability. Instead, they are (quite understandably) thinking about dinner, their friends, the big game, or their work. The crucial challenge will be either to get most of the peoples of the world thinking about sustainability, or to stimulate informed policy that creates structural solutions, so that sustainability itself may be advanced while people march mindlessly through their days.

The second important barrier is misperception in the service of the ego. In another study, using a simulated resource dilemma, community residents had the opportunity to harvest fish at sustainable or unsustainable levels (Gifford, 2005). Almost all the participants used some restraint and harvested less than they could have. Yet the fishery was inexorably destroyed over a number of fishing “seasons.” Interviews with the participants revealed that most were proud that they had taken fewer fish than they could have. Unfortunately, even when they knew the regeneration rate of the fish (which, of course, usually is uncertain in real fisheries) and the size of the remaining stock of fish (also usually not accurately known), their

restraint was less than that needed to achieve sustainability. The fishery died with most fishers congratulating themselves on their environmental concern.

The Uncertain Future

In conclusion, pessimism (as expressed in Shelley's "Ozymandias" poem) versus cautious optimism (as expressed by most proponents of sustainability science) depends on how one weighs the growth, maturity, and future potential of environmental psychology against these challenges and barriers. Will the pessimism of Hardin (1968), among others, be borne out in the end? Are there simply too many people, most of whom believe that they are already doing the right thing, added to those who believe that they have the right to exploit resources as fast as possible? Will it all end with the victory of the biblical Four Horsemen? Given the near-vertical human population curve since the 16th century, the limits of human nature, never-ending war in one region or another, and the constant threat of pandemics, a deep fear seems truly justified. Yet, in the wings are the reasoned voices of super-optimists like Julian Simon (1981), who believed that, considering the long term, there simply are no problems with either resource availability or quality of life, except in temporary, isolated pockets.

Nevertheless, those who see environmental problems as more painful and pressing than that cannot but try. As for this writer, I believe that those who toil toward sustainability solutions comprise, collectively, the very "invisible hand" of which Adam Smith (1776) wrote, that is, the corrective influence against greed. The articles in this special issue, written by some of those who are part of this invisible hand, will go far toward advancing environmental psychology as an essential part of sustainability science.

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