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# Human Ecology Review

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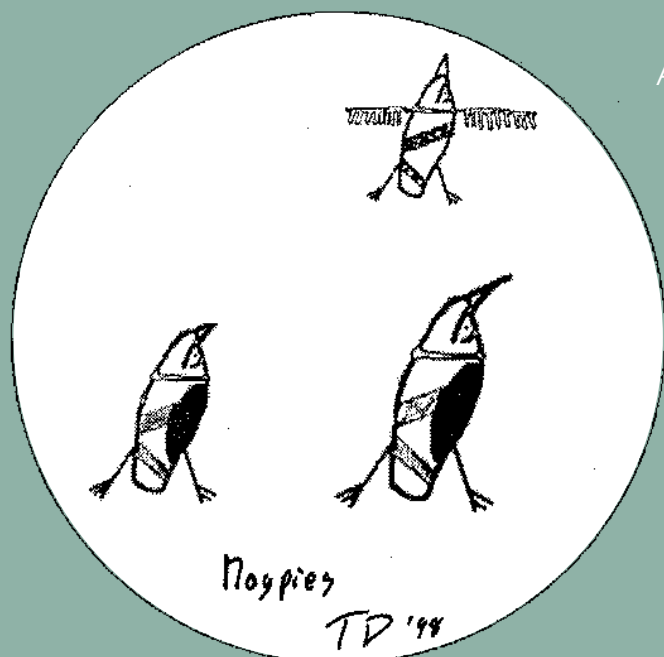
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# **Human Ecology Review**

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“Magpies” the cover art for this issue is by Tom Dietz. “Magpie’s Song” by Gary Snyder (from *Turtle Island* by Gary Snyder and Paul Winter) and friends Greg Artzner and Terry Leonino, who perform as “Magpie,” provided the inspiration for the image.

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## Human Ecology Review

From the Editor

Linda Kalof  
George Mason University

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The past 6 months have been very exciting for George Mason University as we prepared for our new role as the editorial home of Human Ecology Review. This issue of the journal is the result of that flurry of work, as well as the continued diligence of **Jonathan Taylor** and **Scott Wright**, and the unflappable support of **Tom Dietz** who has given us countless hours of his valuable time over those months. Human Ecology Review will be housed at George Mason University for the next three years because of the leadership of the Dean of the College of Arts and Sciences, **Daniele Struppa**. His support of the journal is part of a new programmatic emphasis on the environment at George Mason. In a time of academic disarray about what should or should not be emphasized in higher education, these initiatives have given many of us reason for optimism.

In addition to the peer-reviewed research articles, this issue continues the tradition of the Forum section of Human Ecology Review. The discussion of deliberative procedures in environmental policy is a theme that has long been prominent in publications of the Society for Human Ecology. Human Ecology: Research and Applications, published by the Society a decade ago, included papers by First Vice President **Thom Meredith**, past president **Tom Dietz** and others that called for deliberative approaches and critiques to benefit cost and risk analysis. They foreshadow the discussion in the current Forum. The Forum section also reflects a new approach to developing this section. Now and in the future, special editors will take responsibility for the Forum, under the guidance of Senior Managing Editor **Jonathan Taylor**. I urge those of you interested in developing a Forum to contact Jonathan.

I am committed to a rapid response to manuscripts submitted to our refereed research section and timely publication once a paper has been accepted. Good turnaround and careful review of manuscripts are critically important to scholars, and that policy makes HER an excellent publication option to those seeking an outlet for interdisciplinary research on human/environment interactions. Of course our ability to move quickly but carefully on manuscripts submitted to the journal depends on the extra efforts of our peer reviewers who take time from their busy schedules to give HER priority.

HER is also one of the best bargains around in scholarly publishing, and unlike many journals that treat library subscriptions as a subsidy, HER maintains a very reasonable library rate. Please take a moment to see if your library subscribes to the journal, and if it does not, consider completing the library recommendation form in the back pages of this issue. Your help in increasing the visibility of the journal is one of the most important steps you can take to support HER and SHE. In the continuing effort to reach a larger readership, the journal is now indexed or abstracted with a number of new databases (see the inside back cover), and we hope to have approval from 4 more data bases this Fall. In addition, we have initiated websites for both HER and the 10th meeting of the Society for Human Ecology, to be held next spring in Montreal.

The website for HER is:

<http://members.aol.com/tdietzvt/HER.html>.

The website for SHE X is:

[http://members.aol.com/tdietzvt/SHE\\_X.html](http://members.aol.com/tdietzvt/SHE_X.html).

Please link them to whatever sites you think appropriate.



# Extinction by Exhibition: Looking at and in the Zoo

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## Abstract

*This paper compares the phenomenological structure of zoological exhibition to the pattern prevalent in pornography. It examines several disanalogies between the two, finds them lacking or irrelevant, and concludes that the proposed analogy is strong enough to serve as a critical lens through which to view the institution of zoos. The central idea uncovered in this process of interpretation is paradoxical: zoos are pornographic in that they make the nature of their subjects disappear precisely by overexposing them. Since the keep are thus degraded or marginalized through the marketing of their very visibility, the pretense of preservation is criticized. It is suggested that the zoo as we know it be phased out in favor of more authentic modes of encountering other forms of life.*

**Keywords:** zoos, pornography, captive animals, wildness, exhibition, inter-species ethics, conservation, biophilia

*Second Nature poses more problems for us more acutely than ever before because we have come to realize at once the extent of our dependence upon it and the extent to which our demands could be deadly.* (Schwartz 1996, 173)

Throughout its past the zoo has demonstrated a relational dynamic of mastery. Originally, in its days as a private garden, it was a powerful symbol of dominion, projecting an imperial image of man-the-monarch — ruler of nature, lord of the wild. Eventually, it was converted into a public menagerie and became a ritual of entertainment, projecting an almost trickster imagery of man-the-magician — tamer of brutes, conjurer of captives. The contemporary zoo has become a scientific park and aesthetic site, and its meaning is redemptive; it stands as an emblem of conservation policy, projecting a religious image of man-the-messiah — the new Noah: savior of species, the beasts' benign despot. From empire to circus to museum or ark, the zoo has been organized according to anthropocentric and arguably androcentric hierarchies and designs (Mullan and Marvin 1987).

Historically marked by patterns of paternalism and traces of patriarchy, zoological institutions are now justified by appeal to their allegedly saving graces. Zoos are legit-

imized as havens of wildlife protection, vessels for the rescue of an animal kingdom under attack from industrial civilization. Following John Berger (1977), I argue that this self-promotion is an ideology caught in paradox — for the very exposition established by zoos erases the most manifestly “natural” traits of what were once wild beings, namely their capacities either to elude or engage others freely. (Such an erasure occurs even if one eschews a classical doctrine of natural kinds. My argument depends not on immutable essences of species as such, but rather on received meanings of wildness for any animal at all.) Thus this exhibitionism extinguishes for us the existential reality of those animals even as it proclaims to preserve their biological existence. Even the astute zoo apologist, Emily Hahn, admits that “the wild animal in conditions of captivity ... is bound to alter in nature and cease being the creature we want to see” (1967, 16). Berger elaborates the irony thus: despite the ostensible purpose of the place, “nowhere in a zoo can a stranger encounter the look of an animal ... At most the animal's gaze flickers and passes on ... They look sideways ... They look blindly beyond ... They scan mechanically” (1977, 26).

Since it effectively forces its show-items into an overexposure that degrades their real nature, the zoo can be seen to partake in the paradoxical form of pornography — conceived not as something sexy, but as an institution of visive violence. Hence “the zoo to which people go to meet animals, to observe them, to see them, is in fact a monument to the impossibility of such encounters” (Berger 1977, 19). Here possible parallels with gender analyses of the pornographic may be intimated poignantly by substituting “strip-bar ... men ... women” for “zoo ... people ... animals” (Kappeler 1986, 75-76).

The broad analogy between zoos and pornography is useful because, if it holds true in the relevant respects (as I think it does), then the comparison casts a new and decidedly critical light on the debate over keeping and breeding wild animals in captivity. As an illustration, consider the controversy over pornography. There are several conceivable defenses of pornography, but imagine for a moment an apologist taking the position that we should permit — indeed promote — the institution because it excites or inspires us (particularly the young) to esteem the subjects displayed, because

it “educates” us to look out for the welfare of those so exposed. The centerfold, in other words, would be seen as an icon of compassion and respect! All that need be done now is to discover why so many of us accept the same sort of reasoning when it is presented on behalf of zoological exhibition. Surely there are relevant disanalogies that would warrant the different reactions — or are there?

First, we might be tempted to think that zoos are truly educational — in a way that pornography (at least typically) is not. But this alleged difference does not hold up under scrutiny. We have to ask tough questions, such as those framed by Paul Shepard: “The zoo presents itself as a place of education. But to what end? To give people a respect for wildness, a sense of human limitations and of biological community, a world of mutual dependency?” (1996, 233). No, we have to answer, zoos either teach poorly or instill false and dangerous lessons all too well. One environmental researcher found that “zoo goers [are] much less knowledgeable about animals than backpackers, hunters, fishermen, and others who claim an interest in animals, and only slightly more knowledgeable than those who claim no interest in animals at all” (Kellert 1979). Nearly twenty years later, his verdict is still dismal: “the typical visitor appears only marginally more appreciative, better informed, or engaged in the natural world following the experience.” In reply to Shepard’s question, he finds that “many visitors leave the zoo more convinced than ever of human superiority over the natural world” (Kellert 1997, 99).

There are several unsurprising reasons for these abysmal findings regarding the educational value of zoos: the public is largely indifferent to zoo education efforts (few stop even to look at, let alone read, explanatory placards); animals are viewed briefly and in rapid succession; people tend to concentrate on so-called babies and beggars — their cute countenances and funny antics capture audience attention (Ludwig 1981). Of course, this sort of amusement is at the heart of what a zoo is (scientific ideologies of self-promotion notwithstanding). Consequently, and insidiously, what visits to the zoo instruct and reinforce over and over again is the subliminal message that nonhuman animals are here in order to entertain us humans. Even when, during our deluded moments of enlightenment, we insist that they are here rather to edify — even then their presence is still essentially assigned *to or for us*. Thus the phenomenological grammar of their appearance precludes the possibility of full otherness arising; this is what it means to put and keep a live body on display (a structural inauthenticity that remains despite the best intentions of humanitarian/ecologic pedagogy).

If this again sounds too pornographic, perhaps we can wash away the association by discovering the relevant disanalogy elsewhere. Undoubtedly, someone will think that the

likeness I allege is strained on account of the obvious difference in attraction — erotic versus biotic entertainment. Here I must give some ground, for it is not the average zoo visitor who actually desires a romp with the rhino. I grant that bestiality is not part of the ordinary dynamic of zoo visitation (although it can be seen as an indirect ingredient, as in Peter Greenaway’s 1988 film, *ZOO*). Nevertheless, I maintain that the analogy even here holds strong enough to warrant its validity. The aesthetics of the zoo are not, I believe, far removed from that of pornography. We find in both cases fetishes of the exotic, underlying fear of nature, fantasies of illicit or impossible encounter, and a powerful presumption of mastery and control (Griffin, 1981). Given these similarities, I do not think it at all unbelievable to claim that zoo inhabitants and porn participants are very much alike in this respect — they are visual objects whose meaning is shaped predominantly by the perversions of a patriarchal gaze (Adams 1994, 23-84, esp. 39-54).

At this point some of the impatient among us, unsettled if not outright disturbed by the parallels, may be tempted to rescue the respectability of both institutions at once by wielding the double-edged sword of freedom. Pornography itself is not so bad, the argument would go, because it is staffed by professionals who have “chosen” their careers; and, as for zoos, the animals are “creatures of instinct” anyway and hence were never truly free even in the wild. This counter-argument is far from convincing, however. First, in rejoinder, I would point out that many (probably most, perhaps all) of those who are displayed in pornography can hardly be said to have freely chosen their objectification. Furthermore, I am not prepared to allow instinct to become the imprimatur of zoological exhibition. Biting the bullet, I wish to remind the reader that some cetaceans and other primates appear to partake in what philosophers call positive freedom (roughly autonomous agency). Dodging the bullet, I want to say that most (if not all) other wild animals are at least negatively free in the sense of being at liberty to individually fulfill their species-being (which many qualitatively experience as well).

It will be of no use, at this juncture, for zoo defenders to shift the ground and sing the praises of reform in naturalistic architecture, alleging that in the brave new no-bars biodome, the keep are effectively at liberty. No, that move won’t work — not, for instance, when the measurement of one jaguar’s wild territory (twenty-five thousand acres) is greater than the total land area of all major zoos worldwide (Preece and Chamberlain, 1993)! Moreover, there is reason to suspect the appeal to freedom that we are treating is itself aligned with the structure of possessive consciousness. Indeed, the phenomenology of control from Hegel to Sartre shows that the dialectic of oppression manifests a paradoxical need —



namely, that the master, consciously or otherwise, desires the slave to be free in and through exploitation itself.

It would seem, then, that what may have come across as outlandish at first glance — the analogy between zoos and pornography — is not at all preposterous and rather has much to support its strength. The reader may wonder here what the upshot is. After all, one might counter, this comparative critique succeeds only if one assumes a dubious attitude of moralistic prudery in the case of the analogue. My reply to this last objection is that plausible distinctions can be made, in the area of erotica, between the politics of degradation and the aesthetics of revelation. One way of marking that divide is to speak, as Berger does, of the difference between nudity and nakedness: “To be naked is to be oneself ... To be nude is to be seen naked by others and yet not recognized for oneself ... A naked body has to be seen as an object in order to become a nude ... Nakedness reveals itself ... Nudity is placed on display ... To be naked is to be without disguise ... Nudity is a form of dress” (Berger 1972, 54).

Now let us re-assess the difference at stake, by substituting the words *captive* and *wild* for *nude* and *naked*. The transformation is not seamless, but with a bit of interpretive finesse it is telling: to be wild is to be oneself; to be captive is to be seen wild by others and yet not recognized for oneself (*why aren't the nocturnal animals dancing by day when we come by?*); a wild body has to be seen as an object in order to become captive; wildness reveals itself (*camouflage notwithstanding*); captivity is placed on display; to be wild is to be without disguise; captivity is a form of dress (*costume complete with placards of identity and matching signs of exhibit's corporate sponsorship*). My parenthetical remarks are not the only ones possible — with a little imagination, anyone who has gone to a zoo can add her own comments.

In conclusion, I believe the study of zooscopic pornography would be particularly helpful in critically understanding the emergence of a generally visual culture — for therein the politics of perception ramify to include even natural history. Michel Foucault once observed that “for millennia, man remained what he was for Aristotle: a living animal with the additional capacity for a political existence; modern man is an animal whose politics places his existence as a living being in question” (1980, 143). Perhaps the postmodern human is an animal whose techniques of perceptual power make his relations with other living beings suspect; maybe we now need a genealogy of the “zoopticon.” However that may be, before ending I want to avoid misconstrual of my central analogy and make it clear that I do not frown upon involvement with “wildlife,” whether biotic or erotic. In the case of the former, I do feel there is an authentic animal encounter for which we have a biophilic need.

The popularity of zoos far outstrips that of even major

league professional sports; in the United States alone, they attract 135 million people per year (Kellert 1997, 98). It is likely that the promotional factors of preservation, research, and education are neither necessary nor sufficient conditions for the existence of zoos. What we too lightly call “amusement” is probably both necessary and sufficient, and therefore we ought to redefine and further research this latter motive. If something like what E. O. Wilson (1984) describes as biophilia lies behind our exhibition of other organisms, then I submit that our task is to develop modes of cultivating that biophilic drive and the associated affiliation with animals in ways beyond and better than zoos do or can.

To some ears, it may sound as if I am closing the door prematurely on the promise of ameliorating zoos. In fact, one observer has already laid out an intriguing set of possible pedagogical reforms for these institutions. Scott Montgomery envisions the zoo as a place to study the domestication of animals, to reflect on animality's conventional meanings, to investigate the cultural history of the zoo itself, and to question the very idea of Nature (Montgomery 1995, 576ff.). These are sophisticated goals, some of which are at odds with the entertainment dynamic of the zoo as such. Actual educational reform at the zoo is more modest, though still interesting as a putative catalyst for awakening student curiosity (*Sunday Morning*, 1998). My guess is that true transformation — one which curtails the triviality and stereotyping of, say, television's *Animal Planet* and Disney's *Animal Kingdom* — would change the zoo so radically that another name for the site would be called for.

So what might such changes look like? A first step might be to strip the zoo of its exoticism; the Belize Tropical Education Center, for instance, keeps only native animals and then usually only those that have been injured or orphaned (Coc et al. 1998, 389f.). A second step could involve abridgment or abandonment of the notion and practice of keeping itself. In Victoria, for example, at the southeast edge of Australia's mainland, I have observed a site that has been set up for the protection and viewing of blue (or ‘fairy’) penguins who retain access both to the sea and their regular roosting burrows. It seems to me that, whatever else one may say about ecotourism such as this, one of its cardinal virtues is that it allows the animals themselves to engage or break off any encounter with human visitors. It is the observance of this elemental kind of ‘etiquette,’ referred to throughout Weston (1994), that marks a distinctive departure from the pattern of pornography I have criticized above.

## Acknowledgments

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# A Consideration of Collective Memory in African American Attachment to Wildland Recreation Places

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## *Abstract*

*This study examines the effect of race on place attachment to wildland areas. It is generally assumed that African Americans have a more negative impression of wildlands, compared to white ethnic groups. Studies from past decades report that blacks show less aesthetic preference for wildland, unstructured environments and are also less environmentally aware than whites. While it is assumed that blacks are wildland averse, few studies have considered some of the sociohistorical factors that may have contributed to the formation of such attitudes. One possibility is that blacks' collective "memory" of sociohistorical factors such as slavery, sharecropping/Jim Crow, and lynching may have contributed to a black aversion for wildland environments. Racial differences in aesthetic appreciation of wildlands are tested with a place attachment scale developed by Williams et al. (1992) using confirmatory factor analysis and structural equation modeling. The data are from a 1995 survey of residents in a rural, southern county in the Florida panhandle. Results show significant racial variation, with African Americans having less attachment to wildland recreation areas. Sex and age are also significant predictors of place attachment.*

**Keywords:** African American, collective memory, environmental meaning, place attachment, wildland recreation

This paper examines racial variation in place attachment (Williams, Patterson, Roggenbuck, and Watson 1992). "Attachment to place" is rooted in the social psychological and environment and behavior literature. Similar concepts are topophilia (Tuan 1990), place identity (Proshansky 1978), sense of place (Steele 1981), and place dependency (Stokols and Shumaker 1981). The most agreed upon definition of attachment is that of a deep, positive, affective bond to a setting or type of setting. This bond has less to do with rational thought, as in the case of establishing satisfaction (Williams

1989); rather, it is determined more by emotion in that attachments may be formed with objects or places which are undesirable to the objective observer. For example, an adult may have an attachment to a camping area now surrounded by interstate traffic because the person camped in the area as a child. To the objective observer, this particular camping area might seem undesirable, but to the "attached" adult, the area continues to command visitor loyalty because of some emotional bonding that occurred at some point in the person's life (Rowles 1983).

Attachment is the process of turning physical space into a place endowed with either individual or collective meanings. As Low (1992) writes, place attachment is "the symbolic relationship formed by people giving culturally shared emotional/affective meanings to a particular space or piece of land that provides the basis for the individual's and group's understanding of and relationship to the environment" (165). Low and Altman (1992) note that physical properties may be only incidental to attachment. That is, the physical place may simply provide the background upon which ideas, feelings, and memories are formed. Attachment derives more from what was *experienced* in a particular environment rather than the shape, size, or location of the environment.

Williams et. al. (1992) argue that recreation managers and researchers should pay more attention to these symbolic and emotional attachments visitors have for recreation places rather than continue to view different recreation places as if they were undifferentiated commodities. A recognition of the meanings people hold for outdoor places can help managers understand better why certain publics concern themselves very much for some management policies but seem to care little about others.

Williams et. al. (1992) developed Likert scales to measure emotive attachment to wilderness areas in general (wilderness attachment) and attachment to four specific wilderness places (place attachment). The analysis examined the relationship between these two types of attachment,

respectively, and four independent variables— 1) use history of either wilderness areas or a specific wilderness place and perceived substitutability, 2) sociodemographic characteristics, 3) mode of experience and trip characteristics, and 4) sensitivity to recreational impacts and wilderness conditions. Place attachment was found to be more closely associated with both lack of nonwilderness substitutes and with lower income and education. As expected, attachment to specific wilderness areas was associated with certain sociodemographic characteristics such as membership in wilderness advocacy groups and nature study and also with trip characteristics (preference for longer stays). Gender (male) was significant for attachment to one of the four wilderness areas.

Williams et al.'s (1992) seminal piece has contributed much to our understanding of the more emotive aspects of outdoor recreation by calling theoretical attention to the emotional component of the recreation experience and by providing an empirical measure of place attachment. However, neither Williams et al. (1992) nor subsequent place attachment investigations have addressed whether attachment to types of recreation areas varies by race or ethnic group affiliation (Mitchell, Force, and McLaughlin 1993; Brandenburg and Carroll 1995). Presumably, Williams et al. (1992) was not able to do this because their sample contained only white respondents. This is not surprising given that the sample consisted of on-site visitors to wilderness areas. Empirical studies of on-site wilderness visitors show that the overwhelming majority of visitors are college educated white males (Lucas 1989; Watson, Williams, Roggenbuck, and Daigle 1992). Indeed, one of the greatest disparities among racial/ethnic groups, in terms of outdoor recreation participation, continues to be in activities associated with wilderness, wildland, or primitive recreation areas (Washburne 1978; Dwyer 1994; Woodard 1993).

Yet it is important to understand better why African Americans and other groups appear averse to wildlands, because as Bixler and Floyd (1997, 444) observe, "to ignore apprehensions of wildlands and only investigate what is preferred by those already actively involved...does little more than support the status quo." A number of explanations have been proposed to explain why African Americans seem to have less interest in most wildland areas and activities. Taylor (1989) presents three general categories of theories which address the more general "concern gap" between African American and white involvement in the environment. These are: 1) social psychological, which includes marginality and hierarchy of needs or the idea that blacks have less interest in wildland recreation pursuits because more lower-level, material needs such as food and shelter compete for limited black resources; 2) cultural, including African American mythology, slavery, and segregation; and 3) mea-

surement error, including inappropriate indicator measures and sampling techniques.

This paper does not wish to suggest that blacks are environmentally *unconscious*; rather, in relation to whites, they appear to be generally less aware of environmental issues. However, more recent studies show, that in some instances, African Americans display a similar degree of concern as whites for the dangers of environmental toxins. And environmental activism among both rural and urban African Americans has been mounting in recent decades, for example, grassroots involvement in the environmental justice and environmental racism movements, which are an extension of the 1960s civil rights movement (Bullard 1990). These trends notwithstanding, there still exists a measurable and significant divide between black and white participation in natural area recreation and environmental activism.

Most of the empirical or theoretical studies devoted to wildland recreation participation thus far have attempted to determine the influences of socioeconomic barriers on recreation preferences and behavior (Floyd, Shinew, McGuire, and Noe 1994; O'Leary and Benjamin 1982; Washburne 1978). Analyses of socioeconomic variables have been limited to mostly personal or household income and education level. Other components of social structure such as ethnicity or racial sub-culture have been examined only indirectly, and even less attention has been given to sociohistorical/cultural hypotheses such as slavery, sharecropping, or lynching on African American perceptions of wildlands. However, a consideration of these historical structures may be useful in helping to better understand the lack of a black presence in wildland areas. This negative imageability or symbolism may be especially salient for rural, southern African Americans because much of this group's collective memory is associated with the land (Johnson et al. 1997).

This paper uses the term collective memory in the tradition of Halbwachs (1980) who refers to it as an image of the past within the bounds of social context, for example, meaningful events that occur in one's family, neighborhood, ethnic/racial group, or nation. Writing in the same tradition, Rapaport (1997, 20-21) argues that memory of historical events is not restricted to individuals but shared by ethnic communities that continually relive collective traumas, for example the Holocaust. Successive generations of racial minorities can also be influenced by structural events that impacted their respective groups even though subsequent generations have no direct memory of such events. Although younger generations of African Americans did not witness lynchings or have direct experiences with sharecropping, they do remember stories related to them by older relatives who lived these experiences. It can be argued that these "memories" are retained by younger African Americans and

become a part of their collective identities, that such histories contribute to what it means to be black in American society; and these memories or narratives about the land influence black Americans' choices for outdoor recreation venues. Indeed, to forget these places of oppression would be to disgrace the memory of those who suffered and endured such hardships.

Bixler, Carlisle, Hammitt, and Floyd (1994) make a similar point, noting that wildland fears may be learned not only directly but also vicariously. Stokols (1990, 642) refers to this as social imageability or the "capacity of a place [or category of place] to evoke vivid and widely held social meanings...." This imageability is the gradual process of assigning meaning to a place based on past experiences. Such symbolism can arise even for people who have no direct contact with a place. The history of a place or type of place can be passed to successive generations via storytelling or various other media. Such transference occurs "when people gather together and remind themselves of events or conditions they once experienced" (Rapaport 1997, 20); and, for successive generations, the places referred to in racial and ethnic histories can come to symbolize a certain atmosphere or mood although no direct personal contact has been established.

The place where much of slave labor, sharecropping, and lynching occurred — the mostly wild, primitive, and in some cases semi-structured environment — may be important for understanding African American perceptions of wildland recreation places. Because beatings and hangings often took place in unprotected wild areas, it can be argued that contemporary blacks associate these wild places with terror. Though innocuous, wildland recreation activities like wilderness exploration, backpacking, and camping<sup>1</sup> have nothing to do with the horrors of past generations, the "memories" of terroristic acts taking place in such areas remain.

While the present study does not empirically address this linkage between black perceptions of wildlands and sociohistorical events, it discusses some historical aspects of black Americans' relationship to the land and the natural world. It is suggested that the legacies of these oppressive institutions cannot be divorced from either an historical or contemporary black land aesthetic. It is further suggested that such conditions may contribute either directly or indirectly to the avoidance of wildlands by many African Americans.

### **Sociohistorical Factors Associated with African Americans and the Land**

Traditional African and European peoples worldwide have had different historical and philosophical relationships with wildlands and wilderness type areas. Thompson (1983) and Holloway (1990), contend that the KiKongo Bantu of central Africa brought an environmental perspective to the

Americas which saw humans as being endowed with a vital force that placed them at the center of a harmonious, self-regulating universe (Tempels 1959).<sup>2</sup> Riley (1996) also writes that traditional African cultures stressed their interconnectedness with the nonhuman environment. Similar differences in environmental world views are recognized for Native American, Asian American, and Latin American groups (Tuan 1990; Wyckoff 1995).

Bantu ontology provides a basis for identifying an early African American environmental ethic and land relationship. However, a more complete examination of contemporary African American ontology necessitates looking at the slave folk culture that emerged in the New World, a culture that was influenced by both European and Native American peoples. According to Levine (1977), the spiritual form of song, in particular, allowed slaves to maintain a vital link to the inter-connectedness of an older world order. For the materially bound slave, God, nature, and the supernatural evolved into active, vibrant entities which were present in every aspect of the slave's existence. Superstitious beliefs encouraged the believer to search for meaning in the natural world and to align oneself with universal forces. Only by comprehending the natural world could one hope to avoid unforeseen dangers and also attract to oneself good luck and fortune (Brewer 1968).

This spiritual world of slaves is important in understanding the bases of contemporary African American ideas about the natural environment. Because slaves' lives were so integrated with much of the natural world, they, like their ancestors, saw it not as a romantic place of rebirth or re-creation, but as a continuous, familiar extension of themselves (Meeker 1973). Along with the spiritual dimensions of slave life however, one must also consider the obdurate reality of forced labor on black perceptions of the land. While it is true that slaves lived close to nature and relied on signs from the natural world to help guide their lives, they were, at the same time, chattel property, compelled to work lands which offered them no direct, material benefits or gains. Despite the slave and freedman's adaptation to and perhaps appreciation of the land, one cannot disregard the nature of the relationship. This condition of servitude marks a fundamental difference between the slave and the African relationship to the land.

In the years immediately after slavery, approximately 88 percent of African Americans resided in the former slave states. Most freedmen occupied themselves with some form of contract farming with white planters, where the former worked as either wage earners, sharecroppers, or tenant farmers (U.S. Department of Interior 1872). Relative to whites, few blacks were landowners (Lemaistre 1988; Schweningen 1990) although black ownership varied by region in the Black Belt and generally increased until 1930 (Hargis and Horan

1997). For the most part, though, African Americans' economic relationship to the land is largely a history of disenfranchisement. Scholars have even questioned the popular myth of the government's granting of forty acres and a mule to the freedmen, suggesting that rumors of land redistribution probably originated among zealous abolitionists (Oubre 1978). It could be argued that this lack of ownership and personal stewardship, coupled with the harsh working conditions of sharecropping and tenant farming contributed to the development of a more negative land aesthetic among blacks. The land (including wildlands) may have represented oppression and servitude more than economic opportunity or spiritual freedom.

The random mob violence perpetuated against blacks during Reconstruction and the first third of this century may also have contributed to a black aversion for the land and wildland places. Beck and Tolnay (1990) report that approximately 3,000 African Americans were lynched in the South between Emancipation and the Great Depression in the 1930s, a span of about 70 years. The places where many of these violent acts occurred is important for understanding contemporary black impressions of wildlands and wooded areas. Often blacks were summarily executed in what Raper (1933, 6) calls "open country" (wooded areas). Of eleven black lynchings that took place in Florida in the 1930s, eight occurred in wooded areas. Tolnay and Beck (1991) hypothesize that such random violence in the Deep South was a push factor in the net migration of more than one million blacks from the "Cotton South" states of South Carolina, Georgia, Alabama, and Mississippi during the first three decades of this century. Lynchings continued in the South as late as the 1950s (Woodward 1974).

Some theorists argue that the experiential interactions of both race and gender must be considered in order to fully understand why African American women, in particular, fear wildlands and participate less often in leisure pursuits than other societal groups (White 1991; Shiner 1995). Riley (1996) writes that the embracing of nature is more problematic for black women than for other race/gender groups in American society. She argues that black women's bodies are objectified in Western societies, and women of color are considered by whites to be more sexual and primitive than white women. Because black women have been portrayed as being more animalistic and less feminine, they have sought to debunk this image by distancing themselves from anything relating to the environment and nature.

Empirically, studies show that African Americans generally prefer more developed settings over wild, natural areas. Results from the 1982-83 *Nationwide Recreation Survey* showed that blacks participated more often than whites in activities which required developed settings, for instance out-

door team sports (U.S. Department of the Interior 1986). However, blacks engaged much less than whites in camping, backpacking, and day hiking. Dwyer and Hutchison's (1990) research on attitudes of Illinois residents also indicated that African Americans felt Illinois park management should emphasize developed facilities and conveniences rather than preserved natural areas.

The landscape planning literature also reports that preferences for natural settings vary by ethnic group affiliation, most notably between African Americans and whites (Zube 1981). For example, Peterson (1977) found that black high school students favored structured, developed settings over backcountry type areas, and Kaplan and Talbot (1988) found that African Americans preferred landscaped settings over natural, unaltered scenes.

Despite the seeming aversion blacks demonstrate for wildland places, it is important to recognize that blacks, particularly in the rural South, show a great deal of enthusiasm and interaction with cultivated landscapes such as gardening and yard designs (Westmacott 1992). But these outdoor settings are readily distinguishable from more rugged, unstructured places where one is more likely to feel isolated. It could be argued that isolation connotes absolute defenselessness in the black American mind, a "falling off the earth" region. The popular novel and television mini-series *Roots* magnified this symbolism (Haley 1977). The hero, a young African male, was captured by slave traders while alone in the forest. The *African* Kunta Kinte experienced ultimate death, a separation from all he held sacred as he was forced into servitude in a foreign land. The *place* of his capture, an isolated woodland, may be important in understanding contemporary black views toward wildlands. Such areas may represent a state of being disconnected from the whole.

The next sections discuss the quantitative analyses used to examine degree of affectation or attachment to wildland places. These sections include sampling design, factor analyses, and structural equation modeling.

## Method

Black and white responses to wildland place attachment are compared by first analyzing the place attachment scale with exploratory factor analysis to replicate the earlier work of Williams et al. (1992). The place attachment scale is then subjected to confirmatory factor analysis, which is incorporated into a structural model. Confirmatory factor analyses were performed because they provide unique solutions to model equations, unlike exploratory analyses which yield multiple solutions for a given set of equations. Also, with confirmatory models, the investigator specifies substantive relationships among variables based on theory or other a pri-

ori information. Statistical tests indicate whether the data confirm to the substantive model (Long 1983).

Confirmatory factor analysis assumes the existence of unobserved or latent factors that can be indexed by observed variables. In this study, the items comprising the place attachment scale are observed variables that point to the underlying place attachment construct. Confirmatory factor analysis is best suited for the latter stages of research when the researcher has a fairly clear conceptualization of the underlying latent factor or factors and of the scale intended to measure the factors (Hatcher 1994). The proposed scale should first be administered to a pretest sample, and exploratory factor analysis should be used to determine the number of underlying factors, the loading of observed variables on the latent constructs, and the correlation among the latent factors. Having developed an acceptable scale, the researcher then performs confirmatory factor analysis using a new sample.

### Place Attachment Scale

Williams et al. (1992) developed both a wilderness and a place attachment scale to measure attachment to general wilderness settings and specific wildland recreation settings, respectively. Thirteen place attachment and five wilderness attachment statements were used to measure each of these latent variables. Exploratory factor analysis of these statements revealed three dimensions of place involvement: place dependency, place identity, and place attachment.

The present study adapted four wilderness attachment statements from Williams et al. (1992) to measure attachment to wildland recreation areas (Table 1). For example, one of the statements reads, "I find that a lot of my life is centered around recreating in the woods." This statement captures the identity aspect of wildland place attachment. Two statements reflect identity, one attachment, and the other dependency. An additional attachment and dependency statement (both adapted from the place attachment scale) were included in the survey so that each dimension of attachment was represented by two statements. These statements were measured with a five-point Likert scale ranging from strongly disagree to strongly agree, including a neutral category.

Using a pretest sample of 73 respondents, these six statements were used to replicate Williams et al.'s (1992) exploratory factor analysis. Results are shown in Table 1. The analysis used squared multiple correlations as prior communality estimates. Extraction of factors was specified with principal components. The eigenvalues and scree test both indicated that only one factor was meaningful. Each of the six place attachment variables loaded highly on this single factor. The factor seemed to be an overall affectation or attachment to wildland areas. It appears that respondents

could not distinguish the different dimensions of the construct. Perhaps a scale with only six items was not able to elicit this discrimination. This analysis produced a Cronbach's alpha of 0.91.

Table 1. Exploratory Factor Analysis of Place Attachment Scale

Item	Item Loading	Eigenvalue	Cronbach's alpha	% variance
<b>Place attachment</b>		4.12	0.91	0.69
<u>Identity:</u>				
I find that a lot of my life is centered around recreating in the woods.	2.56	0.87		
I hardly ever take time to go to wooded areas to recreate.	3.13	0.65		
<u>Dependency:</u>				
One of the main reasons I live in a rural area is that I have so many chances to recreate in the woods.	2.65	0.85		
Wooded recreation areas are best suited for the kinds of recreation I like most.	2.96	0.84		
<u>Attachment:</u>				
I get more satisfaction from visiting wooded recreation areas than any other type of recreation places.	3.01	0.87		
I am very attached to wooded recreation areas.	3.01	0.87		

N=261. Based on a Likert scale ranging from 1 to 5 where 1=strongly disagree, 2=disagree, 3=not sure, 4=agree, 5=strongly agree.

### Sample

The study sample is a subset of a larger sample drawn from 1990 census tracts of a six-county area surrounding the Apalachicola National Forest in Florida. This study includes respondents from Gadsden county, where 57 percent of the population is African American. Because the overwhelming majority of African American respondents were from Gadsden county, it was decided to limit the analysis to respondents from this county. Fifty-six percent of the larger white sample were also Gadsden county residents. For the larger sample, the black sample was drawn at random from telephone directories in census tracts that contained at least 50 percent black households. The white sample was selected at random from the tracts, irrespective of racial density.

The survey instrument was administered as a household, mail survey. Surveys were mailed in late December 1994, followed two weeks later by a postcard reminder to non-respondents. Three weeks after the postcard reminder was mailed, a replacement survey was sent to those who still had not responded. Following Dillman (1978), the postcard reminder and replacement survey were sent to help increase

response rate and reduce non-response bias. Undeliverable addresses and surveys that came back marked "return to sender" reduced the original sample of 571 for Gadsden county to 537 valid addresses. A total of 263 responded for a response rate of 48.9 percent. Of these, 147 were white and 116 African American. Responses from racial or ethnic groups other than African American or white were not included in the analyses.

To reduce sex bias in the sample, we asked that the adult in the home, 18 or over, who most recently had a birthday complete the questionnaire. To assess the representativeness of the sample, aggregated sample characteristics— race, sex, age, education, and household income were compared to 1990 U.S. census figures for the population (U.S. Department of Commerce 1991a; U.S. Department of Commerce 1991b; U.S. Department of Commerce 1992; U.S. Department of Commerce 1993). See Table 2.

The sample and population were comparable only for sex. It appears that the sample had more education and higher income levels, compared to the population. This is not uncommon in survey research, as more affluent persons tend to respond to surveys. Within the sample, blacks and whites were statistically different for sex, education, and mean household income.

Table 2. Comparison of Population, Sample, and Racial Group Characteristics

Characteristic	Population 28, 510	Sample N=263	Blacks N=116	Whites N=147
Percent black	57.0	44.0	—	—
Percent male	43.7	50.8 (50.0)	32.7 (47.1)	56.6 (49.7)
Median age	32.8 <sup>1</sup>	51.0 (15.65)	52.5 (14.2)	51.0 (16.5)
Percent college or technical school graduate	29.5 <sup>2</sup>	54.2 (49.9)	46.1 (50.1)	61.5 (48.8)
Median household income	\$19,985	\$37,000 (\$22,719) [N=169]	\$25,493 (\$23,994) [N=70]	\$42,000 (\$20,857) [N=99]

Chi-square tests showed the black and white sub-samples were significantly different for sex ( $p = 0.0001$ ); education ( $p = 0.013$ ); and median household income ( $p = 0.0008$ ). Number in parenthesis is standard deviation. <sup>1</sup>Includes persons less than 18 years of age. <sup>2</sup>Includes only residents 25 and over.

## Results

### Confirmatory Factor and Structural Equation Analyses

The analysis followed a two-step procedure based on Hatcher (1994). First, a confirmatory factor analysis was used to develop a place attachment measurement model. The

place attachment model was analyzed using the CALIS procedure in PCSAS. The measurement model employed multiple indicators for place attachment. Appendix A shows covariances for the six place attachment indicator variables. Next, a structural model was developed with place attachment as the endogenous or dependent variable (Figure 1). Race and three other independent variables—sex, age, and education were included as exogenous predictor variables. The independent variables were added to the analysis to test for racial differences in place attachment, while controlling for other demographic factors.

### Measurement Model

The measurement portion of the model assesses the relationship between the latent variable (place attachment) and the observed indicator variables. This is accomplished by analyzing the covariance among the observed variables (Long 1983). Place attachment was measured by six manifest variables. The basic form of the equation is shown in (1). The equation shows that the variance in  $x_i$  is apportioned into two parts, that part associated with the underlying factor ( $\lambda_{ij}\xi_j$ ) or place attachment and that portion due to error ( $\delta_i$ ). The lambda ( $\lambda$ ) is a coefficient or factor loading of the latent place attachment construct ( $\xi$ ) on the indicator variable,  $x_i$ .

$$x_i = \lambda_{ij} \xi_j + \delta_i \quad (1)$$

The model was estimated with maximum likelihood techniques. The chi-square produced from such analyses is a commonly used index of goodness-of-fit for confirmatory models (Hatcher 1994). Chi square tests the null hypothesis that the predicted  $x_i$  covariance matrix is not significantly different from the observed matrix. In other words, the measurement model provides a good fit to the data. Ideally, one would want to fail to reject the null hypothesis. In the present analyses, the model chi-square was significant,  $\chi^2 (10, N = 263) = 47.1$ ,  $p = 0.001$ , which suggests the discrepancy between the observed and predicted covariances is significant. Although widely used, chi-square is a very stringent test of good fit. Models are rarely accepted or rejected based on this statistic alone because the chi-square can be influenced by sample size and model complexity.

Hatcher (1994) recommends supplementing the chi-square with Bentler's Comparative Fit Index (CFI) and/or Bentler and Bonett's non-normed index (NNFI). The CFI and NNFI indicate the percentage of covariation explained by a model. Values range from zero to one with values over .90 indicative of good fit. Both the CFI and NNFI were 0.983, which indicates an acceptable fit. Also, the factor loadings of the manifest variables on place attachment were highly significant. Table 3 shows the six place attachment scale items



with standardized factor loadings. Both the individual (R-square) and composite reliability scores for place attachment indicated there was strong internal consistency among the indicator variables. This provides further support for the legitimacy of the measurement model. The next section summarizes results from the structural equation models.

Table 3. Reliability Estimates of Place Attachment Indicators

Latent variable & indicators	Place attachment statements	Standardized t-value		R <sup>2</sup>
		factor loadings	factor loadings	
Place attachment		-	-	0.909
x <sub>1</sub>	I get more satisfaction from visiting wooded areas than any other type of recreation area.	0.856	16.1	0.732
x <sub>2</sub>	I find that a lot of my life is centered around recreating in the woods.	0.842	15.4	0.709
x <sub>3</sub>	One of the main reasons I live in a rural area is that I have so many chances to recreate in the woods.	0.829	15.1	0.688
x <sub>4</sub>	I hardly ever take time to go to wooded areas to recreate.	0.582	9.8	0.339
x <sub>5</sub>	I am very attached to wooded recreation areas.	0.824	-	0.678
x <sub>6</sub>	Wooded recreation areas are best suited for the kinds of recreation I like most.	0.785	18.5	0.617

N = 263

**Structural Model**

Again, the purpose of this analysis is to examine the impact of race on perceptions of wildland attachment using a measure of attachment suggested by Williams et al. (1992). At the same time, controls must be employed for other differences between black and white respondents. These differences may be associated with age, sex, or education level of respondent. The initial iteration of the structural model assessed the singular effect of race on place attachment. This first model was compared to a subsequent one that included age, sex, education, and race as predictors. The purpose of this two-step modeling procedure was to determine, first of all, whether race was a significant predictor of place attachment, and if so, whether it remained significant after control variables were included in the analysis. These analyses were also part of the CALIS procedure in PCSAS.

Age was measured as a continuous variable, and sex, race, and education were dichotomous. Males were coded one, females zero. Similarly, blacks were coded one and whites zero. Education levels of high school or less were coded zero, and college or technical school graduate were coded one.

In the first model, race was significant at p < 0.001, and

the effect was negative. With an R-square value of 9.5 percent, race accounted for just under ten percent of model variance. The next model included race, sex, age, and education as controls. Race was again negative and significant at p < 0.001. Sex was positive and significant at p < 0.001. Age was negative and significant at p < 0.01. Education was not significant. Results indicate that African Americans were less likely to have stronger attachment to wildlands, compared to whites. Also, males were more likely than females to be more attached to wildlands, and older respondents had less attachment compared to younger ones. The R-square increased to 20 or 20 percent variance accounted for with the inclusion of sex, age, and education. The fact that race remains significant after including other sociodemographic variables indicates that race is a reasonably strong predictor of attachment to wildland environments. These findings are summarized in Figure 1. The model includes race, sex, age, and education level as predictors of place attachment. Also shown are the six place attachment indicator variables and the error term associated with place attachment.

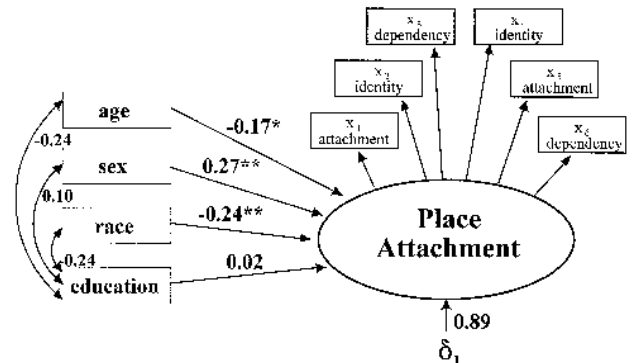


Figure 1. Place attachment structural model. Standardized path coefficients appear on single-headed arrows. Correlations appear on curved double-headed arrows; \* p<.01; \*\* p<.001.

**Discussion**

This study proposed that African Americans have less aesthetic appreciation of wildlands, compared to whites. This proposition was examined empirically with a place attachment scale developed by Williams et al. (1992). It was argued that sociohistorical factors such as slavery, sharecropping, and lynching may contribute to this lack of interest and appreciation. These collective impressions may be especially salient for rural blacks because these groups are more likely than either urban or suburban blacks to have had familial members employed in sharecropping and are also more likely to have been exposed personally to rumors, threats, and actual experiences of lynchings. African Americans were not

asked directly whether such collective experiences influenced their views of nature and wildlands; rather the influence of these factors are assumed to form part of the collective memory African Americans associate with wild, unstructured places. Whether these associations actually exist in whole or in part is a matter of further empirical investigation. These connections are posed in this study to encourage thinking about societal groups and their associations with the land in terms of respective histories and shared memories.

Collective memory is a construct that can be used to help better understand relationships between people and the environment. As a social psychological construct, collective memory mediates between demographic variables such as race, gender, and income, on the one hand, and attitudes, and ultimately behavior, on the other hand. It can be argued that collective memory shapes or even dictates the meaning that a group of people with common memories attribute to objects or events. In Rapaport's (1997, 20) words, collective memory is the "cultural cloth from which patterns of meaning are drawn." For example, events such as the Great Depression, World War Two, Vietnam War, and Civil Rights movement provided collective memories specific cohorts of Americans. But such rallying points or memories seem largely absent for today's youth. Indeed, much of the criticism leveled against members of today's younger generation, the so-called Generation X (those born in the mid-1960s through the early 1980s) is that they have no noteworthy cultural cloth, no meaningful metaphors that delineate the parameters for their lives. It may well be that collective memories exist for younger generations but are located in non-traditional events or occurrences that are not yet fully recognized by older generations. The point is that collective memory is important for ordering people's lives and imparting meaning to objects and places.

The present study employed a quantitative measure of attachment to wildlands. However, it is not sufficient to continue to rely solely upon demographic variables like race and income to provide information about people's interactions with the natural world. To be sure, these variables give some indication of variance in environmental perception, but they can also mask the complexity within categories of sociodemographic variables. A variable like race indicates the degree of racial variation in environmental perception or wildland interaction, but race alone does not say what aspects of race contribute to these variations. Such information requires a deeper understanding of people and their relationship to places.

For instance, this research would have been enhanced with more qualitative assessments of attachment to wildlands, which included some analyses of people's life histories in the community and resident dependence on forestry

resources for their livelihood, not just for recreation. Information from long time residents and older community members would have been enlightening, as they would have been able to talk more about their personal feelings for wildlands and also about their work histories and the social atmosphere (relations between blacks and whites) in the Florida panhandle and how these influence their interaction with wildlands. The forestry industry was a primary employer for panhandle blacks during the first part of the century. Many African Americans worked in the lumber industry and turpentine camps for low pay and miserable working conditions. Surely, such experiences contributed to local black impressions of nature and wildland places.

Results from the factor analyses employed in this study supported the high reliability for place attachment found by Williams et al. (1992). However, the exploratory factor analysis uncovered only one underlying factor, which seemed to be a non-distinct affectation for wildlands. Williams et al. (1992) identified three distinctive components of place attachment—dependence, identity, and attachment. It may be that because only two statements per factor were used, no variation was detected in the exploratory scale. However, the factors were highly correlated, and the coefficient alpha indicated the scale was reliable. The more rigorous confirmatory results also indicated that the overall scale and the individual items were good measures of place attachment.

As hypothesized, the theoretical model showed race was a significant predictor of attachment to wildlands. Blacks were less likely than whites to show liking for such places. Sex was also significant. Males were more likely to have stronger attachments to wildlands, compared to females. Reasons for these differences are varied, but may well have to do with the kinds of activities that typically occur in wildlands, for example hunting and fishing. Hart (1978) also contends that girls and boys are socialized differently with respect to outdoor places. Boys are encouraged to explore and control their surroundings, while girls are taught to adapt to unknown spaces. Even for less rigorous or less traditionally male activities like nature observation or hiking, women may be more hesitant than males to participate from fear of aggressive acts.

Age was also significant and had a negative effect. Education was not significant although the coefficient was positive, indicating that more educated individuals are more appreciative of wildlands. This is contrary to Williams et al.'s (1992) bivariate analysis of education level and place attachment which showed lower education was associated with higher levels of place attachment. Studies of National Wilderness Preservation users have shown that more highly educated persons tend to visit these areas. However, the present study did not ask specifically about wilderness areas.

Income was not a significant predictor of place attachment in any of the analyses.

Natural resource agencies such as the USDA Forest Service and the National Park Service are making sincere efforts to attract more ethnic and racial minorities to federally managed recreation areas. This proactive management is highly commended. However, agencies should first be aware of the various ways that different ethnic groups experience nature. An instructive place to start is with historical impressions of American wildlands and how these might differ across racial and ethnic groups. The content of African American place meanings is important in understanding black responses to both the environment and their lack of visitation to federal and state managed recreation areas. Too often, investigators ignore the perspective of subject groups and assume minorities would have the same ideas about the outdoor environment as the majority culture. If black leisure emphasizes activities such as team sports and visiting with family and friends, then wooded areas probably would not be suited for these activities. For pre-civil rights black southerners, there may remain negative associations with rural, wooded areas given the incidence of race-related violence directed against blacks in such areas. Such places may also connote strictly menial or harsh workplace settings. Further research is needed to explore these factors, in particular, African Americans' collective memory of wildlands and their appreciation, or lack thereof, of such places.

## Endnotes

1. It should be noted that blacks have been shown to participate relatively frequently in some wildland related activities such as fishing (Dwyer 1994). Wildland activities blacks are least likely to engage in are less consumptive activities like backpacking, hiking, and camping.
2. While some scholars contend that Africans lost all ties to their respective cultural heritages when they were brought to the Western hemisphere (Frazier 1957), others insist that African retentions are apparent in many aspects of black American life (Mathis 1978). Most contemporary scholars agree that blacks were able to hold onto some of their cultural heritage although specific practices had to be modified to fit New World structural conditions (Creel 1990; Holloway 1990).

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Appendix A. Covariances for Place Attachment Items

	x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>	x <sub>4</sub>	x <sub>5</sub>	x <sub>6</sub>
x <sub>1</sub>	1.75	1.28	1.30	0.91	1.37	1.29
x <sub>2</sub>	1.28	1.82	1.37	1.04	1.32	1.34
x <sub>3</sub>	1.30	1.37	1.83	0.95	1.30	1.26
x <sub>4</sub>	0.91	1.04	0.95	2.12	1.02	0.91
x <sub>5</sub>	1.37	1.32	1.30	1.02	2.09	1.66
x <sub>6</sub>	1.29	1.34	1.26	0.91	1.66	2.14

N=263

# Demographic Change and Fisheries Dependence in the Northern Atlantic

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## Abstract

*Northern Atlantic fisheries have experienced a series of environmental shifts in recent decades, involving collapse or large fluctuations of the dominant fish assemblages. Over roughly the same period, many fisheries-dependent human communities have lost population, while their countries as a whole were growing. Population loss tends to increase with the degree of fisheries dependence, among communities and sub-national regions of Newfoundland, Iceland and Norway. A close look at Norway, where municipality-level data are most extensive, suggests that population declines reflect not only outmigration, but also changes in fishing-community birth rates. Multiple regression using 1990 and 1980 census data for 454 municipalities finds that fisheries dependence exerts a significant negative effect on population, even after controlling for six other predictors including unemployment and income. The general pattern of changes seen in northern Atlantic fishing communities resembles those identified by migration research elsewhere. Fishing communities are unusual among contemporary first-world societies, however, in that rapid and large-scale environmental shifts appear to be among the forces driving population change.*

**Keywords:** *fisheries, North Atlantic, environment, demography, population, migration, Newfoundland, Iceland, Norway*

Over the past one or two decades, diverse fisheries-dependent regions of the northern Atlantic have experienced strikingly similar patterns of demographic change. They have tended to lose population, even while their countries as a whole were growing. Along with population decline came a new demographic profile: the populations of many fishing communities were younger, on average, than the rest of their countries in the 1980s, but they are older than average today. Such changes reflect a variety of forces, some of them common to other types of rural or resource-dependent communities. But the details and timing of recent demographic changes suggest that environmental shifts in the North

Atlantic have also been among the drivers.

The most visible manifestations of these environmental shifts have been declines in the abundance of cod and other demersal species that until recently were main staples of Atlantic fisheries. Cod populations off west Greenland and maritime Canada both collapsed in the early 1990s. The U.S. belatedly closed key fishing grounds off New England in 1994. Other crises affected Icelandic, Norwegian and Faroese fisheries. The large scale and human impacts of these events have inspired scientific and popular books, including Arnason and Felt (1995), Boreman et al. (1997), Candow and Corbin (1997), Chantraine (1993), Finlayson (1994), Hannesson (1996), Harris (1998), Jentoft (1993) and Kurlansky (1997). The collapse of commercial fish populations resulted primarily from overfishing, sometimes in combination with oceanographic variations. Although specific economic and management decisions have been faulted within each country, the ubiquity of fisheries crises identifies them also as a deep-rooted pattern of contemporary human ecology.

General trends towards declining mean trophic (food chain) levels have been documented for fisheries-influenced ecosystems of the North Pacific (Deimling and Liss 1994) and elsewhere (Pauly et al. 1998). As predatory fish are removed, an ecosystem and hence its fisheries can become increasingly dominated by other species that are closer to primary production. This trend has been prominent in the northwest Atlantic, where the depletion of cod and other predatory fish has been followed by a growing economic reliance on invertebrates (e.g. lobster, crab, shrimp, urchin). An overall downward shift in mean trophic levels can be shown for the northeast Atlantic also, with some exceptions in particular areas.

For fishing communities, marine-environment shifts bring economic ups and downs. Economic uncertainty and crisis-response policy changes then contribute to flows of outmigration. In this paper we begin by examining recent population changes, and their relation to fisheries dependence, within three principal northern Atlantic fishing cultures: Newfoundland, Iceland and Norway. We then focus

particularly on Norway. Comparisons between 1980 and 1990 census data on more than 400 municipalities provide a portrait of demographic changes taking place in fisheries-dependent places. Finally, we explore whether fisheries dependence remains a predictor of population loss, after adjusting for other structural and economic factors. These analyses make use of community and regional-level data sets developed for research on Norwegian fishing communities (Otterstad 1993), and for a comparative study of North Atlantic fishing communities (Hamilton, Duncan and Flanders 1998).

## Population and Fisheries Dependence

Conceptually, “fisheries dependence” is a continuous dimension, or several dimensions, and hence a matter of degree. For our purposes, statistics on the proportion of a place’s labor force, employed persons, or actual labor devoted to fishing and fish processing, provide simple operational measures of the degree of fisheries dependence. Such statistics commonly are available at community and regional levels, permitting comparisons between many places within each nation. Formal cross-national comparisons based on community or regional data remain problematic, due to inconsistencies in the definitions and units of analysis employed by each country. Less formally, however, we can examine the extent to which similar relationships exist between corresponding variables, measured within each of several nations. This section explores the relationship between population change and fisheries dependence.

Using data from Statistics Canada, Figure 1 plots relative population change (1991–96) against the percent of the work force involved with fishing and fish processing in 1991. Each data point represents one of the 10 Census divisions in Newfoundland, Canada’s most fisheries-dependent (and chronically poor) province. Demersal fish populations on Newfoundland’s Grand Banks fishing grounds, once the world’s richest, collapsed in the early 1990s and have not since recovered. Since a moratorium on cod fishing was declared in 1992, Newfoundland as a whole has been losing population — down 2.3% from 1993 to 1996, after a period of approximate stability 1983–92, and a steady increase of 28.6% over 1960–82. All 10 Census divisions show negative growth in Figure 1, but population loss increases with the degree of fisheries dependence (Pearson correlation  $r = -.86$ ,  $t$  test probability  $P < .01$ ).

Figure 2 shows a similar plot based on data from Statistics Iceland and Iceland’s Rural Development Institute. The points here represent Iceland’s 9 geographical regions. “Fisheries dependence” is measured as a proportion of the total man-hours worked. Unlike Newfoundland, where gov-

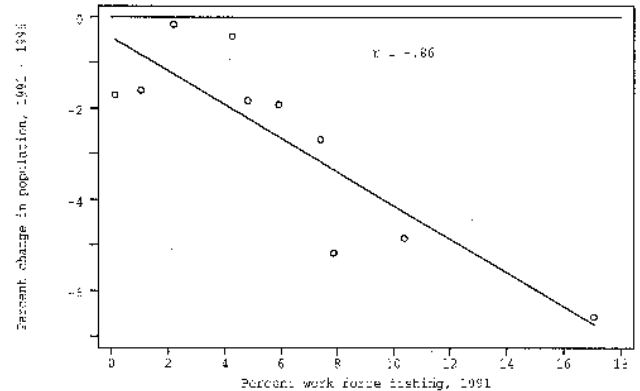


Figure 1: Population change (1991-96) and fisheries dependence among the 10 Census divisions of Newfoundland.

ernment subsidies support fisher folk, Icelandic fisheries must in large part support their government. Faced with the imperative to manage their key resource rationally, Icelanders have pioneered a management/social experiment called individual transferable quotas (ITQs). ITQs were initially proposed as a conservation measure, meant to solve the “tragedy of the commons,” but much recent discussion has focused on their social effects (Pálsson and Pétursdóttir 1997). Quota shares command high market prices, which create both strong incentives for small-scale fishermen to sell out, and barriers to the entry of new fishermen. Over time, quota shares increasingly concentrate in fewer hands. This concentration can affect communities as well; the quota shares held in some ports increase, while in others some or all fishing rights have been sold away. The ecological consequences of ITQs — whether they in fact encourage conservation, or the opposite due to high-grading of catches — are another topic of debate.

Icelandic fishermen who remain active are adapting to environmental change by pursuing alternative species around

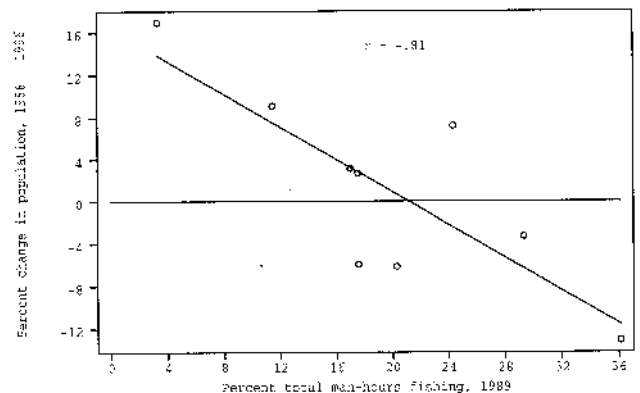


Figure 2: Population change (1986-96) and fisheries dependence among the 9 geographical regions of Iceland.

Iceland, and sending ships to distant waters in compensation for home-waters depletion. These efforts have maintained overall fishing-industry income, but have not stemmed the recent tide of migrants out of fishing areas, and into the capital region around Reykjavík. During 1986–1996, the population of Iceland as a whole grew by 10.4% — but most of that net gain occurred in the capital region, at top left in Figure 2. Low or negative growth rates occurred in the more fisheries-dependent regions ( $r = -.81, P < .01$ ).

Both Newfoundland and Iceland are comparatively small island societies (560 and 270 thousand people, respectively), that in fundamental ways depend upon fishing. Norway, in contrast, is a nation of 4.4 million people, with a more diverse economy — boosted in recent decades by the windfall of North Sea oil. Fishing troubles therefore present a less general challenge to the Norwegian economy, but they still threaten the viability of many communities along the west and northern coasts. The Norwegian story illustrates the division between capital- and labor-intensive fisheries (typically, offshore and inshore) that exist within most fishing nations. It also shows how this division can interact with marine ecology.

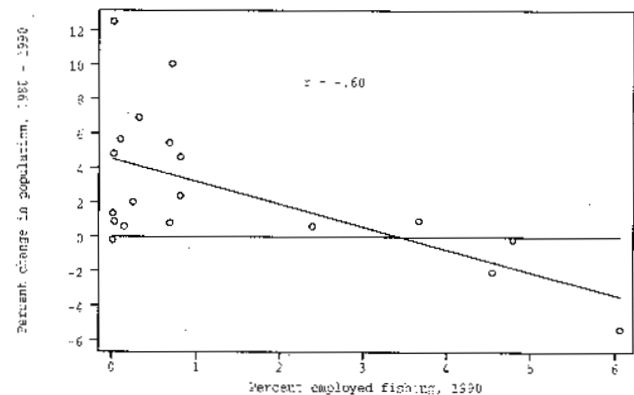
Population declines in fishing-dependent Norwegian municipalities date back to the early 1960s, reflecting a series of postwar problems. Cod and herring are historically distinct Norwegian fisheries. Herring and other pelagic fish have been pursued primarily by vessels from west Norway. This fishery industrialized earlier, and consequently its catch sooner exceeded ecological production. Herring catches peaked in the mid-1950s, then suffered collapses in 1956–63 (for which the temporary solution was expanded deepwater effort based on a technological intensification, the power block) and again in 1968–72. Large increases in capelin landings compensated for the second herring collapse, but in the late 1980s capelin too declined.

The postwar coastal cod fishery in north Norway was initially more labor-intensive, and less capable of overfishing. Overall cod catches did not peak until the 1970s, but thereafter followed an erratic, gradually downwards course leading to a late-80s crisis. Strong catch limitations and deliberate capacity reductions, imposed to protect the resource, also created difficulties for fishermen. Government subsidies to support fishermen's incomes, begun in the 1960s but declining since 1980–81, briefly increased again during 1989–90 to cushion this crisis.

Thus for both pelagic (herring, capelin) and demersal (cod) fisheries, the 1980s were a period of troubles. Norwegian cod and spring-spawning herring catches increased in the early 1990s, although the most recent (1996–97) estimates suggest a cod population decline. Capelin and North Sea herring populations remain low.

Among the human correlates of fisheries troubles have been difficulties in attracting young men to work in the fisheries, or in keeping young women in the fishing communities at all (Hamilton and Otterstad 1998).

Figure 3 graphs population change, 1980–90, against fisheries dependence of 19 Norwegian counties (data here and for Tables 1–2 from Otterstad, 1993). Compared with Figures 1 and 2, we see more scatter around the left side of the regression line in Figure 3, reflecting variations among the several Norwegian counties that have little fishing. An overall negative trend in Figure 3 is nevertheless clear ( $r = -.60, P < .01$ ). All counties with more than one percent of their employment in fishing experienced low or negative population growth, during a decade when Norway as a whole grew by 3.8 percent.



**Figure 3:** Population change (1980-90) and fisheries dependence among the 19 counties of Norway.

Population change, of course, is the sum of three flows: births, deaths, and migration. Outmigration provides the most obvious explanation for fishing-region population loss. It is not quite the whole story, however. The next section looks more closely at the demographic changes that took place in Norwegian municipalities during this decade.

## Demographic Change

Large units of analysis provide a degree of comparability in Figures 1–3. For a clearer picture we need finer resolution, bringing our analysis closer to community level. Table 1 employs smaller-scale data on Norway, dividing 454 municipalities into two broad groups: ‘fisheries-dependent’ and ‘other.’ For this analysis, we classified as fisheries-dependent any municipality where at least 10% of employed persons in 1980 worked in the fishing industry. (Because municipalities are small units, many of them are fisheries-dependent to a higher degree than any of the whole counties



shown in Figure 3.) Forty-eight municipalities met this criterion. The cut-point is arbitrary, of course, but the substantive conclusions from this table are not sensitive to the specific value chosen.

*Table 1.* Demographic changes in fisheries-dependent municipalities (at least 10% of employed persons in fishing, 1980) and other Norwegian municipalities

	Other municipalities (406)			Fisheries dependent (48)		
	1980	1990	change	1980	1990	change
Median population	4813	4865	+52	2100	1900	-200
Median growth			+1.2%			-10.0%
Percent ages 0-19	29.4	26.4	-3.0	32.3	28.2	-4.1
Percent ages 20-39	29.2	30.4	+1.2	26.8	27.7	+0.4
Percent ages 40-59	20.8	22.2	+1.4	19.9	21.3	+1.4
Percent ages 60+	20.6	21.0	+0.4	21.0	22.8	+1.8
Percent female 20-39	47.7	47.9	+0.2	44.7	45.7	+1.0
Median age, males	33.3	35.0	+1.7	32.3	35.5	+3.2
Median age, females	35.4	36.9	+1.5	34.1	37.2	+3.1
Median births/1000	59.1	56.1	-2.9	66.8	58.5	-8.3
females ages 15-49 <sup>a</sup>						
Percent with college education	9.0	16.2	+7.2	5.0	14.0	+9.0
Median income per taxfiler, in 1980 kr.	55.3	45.8	-9.5	47.3	42.3	-5.0
Percent unemployed	1.0	5.5	+4.5	2.0	8.8	+6.8

<sup>a</sup>1990 birth rates based on the number of females ages 15-49, and 1980 birth rates on females ages 16-49.

Table 1 confirms that fishing regions in general lost population, while the rest of Norway gained, over the years 1980–90. The proportion of children fell, and the proportion of elderly rose, to a greater extent in fisheries-dependent municipalities. Such places remained more heavily male than the rest of Norway, reflecting disproportionate female outmigration (a trend described half-jokingly by some residents as “The women leave, and the men follow”). Among both males and females, the median age patterns reversed: fishing communities were younger than the rest of Norway in 1980, but older by 1990.

Partly, this change in age structure reflects outmigration by young adults. Table 1 reveals a second element, however. The median age-adjusted birth rate was, in 1980, considerably higher for fishing communities than elsewhere in Norway. By 1990, however, the birth rate had fallen steeply, making fishing and non-fishing places more alike. Thus, population in the former declined not merely because people were leaving, but because outmigration was no longer being offset through fishing communities’ previously high fertility. The youngest age group (0–19 years) in fishing communities shows the largest relative decline in Table 1: there are fewer children because fewer young adults remain to start families; and among those who do remain, fertility tends to be lower

than before.

In several other respects, fishing communities also became more like the rest of Norway. In incomes and the human capital of higher education, fishing municipalities narrowed the gap, although they still lagged behind. With respect to unemployment, however, the disadvantage of fishing municipalities increased. This raises the question of whether unemployment, rather than fisheries dependence as such, might account for some of the observed population loss.

## Predictors of Population Loss

The environmental shifts described earlier provide one set of reasons why livelihoods in Norwegian fishing communities have become more tenuous, and hence less desirable, in recent years.<sup>1</sup> Other characteristics of fishing communities also comprise “push” factors. For example, global competition and a widespread shift from labor-intensive to capital-intensive production (including offshore fish processing) made growing numbers of fisheries workers redundant. Furthermore, small fishing communities cannot offer the range of amenities, or educational, social and economic choices, found closer to urban centers. The range of job opportunities and social roles for women, in particular, appears limited in many fishing communities — even more so with the loss of fish processing jobs. These factors presumably act together to influence individual decisions. Given the presently available data, however, we cannot formally estimate the separate effects of different push factors within fishing communities.

The preceding explanations all look for the causes of outmigration in the characteristics of fishing communities as such. Alternatively, we might look beyond fisheries issues, and consider more general explanations. For example, the correlations between population change and fisheries dependence could reflect geographical, not environmental, factors. Fishing communities tend to be rural, or small in size, and perhaps small rural places are not preferred. In Norway, furthermore, fisheries dependence is most common in the north. North Norway’s distance from metropolitan centers, narrow economic base and dark winters might cause it to lose population anyway, regardless of fisheries trends. We should also ask whether fishing-community declines are not simply one aspect of modernization: the shift of labor from primary to secondary and tertiary industries. Or perhaps other community characteristics — such as limited physical and human capital, or poor employment prospects — that encourage outmigration, just happen to be higher in fishing communities. These alternative explanations are compatible with some of the push factors mentioned previously, although they depict

them as properties of rural places or resource-dependent communities in general, and not just of fishing communities. On the other hand, this class of explanations does not encompass marine-environmental factors, which uniquely affect fisheries.

Data on Norwegian municipalities permit us to test some of these competing explanations. Table 2 shows a multiple regression of 1990 population on 1980 population, fisheries dependence and other predictors.<sup>2</sup> With 1980 population included as a control variable, the coefficients on predictors in Table 2 can be understood as effects on relative change in population. Thus Table 2 shows that, other things being equal, population during this decade tended to increase with median taxpayer income, the percent of adults with higher education, and the percent of employed persons in primary-sector industries other than fishing. North Sea oil is the most important such primary industry, a mainstay of the Norwegian economy that helps to subsidize the less profitable fisheries (Hannesson 1996). Primary industry's positive coefficient indicates that fishing in particular, rather than primary or resource-extraction industry in general, is associated with population decline. Population tended to decrease as the percent of the workers in fishing increased, and also in the municipalities of north Norway. Adjusted for other variables in this model, unemployment rates had no discernable net effect on population.

These results support the view that population declines result partly from fishing communities' special character and experiences. Fisheries dependence exhibits a net negative effect upon population even after we adjust for six other predictors: community size, wealth, education levels, primary industry, unemployment, and location in north Norway. Although the coefficient on fishing dependence is statistically significant ( $P = .004$ ), its actual magnitude is modest. If all other predictors remained equal to their respective medians, this coefficient implies about 75 fewer people with each 10-point increase in fisheries dependence. Dependence

arguably exerts substantial indirect effects, however, which give it a total effect more than twice the size of this direct effect.<sup>3</sup>

## Discussion

Studies of farming, logging and mining areas of rural North America have produced a wealth of empirically-derived generalizations about resource-dependent rural communities (e.g., Field and Burch 1988; Freudenburg 1992; Humphrey 1995; Luloff and Swanson 1990). Some of these generalizations fit Atlantic fishing communities well. Changes in human populations following changes in the resource base are typical of natural resource-dependent communities (NRDCs) in general. NRDCs tend to boom as resource-extraction activities expand, and subsequently to bust as resources get depleted, or marketing/production advantages shift. Field and Burch (1988, 38) observe that "Resource-dependent communities may be unique in that the primary production processes and changes therein have direct consequences for community stability." In the special case of fishing communities, the primary production process is the marine ecosystem itself, which must supply all the fish. Thus the linkage between environmental and social change should be particularly strong there. Like other NRDCs, however, fishing communities' vulnerability to resource change reflects more general problems: the weakness of backward and forward economic linkages, plus an historic underinvestment in human capital. Remoteness, as well as limited natural and human resources, add to their competitive disadvantages in the new global economy.

Rural-to-urban population flows are the classic subject of migration research, and contemporary Atlantic fishing communities conform to many of the classical patterns. Young people, especially those with more education, are the most likely to move. Their departure thus weakens the source communities, more than numbers alone might suggest. Motivations for individuals leaving fishing communities include a mix of push and pull factors, broadly resembling those identified for other rural areas by authors such as Lee (1966) and Bogue (1969) — for example, resource problems, loss of jobs, limited opportunities, and catastrophes in rural areas; better job and education opportunities or living conditions in urban centers. Ólafsson's (1997) surveys regarding community satisfaction and reasons for migration within Iceland yielded results broadly consistent with older studies from the rural U.S. and elsewhere. The excess of young women among fishing-community outmigrants presents a less universal pattern, although it has been observed elsewhere in the North (e.g., Hamilton and Seyfrit 1994). What makes Atlantic fishing communities most unusual, however,

*Table 2.* Robust regression of 1990 population (logarithms) on 1980 population, fisheries dependence and other characteristics of 454 Norwegian municipalities

Predictor	Coefficient	Std. error	P
Log <sub>10</sub> of population 1980	1.0009	.0041	<.001
Fishing as percent of employed 1980	-.0008	.0003	.004
Median taxpayer income 1980	.0031	.0003	<.001
Percent with higher education 1980	.0014	.0003	<.001
Unemployed as percent of workforce 1980	.0002	.0011	.848
Percent workforce in primary industry (not fishing)	.0006	.0001	<.001
Dummy variable coded 1 for North Norway	-.0110	.0039	.006
(Constant)	-.1938	.0250	

is not the nature of recent changes, but rather their timing and proximate causes. As Bogue (1969, 753) notes: "Whenever we observe population flowing out of an area or into others, we should suspect that a major social/economic change is going on." In the case of the northern Atlantic fisheries, social changes are happening quickly, and large-scale environmental shifts are among their drivers.

Aging, declining populations bode ill for the future of small fishing communities. To maintain viable communities and avoid rising dependency, governments perceive an interest in halting these trends. We have seen that such trends are not merely national, but regional or global in scope; their causes are rooted at least partly in human ecology. Halting such trends through national policies will prove difficult. Governments could, however, make more room for traditional, labor-intensive fisheries by sacrificing some industrial, capital-intensive fishing — or vice versa. Either choice has serious political and economic costs, although not choosing will undoubtedly cost more. Within each sector, as well as in tradeoffs between sectors, overall fish catches will decrease either in a deliberate way through policy, or more chaotically through resource collapse.

Fundamental values are involved in the policy choices. The economic value of industrial fisheries and the employment value of traditional fisheries get the most attention in political discussions. Cultural diversity provides a different, more ecological reason for valuing traditional fisheries. The cultural variety that can be observed along the coasts is an historic reflection of human adaptations to nature, climate, local experiences, macro economics, policies and a range of other processes — observed almost as coincidences. Each community has followed its own particular path of adaptations. At any one time these communities together present a snapshot, or a shop window, displaying the variety of specific local adaptations. Viewed over time, there would be an interesting movie for each of them. For each community the results today are different. Some are success stories, others are continuous failures. And success in one period can prove to be a drawback in the next, when conditions change but people are reluctant to alter a winning strategy. For example, the most capital-intensive fisheries of the 1930s often were victims of bankruptcy some years later, and the small scale fisheries that survived those lean years fared poorly during later times of expansion.

Such cultural diversity comprises an adaptive resource in itself, capable of contributing to social systems in the same way that genetic and species diversity contribute to the flexibility of biological systems. The survival of traditional fishing communities has ecological importance, therefore, not as museums of the past, but as sources of information and possible models for the future.

## Endnotes

1. Evidence favoring the importance, although not the singularity, of environmental explanations in other fishing regions comes from the timing of migration trends in Newfoundland, Greenland and the Faroe Islands (Hamilton and Haedrich 1998; Hamilton, Lyster and Otterstad forthcoming). Case-study interviews in Newfoundland and Maine provide additional lines of evidence (Duncan et al. 1998).
2. Populations were re-expressed here as base 10 logarithms to linearize relationships and reduce the leverage exerted by Oslo. Even in log form, distributions of population measures (and certain other variables) exhibited some outliers. Consequently we employed a robust regression technique (described in Hamilton 1992) for Table 2, rather than the usual ordinary least squares (OLS). This particular robust technique uses iteratively reweighted least squares to reduce the influence of  $y$ -outliers. Screening for unduly influential  $x$ -patterns is accomplished through a preliminary calculation of Cook's  $D$ . Monte Carlo experiments support theoretical arguments that this estimator remains efficient, with unbiased standard error estimates, given even severely non-Gaussian (but independent and identically distributed) errors. For comparison purposes we also estimated the same model using OLS, and obtained an adjusted  $R^2$  above .99 (robust regression itself does not yield an  $R^2$  value). The OLS  $t$  tests lead to similar substantive conclusions, although OLS parameter estimates are less precise than their robust counterparts in Table 2.
3. An exploratory path analysis, not shown here, suggested that the indirect effects of fisheries dependence, through education and income, could be half again as large as the direct effect seen in Table 2.

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# Steps to a General Theory of Habitability

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## *Abstract*

*A theoretical basis is presented for a unified discussion of the sustainability and habitability of the built environment. This theory is inspired by concepts in human ecology, information theory, and thermodynamics. It suggests, in a first approximation, to subsume the quality of the built environment in view of provision of comfort, flexibility, control, and informational quality as a "Habitability Index," which, ideally, could be ordered on a negentropic scale. Likewise, the environmental impact of buildings may be captured in terms of a "Sustainability Index," which is assumed to inversely correspond to the entropy increase (in the relevant environmental system) attributable to the building activity.*

**Keywords:** *habitability, sustainability, entropy, negentropy*

Having given in to the temptation of various associative resonances in the paper's title, I would like to emphasize upfront the premises that have informed its programmatic intention:

*i)* Construction, operation, and disposal of buildings and related infrastructures are responsible for a major part of the overall antropogene environmental impact (resource depletion, environmental emissions, waste production, etc.). This is in part due to poor design.

*ii)* People spend the major fraction of their lives in building interiors. It is generally accepted that the quality of the built environment has significant implications for people's health, comfort, and satisfaction. Due in part to poor design, most buildings fall short of satisfactorily meeting such requirements.

*iii)* Methods and tools to predict and consider the environmental and occupancy implications of building activity are not well developed. Moreover, what is available in terms of tools and methods is typically not considered in the architectural and urban design decision making process.

I suggest that points *i* and *ii* above correspond respectively to the questions of "sustainability" and "habitability" of the built environment. In the past, these terms have been used in many different ways (see, for example, Preiser 1983).

However, I argue that sustainability and habitability, if used in the specific technical sense described in this paper, may serve well as the basic terminological cornerstones of a general theory of the built environment. In this paper, I cannot offer but a schematic outline of such a theory. Yet even if complete and comprehensive, I doubt a theory could as such "solve" the problem stated in points *iii* above. All we can hope for, at this point, is a more organized manner of stating the problem.

Design of buildings and related artifacts may be viewed as an integral part of the totality of (largely regulatory) operations initiated by human beings as they interact with their surrounding world. We may better understand these interactions using two somewhat abstract yet useful concepts. These are *i)* the human beings' *ecological potency* (e.p.) and *ii)* the surrounding world's *ecological valency* (e.v.) (see Knötig 1992 or Mahdavi 1988 for a detailed description of these terms). Stated in simple terms, the former concept refers to a dynamic human repertoire of capabilities and means of dealing with the world, while the latter concept denotes the totality of that world's characteristics as it relates to or accommodates such repertoire. This being established, design may be viewed as follows:

Designing, in the context of the built environment, involves the generation of formal/spatial entities based on (both "real" and "symbolic") organizational and functional considerations, physical/material specifications, and operational regimes with the (*a priori* expressed or *a posteriori* deducible) intention of favorably influencing the relationship between people's ecological potency (e.p.) and the ecological valency (e.v.) of their surrounding world. Note that:

*i)* I do not imply that the design activity is *caused* by a perceived imbalance in the e.p.-e.v. relationship *quasi* in the way "response" would follow "stimulus".

*ii)* The suggestion to understand design in the context of means and actions to "favorably affect the e.p.-e.v. relationship" may be considered too narrow or even deterministic, particularly if the desired outcome in that relationship is understood to be a static equilibrium: here equilibrium itself is in a transient state as changes continuously occur in e.p. and/or e.v. Furthermore, positive experiential qualities associated with certain non-equilibrium transitional states may

themselves be accommodated in designs, as a class of desirable e.p.-e.v. relationships.

iii) Building activity goes far beyond the realization of a reflexive individual activity model to temporarily improve the e.p.-e.v. relationship. Rather, it involves considerable modifications to the surrounding world, so that its transformed e.v. can provide a better long-term match to the e.p. of the inhabitants. Biologically inspired arguments from the cultural evolution theory may explain in principle the emergence of habitat patterns which in fact facilitate an improved e.p.-e.v. relationship (Mahdavi 1989, 1996a).

## Sustainability and Habitability

The previous discussion implies a view of design as intervention involving three pertinent systems, i.e., System 1: Environment, System 2: Built Structures, and System 3: Inhabitants. A discourse of design may address these at various strategic levels of observation, and the boundaries of the system elements may be defined in various scales, from narrow to broad. Conventional practice has a radically limited view of each system: Environment is often only a "site," built entities are seen only in their individuality and devoid of an infrastructural context, and inhabitants' needs are typically considered only in so far as they are represented in code-type minimum requirements. At a highly abstract level, however, we may define the objective function of building activity as one that is geared toward provision of desirable occupancy conditions while reducing (ideally eliminating) negative ecological impact (Mahdavi 1997). Provision of desirable occupancy conditions may be seen in the context of the previously discussed relationship between the inhabitants' ecological potency and the habitat's ecological valency. However, facilitating the potential for a better match in this relationship is only one part of the equation. To satisfy the above definition of the objective function, it must be done in a "sustainable" manner.

Given this background, the objective function of the design activity may be conceptually expressed in entropy terms. This would suggest, in a first approximation, to subsume the quality of occupancy in view of provision of comfort, flexibility, control, and informational quality as a "Habitability Index" ( $I_h$ ) which, ideally, would be ordered on a negentropic scale (Brillouin 1956):

$$I_h = f(\Delta N) \quad (1)$$

Likewise, the environmental impact of buildings may be captured in terms of a "Sustainability Index" ( $I_s$ ) which is assumed to inversely correspond to the entropy increase (in

the relevant environmental system) attributable to the building activity:

$$I_s = f(\Delta S^{-1}) \quad (2)$$

This yields the objective function:

$$\text{maximize } \psi, \text{ with } \psi = I_s \cdot I_h \quad (3)$$

In the above equations  $\Delta N$  is the negentropy increase relevant to the inhabitants and  $\Delta S$  is the resultant overall effective entropy increase due to an intervention (i.e., building activity).

Obviously, the operationalization of the above function involves major difficulties: measures of environmental impact are non-trivial and may vary according to the evaluation time horizons considered. The definition of occupancy quality is no less complex as generally agreed upon indicators are difficult to identify. Nonetheless, a good understanding of this correspondence is important, even if it may be "merely" *conceptual*. Below research directions are discussed that are likely to provide evidence for the *operational* relevance of the proposed view.

## Sustainability and Entropy

For a long time, the evaluation of the environmental impact of buildings was limited to their energy consumption. The function proposed above not only allows for the incorporation of energy use in an entropic interpretation, but it also points to the limitation of energy use as a exclusive building performance criterion. Obviously, building energy systems can maintain target space temperatures (and other relevant indoor environmental parameters) over long periods of time even under extreme outdoor conditions. Needless to say, this local increase in negentropy is accompanied by an even larger entropy increase in the encompassing system that includes both the habitat and its environmental context, as in the process typically non-renewable energy resources are depleted, waste heat is generated, and pollutants are introduced into air, land, and water. In a sense, the entropy increase may be interpreted as corresponding to the "investment" that would be required to reverse the impacts of the intervention.

As such, building construction and operation practices have not been and are not concerned with setting up entropy-relevant balance equations to evaluate alternative means and approaches for indoor environmental conditioning. One should not forget that the emergence of energy use in the early seventies as one of the major indicators of a buildings' quality (or lack thereof) was principally attributable to eco-

conomic forces (abrupt rise in energy prices) rather than environmental concerns. Only recently a consensus has emerged suggesting that energy consumption alone is not a sufficient criteria for the evaluation of the thermal performance of a building, let alone its overall quality. Although energy requirement indicators reflect to a certain degree resource depletion (i.e., fossil fuel consumption) due to building operation, they fall short of representing the complex pattern of environmental impacts caused by the construction, operation, and decommissioning of buildings. This insight has led to increased research and standardization activities toward the development of more comprehensive indicators of environmental sustainability.

There have been many recent efforts to apply comprehensive life-cycle assessment (LCA) methods toward representation and evaluation of the environmental implications (energy use, depletion of resources, environmental emissions, degradation of landscapes, etc.). However, the majority of these efforts still do not sufficiently address the multiple phases of a building's life, i.e., design and construction, operation, and decommissioning (Etterlin et al. 1992, Fava et al. 1991, Goedkoop 1995, Graedel and Allenby 1995, Lippiatt and Norris 1995, Little 1995, Mahdavi 1997, Mahdavi and Ries 1996). Despite their potential toward comprehensive environmental evaluation of building designs, LCA tools have certain limitations: *a)* LCA's are data-intensive, and therefore require considerable time and effort to prepare; *b)* reliable and adequate data may not be available, *c)* results from the analysis may require an expert interpretation; *d)* aggregation of impact categories toward unified indicators may be problematic; *e)* the pertinence of LCA's results depends to a large extent on a comprehensive definition of the "balance domain." However, some of these problems may be alleviated in part by the use of computational modeling in general and a negentropic framework in particular (Mahdavi 1997, Mahdavi and Ries 1996).

Although very different in their scope, domain, objectives, and tools, most LCA methods attempt to accomplish a two-fold aggregation of:

*i)* multiple environmental impact measures into a small group of indicators (occasionally into only one super-indicator);

*ii)* multiple environmental impacts over a certain time horizon.

It appears that most LCA methods attempt to accomplish this two-fold aggregation *via* means that display an entropic-negentropic "touch," even though they rarely entail an explicit reference to an entropy-inspired terminological framework, nor do they provide for a coherent operationalization of entropic eco-indicators. It is useful to briefly dwell on the latter point using the example of the eco-balance method

(Etterlin et al. 1992). This method groups the basis data into energy consumption (in MJ·kg<sup>-1</sup> of material) as well as loads to water, air, and land (in m<sup>3</sup>·kg<sup>-1</sup> of material). The key operation is the conversion of loads to the air and water from units which represent pollutant volume, into a unit which expresses the Critical Volume ( $V_c$ ) of air or water which would be contaminated to its legal threshold limit by the pollutant:

$$V_c = E \cdot T^{-1} \quad (4)$$

Herein,  $E$  is the actual volumetric emission of the pollutant and  $T$  represents the legislated legal threshold limit for the pollutant. Critical volume represents thus a measure of dilution (contamination, dispersion) which may be seen as corresponding to entropy increase. Obviously, there is still a long way from such simple measures such as critical volume to a more comprehensive and coherent entropy-based eco-indicator. Certain intermediate improvements are not difficult to bring about, whereas other more substantial and genuinely entropy-based formulations may require much more research. Below I provide an example for the former and some references for the latter.

One problem with the Critical Volume (and other similar simple eco-indicators) is its static nature; it is not an intensity term with temporal and spatial qualifiers. Thus, while it may allow for an approximate comparison of various building design options, it does not allow for the evaluation of the appropriateness of a specific design for a specific site or geographic domain. Let me explain this with an example from the environmental noise control. Imagine a fairly undeveloped urban zone with mix-use dedication and a legislated maximum ambient noise level of  $X$  dB. Contractors of the first factory in the area may argue that their factory should be allowed to generate whatever noise level as long as the actual ambient noise level in the area has not exceeded  $X$  dB. The problem with this argument is obvious. If the first factory is permitted to exhaust the emission potential all the way to the legislated maximum acceptable noise level, there will be no room left for others; they could create zero emission sources only.

To alleviate this problem, an eco-indicator would be needed that *a)* is dynamic in nature (i.e., can be expressed in intensity terms) and *b)* considers the inherent ecological properties (approximated in various approaches *via* terms such as "carrying capacity," "ecological impact valency," "ecological impact affordance," etc.) of the geographic area under consideration. To exemplify this point, consider the ecological impact indicator  $P$  due to building-related emission rates of  $n$  agents:

$$P = \sum(w_i \cdot e_{a,i}) \quad (5)$$

Herein,  $e_{a,i}$  is the predicted emission rate of agent  $i$  due to the proposed built structure and  $w_i$  is the weighting factor for the emission rate of agent  $i$ . A simple approximation of  $w_i$  is given by

$$w_i = (e_{i,max} \cdot n)^{-1} \quad (6).$$

Herein,  $e_{i,max}$  is the maximum permissible emission rate (which ideally should represent the ecological impact affordance) for agent  $i$  in the geographic domain under consideration. The emission rates can be expressed in area-specific (or per capita) intensity units such as  $\text{kg} \cdot \text{yr}^{-1} \cdot \text{m}^{-2}$ . A more elaborate approximation of  $w_i$  would be:

$$w_i = (e_{i,max} \cdot \sum e_{j,max})^{-0.5} \cdot n^{-1} \quad (7).$$

From this definition it is obvious that the value of the ecological impact index would be 1 for the case where the ecological impact index equals the aggregate ecological impact affordance, that is when all building-related agents are emitted at the maximum permissible rate. Note that in this formulation small permissible emission rates lead to high corresponding weighting factors and result thus in a high value for the ecological impact indicator. It is conceivable that in certain cases (e.g., rehabilitation of ecologically damaged areas) maximum permissible emission rates would be zero or even negative. Such cases are not covered by the proposed formulation.

Beyond such incremental improvements, future research that would build upon works such as Ayres (1994), Ayres and Martinas (1994), Brillouin (1956, 1964), and Georgescu-Roegen (1971) may well lead to the formulation of a new generation of substantially refined, comprehensive, and computationally supported entropy-based eco-indicators. This could facilitate a sufficiently detailed evaluation of the entropic implications of architectural interventions as represented by equation 2. There is no question, however, that the approximation of the occupancy-related negentropy term ( $\Delta N$ ) in equation 1 involves no less challenging difficulties.

## Habitability and Negentropy

I suggested interpreting building activity as an intervention in the surrounding world with the aim of positively affecting the e.p.-e.v. relationship. Obviously, this intervention has entropic implications, as expressed by equation 2. However, the degree of actual entropy increase does not necessarily correlate with the resulting "habitability," i.e., occupancy-relevant quality of the built environment in view of provision of comfort, flexibility, control, and informational quality. For example, it has been frequently argued that a

building with a high energy consumption rate does not necessarily provide a higher degree of thermal, visual, and acoustical comfort. (In fact, some have even suggested a negative correlation.) This is part of the reason why it would be beneficial to evaluate such occupancy-relevant qualities on a separate negentropic "habitability" scale (cp. equation 1).

How does one generally go about evaluating habitability? Three programs readily come to mind:

*i)* The prescriptive program involves the quasi lexicological definition of minimum requirements regarding the constitutive building elements, components, and systems and their relationships. The idea is that meeting such requirements would warrant habitability.

*ii)* The performance program implies the definition of target performance criteria together with their attributes. The idea is that a building's habitability can be evaluated by measuring its behavior against the target performance criteria.

*iii)* The flexibility program suggests that given variations in occupants' ecological potency, buildings' habitability should not be linked with meeting any rigid set of performance criteria. Rather, the idea is to measure the habitability in terms of buildings' capability to accommodate a wide range of spatially and temporary variable environmental expectations.

Put in provocatively simple terms, all programs suggest one has to do *a* if one wants to achieve *b*. However, the prescriptive program defines *a* and not *b*, the performance program defines *b* but not *a*, and the flexibility program defines neither *a* nor *b* (although it sometimes defines performance variables without specific target attributes). But what sources of information lead to the definition of attributes for a *b*-type parameter? Typically, psychophysical correlations have been the prime candidate. Thermal comfort research exemplified this point *par excellence*, as successive efforts have been made to correlate certain measurable environmental and personal variables (such as indoor air and radiant temperatures, air speed and relative humidity, clothing and activity, etc.) with occupancy reports on thermal sensation as expressed *via* a standardized psycho-physical scale (Mahdavi 1996b). These efforts have typically relied on both physical and physiological models and statistically systematized observations.

If, in fact, clear and measurable performance variables and associated (desirable) attributes can be established, then we should be able to work out the basis for a negentropic formulation of habitability. We expect a "well-tempered" indoor environment to be in a specific behavioral state among a very large number of possible behavioral states. In this context it does not matter if the performance program is considered or the flexibility program. While in the former case, the assumption is that the desired state is known *a priori*, in the latter case it is continuously re-established based on occu-



pancy feed-back: a building that offers the possibility for *ad libitum* realization of a large number of indoor environmental states, obviously ranks high on a negentropic scale of habitability. (An essentially identical reasoning is sometimes used to define a key feature of "intelligent" buildings. It implies that a building should be considered as more intelligent if it allows occupants to individually adjust their immediate environment according to their preferences. Micro-zoning as applied to air conditioning and lighting systems and the so-called user-based environmental systems are examples of methods and technologies toward facilitating such adaptability.)

However, matters are more complicated. A major problem lies in the fact the psychophysical scales are notoriously debatable. An increasing number of researchers would agree that it is highly problematic to postulate a deterministic relationship between measurable environmental factors and occupants' evaluation of environmental conditions (Mahdavi 1996b). To systematically elaborate on this point, a suitable terminology is needed. In this context, it is appropriate to remember the general-level distinction between the material-energetic and informatory aspects of the environmental relationships (Knötig 1992; Mahdavi 1988, 1992, 1996c). According to the human ecological terminology, a "material-energetic" aspect as well as an "informatory" aspect can be assigned to every entity, state, and process. The material-energetic aspect refers to the assumption that there is nothing called "existing" unless some amount of matter and/or energy is involved. The informatory aspect refers to the assumption that matter/energy has a certain distribution in space and time which can be understood as a structure. An information content can be correlated to this structure.

The idea is that people's evaluation of the environment involves both the material-energetic and the informatory aspects of the relationships between inhabitants and the built environment. In a nutshell, it appears that human evaluation processes are generally easier to describe and predict in exposure situations dominated by the material-energetic aspect of the environmental relationships. In extreme cases of high-intensity exposure, the necessity for protective regulations is self-evident due to the obvious health hazards (e.g., physical damage to the hearing organs) for the involved individuals. It is thus not surprising that most efforts toward predicting the outcome of human evaluation processes have focused on the identification of a measurable material-energetic scale (such as sound pressure level) to which subjective judgments (such as the degree of annoyance) are expected to correlate. To further explore this point, let us consider a few ideas and case studies from the acoustical and thermal building design domains.

*Noise levels and subjective evaluation of the acoustical environment.* The impact of internal information processing on the degree of expressed dissatisfaction associated with various energetic levels of exposure has been demonstrated in many experimental psycho-acoustic experiments. In one experiment (Schönpflug 1981), participants were exposed to white noise (of different intensity) while performing certain tasks (time estimations). This study showed that the participants who received positive feedback indicating successful performance evaluated the same acoustical exposure more favorably than the participants who received negative feedback indicating failures in their performance. Since the feedback messages were manipulated (not reflecting the true performance), their effect on the subjective evaluation cannot be explained in terms of an acoustically induced impairment. The explanation lies rather in the nature of the information processing that was triggered by the combined effect of acoustical exposure and negative feedback regarding performance. This process generated apparently an internal "model environment" in which noise was identified as the source of annoyance and blamed for one's performance failures.

*Traffic noise control strategies.* A comparative study of the effectiveness of different traffic noise control strategies (Kastka 1981) indicates that the fine structure of the evaluation processes of exposure situations cannot be reflected in a simple specifier. Moreover, this study shows clearly the critical importance of the informatory aspect of environmental relationships for the evaluation of noise exposure conditions. The study included the analysis of the annoyance of inhabitants before and after installation of noise barriers, and traffic quieting measures in two locations in Germany.

According to the result of this study, the annoyance reduction effect of the barriers is not as large as their "objective" noise level reduction effect (in average about 8 dB). While the stimulus-centered annoyance component decreases proportionally with the sound level reduction, the subject-centered component decreases to a much lesser degree as might have been expected due to the magnitude of the sound level reduction. In contrast to this, the traffic quietening measures show a considerable positive change in the evaluation in the acoustical exposure situation, although, in this case, the sound level reduction was insignificant (in average about one dB). This discrepancy in the effectiveness of the above described noise control strategies can only be understood if the involved information processing phenomena are considered. The traffic quietening measures reduce the annoyance probably not through changes in energetically relevant component of the acoustical environment, but rather through the changes in the negative attribution (meaning) of the traffic for the inhabitants. Apparently, the quietening measures effec-

tively reduce the dominance of the environmental factor “traffic” in the inhabitants’ internal “model environment”.

*Thermal comfort in theory and practice.* Given the limited availability of energy resources prior to the industrial revolution, environmentally responsive design of building structures practically remained the only way to alleviate the impact of the climatic extremes on human habitation. From late nineteenth century, the efforts toward augmented control over “environment” have been increasingly directed toward the use of rather energy-intensive building service technologies. Assuming, for argument’s sake, that these building service systems and technologies in fact maintain exactly and effectively a predefined set of environmental conditions throughout the entire interior spaces of buildings (a highly debatable assumption), one must still address the question if there is, in fact, a “predefined set of environmental conditions” that, if offered, would assure the comfort and satisfaction of the inhabitants (cp., Mahdavi and Kumar 1996).

A brief review of the evolution of thermal comfort research demonstrates a process of continuous refinement of increasingly comprehensive predictive models based on classical heat transfer, the body’s physiological processes, and statistical analysis of human perception (Mahdavi and Kumar 1996). The important question that now arises is the applicability of these models and their derivative standards in real world situations. Much as the researchers would have liked to base their findings on “real-world” situations, they had to perform their experiments mostly in climate chambers where the factors influencing thermal comfort can be selectively measured and closely monitored. This controlled research design which may have permitted the relative importance and interactions of several independent variables to be disentangled involves the risk of reducing complex comfort evaluation processes to rather simplistic stimulus-response patterns (McIntyre 1982).

*Thermal comfort field studies.* In this context, it may be helpful to mention a number of recently conducted field studies (Busch 1992; de Dear et al. 1991; Schiller et al. 1988) that involved the comparison of the results obtained from field data with predicted values using comfort models (in situ measurement of the environmental and behavioral variables known from climate chamber experiments to influence thermal comfort). The results of these experiments have not always supported those of the climate chamber method. Thus, the thermal comfort researchers have been confronted with the problem of accounting for this discrepancy in a consistent and scientific way so that either changes can be incorporated in the standards or some alternative approach can be found toward enhancement of the thermal conditions for occupants in real world situations.

Considering the evidence collected in the field and given the fundamental complexity, variance, and dynamism of the relationship between people’s ecological potency and the ecological valency of their surroundings, it is safe to postulate a certain “systemic” limit in predictability of thermal comfort and thus in provision of maximum thermal satisfaction in uniformly conditioned indoor environments. Furthermore, even if it would be possible to confidently predict that a certain percentage of inhabitants will be thermally comfortable given a set of predefined thermal conditions, we would still have to seriously question the admissibility of the simple exclusion of a large number of people as thermal “outcasts.”

*Personal environmental control.* In response to the problem of uniformly conditioned buildings, an increasing number of researchers, engineers, and designers are considering new approaches and alternative ways of dealing with the problem of defining and providing adequate thermal conditions in the built environment. The proponents of “user-based” thermal conditioning systems question the appropriateness of uniform environmental conditioning in all but single-occupancy spaces. They suggest that one abandon the strategy of minimizing the number of dissatisfied in uniformly conditioned spaces and allow instead for a flexible multi-zone context that can be differentially and dynamically controlled by individual occupants. This provides, from the human ecological point of view, a potentially wider range of possibilities to maintain adequate relationships between inhabitants’ ecological potency and their surroundings’ ecological valency. By giving freedom to occupants to adopt their immediate surroundings, one hopes to specifically counteract problems arising out of inter-individual differences. At the same time, this process of partly transferring the controls to occupants may, psychologically, elevate the level of satisfaction with the thermal conditions while relaxing the requirements concerning the “comfort variables” of the ambient environment.

*Thermal pleasantness.* Most thermal comfort prediction models rely on a psychophysical scale, which includes thermal neutrality as the desirable thermal condition, and as the target of the thermal design. Thermal neutrality denotes a thermal condition in which people do not wish the environment to be warmer or cooler. However, as Kuno mentions, “there are situations when we can feel pleasantly cool or warm” (Kuno 1995). Following this line of thinking, Kuno developed a two-dimensional model of thermal sensation to clarify the distinction between comfort and pleasantness. According to this model, the experience of thermal pleasantness results from the body’s physiological inertia in dealing with quick (or discontinuous) changes in ambient conditions

that are initially experienced as uncomfortable. As a consequence, one must experience the “uncomfortable zone” before entering into the “pleasant zone.” According to Kuno, this two-dimensional nature of thermal sensation semantics is clearly expressed in Japanese language, where “Dan” and “Ryou” involve connotative references to the experiential hues of thermal pleasantness.

## Discussion

While I believe that the proposed theory provides in principle a suitable theoretical basis for the consideration and evaluation of the habitability and sustainability of the built environment, I have no doubt that much work remains to be done for the “operationalization” of the corresponding indices. We have made some considerable advances in envisioning an entropy-based sustainability indicator. And it would not be all too difficult to formulate a negentropic habitability index based on statistical “dose/response”-type relationships. But the understanding and prediction of inhabitants’ evaluation of exposure situations in circumstances where the individual information processing plays a decisive role has been and remains an extremely difficult task. Information theory provides a basis for a “content-neutral” quantification of information *via* utilization of the negentropy concept. From thermodynamics, we know that the knowledge of the microscopic state of a system is inversely proportional to its entropy, i.e., information may be interpreted as negative entropy or negentropy. However, in order to measure the semantic component of information, we would have to achieve the near impossible goal of fully understanding the deep structure of human information processing, including the inter-individual differences in contextual, experiential, and associative conditions of perception and evaluation processes.

This does not mean, however, that the cumulative experiences in the architectural and urban design community as well as scientific research in this area (particularly in human ecology, cognitive psychology, and experimental sociology) have not provided us with some valuable clues as to the scope of the necessary environmental conditions (including the required levels of flexibility and adaptability) to facilitate higher levels of habitability. An evaluative approach based on such clues and on the conceptual framework of human ecology may not eliminate the shortcomings and inconsistencies of current practices in architectural and urban design. However, it is likely to add conceptual transparency and coherence to procedures for deriving aggregate judgments on the habitability and sustainability of the built environment.

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# Ken's Problem: Environmental Activism in an Age of Deconstructionist Biology<sup>1</sup>

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## *Abstract*

*New biological perspectives describe the members of the ecosystem as less tightly connected than earlier models. This deprives many environmentalists of one of their most important arguments that claims that harm to one species will harm all others. The nature of argument in ethics is raised and it is claimed that its structure is closer to analogical argumentation in the law than to the deductive model in logic or some parts of science. The loss of the "house of cards" argument is only a problem if one misconstrues the nature of ethical argumentation.*

**Keywords:** *ethics, ethical reasoning, deconstruction, practical ethics*

*In the book of Genesis Noah built an arc and saved all living species from destruction. It was God's command. Well, today God's creatures are threatened by our own great flood of pollution, of habitat destruction, and that's why America has built an arc: the Endangered Species Act. This arc has already rescued some of our most threatened wildlife from extinction — the whooping crane, the American Bald eagle. But now the arc itself is threatened. Powerful special interests are pressing Congress to weaken and undermine the Endangered Species Act. As Evangelical Christians we urge Congress to strengthen the Endangered Species Act with funding adequate to meet the needs of wildlife preservation.*

(The Evangelistic Environmental Network, 2/1/96)

## **The Problem**

This is a good advertisement. The implied argument is pretty powerful: "God made these creatures — you mess with them, you mess with Him." I think that most environmentalists would like to have an argument like this. Some have suggested a somewhat parallel argument that appeals to the intrinsic worth of different species or various natural objects.

But this line of approach clearly doesn't have as much snap to it. It would be hard to imagine the effectiveness of standing in front of a bulldozer and shouting "These species have intrinsic worth!" Whereas, "You mess with them, you mess with Him" can empty many a cab.

Perhaps the closest thing that many environmentalists have had to a God-argument is the House-of-cards argument which declares "If you pull this species out, the whole thing will come tumbling down." This threatens chaotic disaster and intense personal discomfort — something that should give pause to anyone. But this house-of-cards picture of nature has recently been seriously challenged and its companion concepts of "balance," "natural order," "stability," "ordered development," "succession" and "maturity" have been called more metaphysical than biological. I was at a recent scientific meeting where someone was hooted and jeered for mentioning the idea of "forest climax" in his presentation.

With the downfall of deterministic and teleological models, the various actors in an ecosystem are for the most part seen as weakly interacting, so that the removal of one species, unless it is what is referred to as a "keystone species," leaves everything more or less as it is. According to Drury (1974, 18), "...experience indicates that one can seldom prepare an ecological model that will allow a priori predictions of the effects of manipulations of parts of a natural system ... because most of the elements of a system operate largely independently of most other elements."

With the study of "natural disturbance" and "patch dynamics," natural systems are now seen to be in constant change and to succeed one another with little law-like regularity. Armed with this new biology, the informed bulldozer operator can retort: "Yes, well these trees may have intrinsic value, but they're going to be replaced anyway by natural change. We're just helping nature along." The really sophisticated operator might even argue that "extinctions have almost always been followed by outbursts of biological creativity and novel forms; we are helping to set the stage for

biological diversity.” Nature has no preferences, all the preferences are ours. Nature does not prefer a diverse tropical jungle to a barren desert with radioactive cockroaches (Visvader 1991).

Preferences are very weak things to argue — dozers roll over them all the time. In the absence of a God-argument it seems as if the strongest thing the environmentalist has to work with is the self-interest argument. “If you cut all the redwoods you’ll lose the tourist business,” etc. The environmentalist is also assaulted by “social constructionist” arguments that anxiously demonstrate that the concept of nature varies from time to time and place to place. In an earlier essay, I noted that “As we have seen with the different perceptions of wilderness, the characterization of nature even changes within the history of a particular culture as the boundaries between the self and not self are reimagined and reconfigured in response to the evolution of common experience ... In this sense the idea of nature is more of a cultural concept than a physical or biological one” (Visvader 1996, 16).

The point of these often well-meaning arguments is to shift environmental discussion away from metaphysics to concentrate on questions concerning the conflict of values, and bring the debate into the realm of practical ethics. But such arguments, by stressing the changeableness of both the concept and the values associated with it, make it appear as if the values are almost arbitrary. The net effect of “de-mythologizing” biology and social constructionism is to make environmental values appear to be subjective and relativistic, in short mere preferences that might even be considered, from the point of view of mainstream America, individualistic and idiosyncratic. This brings us into a strange and giddy realm. This is also a problem for Ken who is an environmental activist.

### The Problem with the Problem

I have called this new biology “deconstructive” or “deconstructivist” in order to make a conscious alignment with the current intellectual movement associated with “post-modernism.” There is a giddy feeling produced by this latter movement as well when all “grand narratives” are shown to be social constructions often created in the interests of the powerful, and all ideas of progress and human ascent are teleological fictions of the human imagination. The world has no preferred states, only humans have preferences, and these preferences are governed by variable needs and power struggles. Subjectivism and relativity again. This is a giddy realm especially for the social activist, for though such arguments bolster our appreciation of cultural diversity, they leave the activist with nothing but subjective preferences to counter

aggressions, indiscretions and abominations of other people and other cultures.

The problem here is that this is a God-like view of human values and their interactions. From the perspective of history or epistemology the philosopher assumes a superior perspective above the humdrum clash of values and cultures, a perspective that itself must not have the kind of values it analyzes. Many so-called deconstructionists suffer from severe problems of self reference. This helps to explain in part Derrida’s peculiar convoluted style — he keeps trying to deconstruct himself. Michel Foucault, who had been very personally concerned with the rights of minority groups, developed an Olympian view of the role of value in culture which deprived him of the ability to justify his own value commitments and maintain the truth of his analysis at the same time.

This little discussion is meant to warn us of the great dangers of theoretical ethics. If in order to examine values one has to decontextualize the point of analysis then an element of falsity and exaggeration has entered into the situation. The problem with the problem, as I have stated it, is the illusion that once you have lost the God-argument you fall into a value vacuum and the only way to get out of that is to find some other God-like argument. Ever since Descartes, philosophers have been trying to fight their way out of vacuums of various kinds. The feeling is that unless you can find an indubitable premise or argument, you cannot anchor the field you’re interested in.

The loss of the House-of-cards argument is a rhetorical loss and is not a philosophical catastrophe. The environmentalist does not have to fight to keep from falling into subjectivism. Values lose their anchoring only when they lose their context. Values are woven into particular contexts, they only make sense there, they have life there. People don’t live in vacuums or disembodied contexts — they are value creatures. There are many kinds of values; only some of them look like preferences. Important values are not held subjectively. It is impossible to be a consistent relativist or subjectivist in ethics — we hold our central values absolutely.

### Practical Ethics

The arguments of the social constructionist should have little effect on ethical discourse. If someone tells me that at one time Roman fathers had life or death power over their sons, I do not thereafter lose my revulsion for filicide. I may say something airily philosophical such as “Well, when in Rome, do as the Romans do...,” but if I *were* in Rome and witnessing such an event, I could not take it as lightly as my rhetoric would suggest.

This disparity between what I say and what I feel is

important. If I were to state that filicide was never permitted in any society, then the information about the Romans will undercut my claim. When I make a statement or propose an hypothesis what I say stands in need of justification of a certain kind, it can be mistaken or “go wrong” in a certain way. But saying that filicide is *wrong* is not to make a general statement or hypothesis about human actions — historical observations don’t undermine it. Despite the language we use on occasion to talk about ethical statements, they are not mere expressions of feeling. If they were the latter then all argumentation in ethical disputes would be irrelevant, and we know that arguments play an important part in ethics. But the kind of argumentation in ethics is different than that appropriate to factual claims.

Reasoning in ethics is much closer to legal reasoning than it is to scientific reasoning. Much of legal reasoning is analogical in nature and involves the classification of particular problematic cases. There are a number of clear precedents which act as models for the application of terms like “negligence,” “assault,” “act of God,” “duty of care,” “reasonable expectation” and so on, and various arguments are given by each side in the dispute as to whether the case at hand is more like one or the other models. Suppose, for example, that someone trips over a crack in my sidewalk and tries to sue me. My defense will turn on making the case as close to one where the other person is more responsible for the accident than I am. The facts in the case will be extremely important, but the conclusion of the case is not, strictly speaking, factual. It depends upon whether the facts, creatively assembled, make the event appear under one classification rather than another.

Ethical reasoning proceeds in a similar manner. We do not have to prove an ethical statement as we do a scientific statement. Though facts are relevant, they are used differently. Ethical dispute usually takes place in a shared background understanding of clear cases of right and wrong, of what is permitted and what isn’t. Without this background agreement there would be nothing that we could say in the short run.

Is abortion moral or not? A large part of the debate depends on how the entity in a pregnant woman’s stomach is classified. Everyone agrees that infanticide is immoral, no one in the debate tries to establish or dispute this. Infanticide is the clear case in the background. The debate takes place about whether this entity is to be thought of as a human child or an undeveloped biological fetus. Facts are important, but they need to be assembled to present a convincing *interpretation* — if you take it this way, these values apply, if you take it the other way, those other values apply.

The environmentalist does not have to deduce certain values out of a vacuum, nor are the values held in solipsistic

solitude. Extending our duty or care to entities in the environment will, for the most part, involve analogical arguments. They are *like* members of our community who have respectable and protectable interests, they are *like* pets or farm animals to which we have a duty to care and maintain, they are *like* works of art or works of God that have intrinsic worth. Nowhere is our duty to pets or community members at stake, nor the value of works of art in dispute.

In Aldo Leopold’s argument for his “Land Ethic” in *The Sand County Almanac*, it is no accident that the ethics come after all his personal descriptions of various animal episodes. It is an essential part of the presentation of his case that we see wild creatures in a strong and familiar way so that we can take them as members of more than our biological community. He increases the value of woodland creatures by familiarity — a kind of value by acquaintance, which is more or less the purpose of environmental education — and then argues by analogy for the reclassification of these creatures. I have never met a logger who did not love the woods. In the argument between the logger and the environmentalist there is a strong overlap of shared values though the ranking may be different in particular cases. In these cases one argues for a change in ranking, making the economic factor more or less important than the intact forest.

## Discussion

This paper has taken us through some difficult territory. It would have been nice if I could have come up with another God-argument or House-of-cards argument for the environmentalist, but it may be that such arguments only incur the wrath of the philosophers and plunge one into some giddy and unfamiliar realms. The only consolation I can offer in the loss of a good argument is that such a loss doesn’t plunge one into relativism and subjective preferences. The realm of practical ethics is still intact. The environmentalist does not have to deduce the correctness of environmental values — no one can do this anyway as they are not deducible kinds of things. All that has to be done is to convince others to value things differently and extend the range of the things they already care about. This is a difficult enough job in itself.

## Endnote

1. The “Ken” in the title refers to Ken Cline who is both a faculty member of the College of the Atlantic and the President of the Maine chapter of the Sierra Club. Ken has felt that the new biology that describes the ecosystem as only “loosely connected” has taken away one of the important arguments of environmental activists. At the College we refer to this issue as “Ken’s Problem.” A good account of what I have called the “new biology” can be found in Botkin (1990), Allen (1986), Warren and Cheney (1993) and Real and Brown (1991). Philosophical

discussions of “deconstructive biology” can be found in Brennen (1988), Bennett and Chaloupka (1993), Cronon (1996) and Soule’ and Lease (1995). A reviewer has asked me to mention that in *Human Ecology Review* “there is other literature dealing with the issue of making decisions and justifying action in the face of complexity, uncertainty, and conflict ... Some of the literature that seems relevant to this discussion includes Dietz (1994), Keister (1996), and Merchant (1997).”

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## How To Do Environmental Decision Making: Varying Perspectives on the U.S. National Research Council's *Understanding Risk* Report

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There are two reasons why public participation in decision making about risk and environmental management persists as an important, timely issue. First, people still disagree about whether lay people<sup>1</sup> should be involved in these decisions at all. This is the question of “why?” Second, there is uncertainty about how to best involve, meaningfully, diverse lay people and scientists in an efficient, effective decision making process. This is the question of “how?”

In 1989, Daniel Fiorino provided a wonderful approach to answering the “why” question when he outlined three kinds of reasons for involving the public in risk and environmental decision making:

*Instrumental* — reasons associated with people trying to achieve other, related goals. For instance, agencies promote participation because when people participate, costly legal challenges against the agency or industry can be avoided.

*Substantive* — reasons associated with the information or knowledge needed for the decision. For instance, lay people bring knowledge and experience relevant to the decisions that scientists might miss.

*Normative* — reasons associated with what is right and wrong. For instance, in a democratic society, it is proper to have all interested and affected parties involved.

Fiorino's observation does not resolve the continuing debate as to whether public participation should be pursued; in fact, opponents make instrumental, substantive, and normative arguments against public participation. However, Fiorino's approach helps give structure and organize arguments for and against participation. It also helps clarify the need for research on these topics.

Until recently, there had not been a lot of progress on the “how” question. Experiential knowledge from practitioners, lay people, and university participant-observers has been accumulating for some time, but there have been few attempts to create conceptual approaches to understanding “best practices” for public participation. A recent contribu-

tion has been made with the publication of a report by the United States National Research Council.

*Understanding Risk: Informing Decisions in a Democratic Society* was published by the National Research Council in June 1996. The report sees risk-policy decision making as combining two ways of knowing about the world: analysis and deliberation. It also asserts that, at least for some kinds of decisions, both lay people *and* scientists need to engage in analysis and deliberation in a manner that is iterative and that promotes learning. *Understanding Risk* has received a great deal of acclaim, but it has also sparked some provocative discussion. This Forum captures a slice of that discussion.

At the 1997 Society for Human Ecology meeting in Bar Harbor, we participated in a session on the National Research Council report. There, Carolyn Raffensperger presented a paper that constructively criticized the report. We vividly recall discussing these issues with Carolyn over a lobster dinner. One of the reasons why Carolyn's contribution is fresh and unexpected may be because she writes from the perspective of a scientist who works in the public interest. She considers herself a spokesperson for lay people affected by risk decision-making. It is not surprising, perhaps, that a thoughtful person with diverse such affiliations and interests would have something novel to say about a book, written by scholars, on the topic of involving lay people in environmental and risk decision making.

Our interest in assembling this Forum was to introduce Carolyn's arguments to a larger audience and to provide as many perspectives and opinions as possible on her paper. Toward that end we have sought commentary from activists, governmental officials, scientists, a member and chief staff officer of the National Research Council committee, as well as from scholars of public participation. We were astounded and pleased by the variety, richness, and depth of the comments we received.

Naturally, we would have liked to have heard from a greater number of people from affected communities. We also know how difficult it is to arrange a discussion involving scientists and lay people. Academic interchanges such as this Forum tend to occur in venues that exclude and disempower people without the “right” credentials or means of access. Bringing these new voices into such deliberative spaces is incredibly challenging. Moving the discourse to a more public space is arguably a better solution, if the goal is to engage all perspectives. We hope that this Forum serves as the seed for future discussions, among scientists, consultants, and members of affected communities, as we continue to wrestle with the “why” and “how” questions of public participation. All of us have much to learn from each other.

### Endnote

1. One of the difficulties we encountered in editing this Forum was how to best refer to the different people associated with decision making

processes. Often, the terms “scientist” and “expert” are used interchangeably. Others point out that this discredits the expertise of people who are not scientists. Local knowledge of community members is also a kind of expertise. Thus, in this introduction, and in our own papers, we use the term “technical experts” as a synonym for “scientist.” (We did not ask the other authors to make the same commitment.) We also found it difficult to agree on how to refer to those people who are not scientists. Calling them “nonscientists” seemed discrediting. The term “publics” is somewhat satisfactory. But, we decided to use the term “lay people” to refer to community members who are not scientists with expertise in the topic associated with the decision. “Lay people” casts a broad net. And we use it in a sense that is respectful of the many different experiences, levels of education, and expertise that people have.

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# Guess Who's Coming For Dinner: The Scientist and the Public Making Good Environmental Decisions

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## Introduction

The National Research Council's report *Understanding Risk* (National Research Council 1996) offers an opportunity to consider the way we make environmental and public health policy using science and public considerations. In light of this work, some aspects of policy-making in the face of scientific uncertainty bear further discussion.

First, growing criticism of risk assessment by environmentalists challenges us to rethink ethical and scientific issues involved in risk characterization. Specifically, at its heart, *Understanding Risk* addresses the ethics and epistemology of decision-making about problems with high societal stakes. The National Research Council (NRC) issued its report in a climate where risk assessment has been the primary decision-making tool and so the NRC used risk assessment as its "case study." However, in the friendly environment of professional societies we have the opportunity to ask whether risk assessment is the best tool to deal with problems characterized by uncertainty and high stakes, even with increased public participation.

Second, by significantly redefining the role of the scientist to more closely fit with the notions of analysis and deliberation portrayed in *Understanding Risk*, the vision of a more democratic decision making process can be fulfilled. The NRC introduced a new process for scientists, decision-makers, and stakeholders engaged in issues of risk. It also provided a job description for the public: the public has the right and responsibility to deliberate about analyses leading to decision-making. But the process will change more quickly if all the participants, and particularly the scientists, get new job descriptions and read from new scripts.

Finally, the NRC committee argued for involving stakeholders in risk characterization ostensibly because it makes better policy. I will also argue that it makes better science.

This paper will examine other decision-making tools, offer an alternative role for scientists other than that of "expert" and argue for a philosophy of science that expands on traditional views of "good" science. It is not a critique of the NRC's report, which makes an important and radical contribution to policy-making. Rather, this paper extends those ideas. In fact, this paper might be read as a prospectus for Volume Two of *Understanding Risk*.

## The Shape of the Table

The most famous painting of the Last Supper is by Leonardo da Vinci. In this artwork, da Vinci portrays a long skinny table with Jesus in the center facing the observer. Jesus is seated so that he is illuminated by the large central window which functions like a halo. Six disciples are seated on either side.

Contrast this with the image of King Arthur and the Knights of the Round Table who gather around the table that Merlin made for Arthur's father-in-law and who gave it to Arthur on the occasion of his marriage to Guinevere. This table is described as 200 feet in diameter, designed so all 150 knights could sit at the table during a feast. The gathering was called a "fellowship."

These vivid images of tables illustrate the different ways we can establish relationships between scientists and lay people for environmental problem-solving. The old model was to have the scientist central to the decision and announce his findings and opinions to the decision-maker — the Last Supper model. The public received the benefit of the scientist's wisdom and public relations provided information to the public. It was a unidirectional information flow to the public. The NRC's report challenges this model and, in effect, says that we need to create a round table that has a place for the public as well as scientists.

The National Research Council committee made seven points (National Research Council 1996, 1-10):

- 1) Risk characterization should be a decision-driven activity.
- 2) Coping with a risk situation requires a broad understanding of the relevant harms or consequences to the stakeholders.
- 3) Risk characterization is the outcome of an analytic-deliberative process that encompasses all aspects of the problem facing the decision makers and requires the participation of diverse stakeholders.
- 4) Those responsible for a risk characterization should begin by developing a provisional diagnosis of the decision situation so they can match the process to the required decision.
- 5) This process should focus early on problem formulation and should include stakeholders at this stage.

6) The analytic-deliberative process should be mutual and recursive: analysis and deliberation feeding back into each other.

7) Organizations engaging in this process need to build organizational capability to conform to these principles.

### Use the Right Tool

The main dish on the NRC's table was risk characterization, a key component of risk assessment. Risk assessment has dominated federal decision-making for the past fifteen years, mostly as a result of past NRC reports which delineated the process of doing a risk assessment. In fact, in *Understanding Risk*, the committee says that "[g]overnment and industry have devoted considerable resources to [risk assessment] to make better informed and more trustworthy decisions about hazards to human health, welfare and the environment..." (National Research Council 1996, 1). The NRC has been a major recipient of those resources.

While no other decision-making tools were assessed in *Understanding Risk*, risk assessment is not the only tool we now have. Risk analysis is, perhaps, best suited for prioritizing clean-up tasks. But, it is a poor tool for deciding the merits of introducing a new chemical, technology, or process into the environment. For instance, risk assessment could not have predicted the outcome of introducing CFC's into the atmosphere.

It is no secret that environmentalists do not believe that: *"QRA [quantitative risk assessment] methods sufficiently characterize the danger of environmental hazards to humans and to ecological systems. They widely agree that too much energy goes into quantifying risks, and too little is done to reduce or eliminate them. Almost unanimously, environmentalists resent the technocratic, exclusionary nature of risk assessments that undermine democratic participation in local environmental decisions."* (Tal 1997, 470)

We do not need to spend as much time on risk assessment and management. We do need to spend more time on risk reduction.

Two important tools approach the question of risk, and risk reduction, quite differently. The first approach is called *alternatives assessment*, and as a decision making process it is similar to the Environmental Impact Statement required under the National Environmental Policy Act (NEPA). Under NEPA a proposed action cannot go forward until decision-makers have considered all the alternatives, including the "no action" alternative. Alternatives assessment provides the opportunity to avoid risk, rather than manage it (O'Brien 1998).

The second approach to decision-making is the precautionary principle, which in its most elemental form says: act

with prudence or caution in the face of scientific uncertainty and the likelihood of societal or environmental harm.<sup>1</sup> The fulcrum of the precautionary principle is scientific uncertainty. And, in this way it differs from risk assessment which seeks certainty before action can be taken. The precautionary principle requires action *before* certainty is in place, if there is a possibility of substantial harm. Some have coupled the precautionary principle with the reverse onus which requires the proponent of a new technology or chemical to prove that it is safe — rather than the public having to prove that it is harmful. Others consider alternatives assessment as a method for implementing the precautionary principle. These notions more closely parallel the environmentalist's concern about risk reduction and prevention, rather than risk characterization.

In contrast to the temperate, almost common-sense, language of the precautionary principle and alternatives assessment, risk analysis is a gambler's term. The focus isn't on harm or damage, it is on this blackjack notion of risk: we decide the probability of an unfortunate outcome and then choose whether to play or not.

The NRC report appropriately circles another issue which illustrates the contrasts between the precautionary principle and risk assessment, and that is the problem of ethics and science. Risk assessment is not well suited to handling the values component of decision-making. Many of the harms that can happen are not measurable by scientific criteria and touch on those things we hold most dear. Some have said that risk assessment addresses the risk of death while most people are afraid of fates worse than death. Consequently, the NRC recommendation that coping with a risk situation requires a broad understanding of the relevant losses, harms, or consequences, would be applied more wisely using a different decision-making tool.

### Who is at the Table?

Perhaps the stone soup fable is helpful here. A group of refugees come into a town, set up a cast iron pot and describe a fabulous dish called "stone soup." They put a stone in the pot and soon every household, marveling at this recipe, brings a vegetable, soup bone, herb or grain to add. The soup feeds the entire town.

In order for a truly analytic-deliberative process to occur, everyone who comes to the table must bring something and be recognized for what they bring—much like the stone soup. On too many occasions, the scientists are viewed as the experts who have everything to contribute while government agencies want the public to be quiet and accept the interpretation offered by the scientists. This results in bad science and bad policy.

When diverse people come to the table as equals there is more room for the valuable processes of questioning, observing, analyzing, describing and creating to take place. That makes for better science. One way to do better science is to redefine the task. Rather than characterizing risk we could strive for learning and problem-solving. Scientists and farmers working in Montana have done just that by establishing Farm Improvement Clubs which are learning environments (rather than research institutions) and scientists are invited in as co-problem-solvers, rather than experts (Matheson 1996).

When scientists are co-learners and co-problemsolvers, everyone at the table brings something. All are equals, in large part, because of the diversity of skills. The public brings observations, wisdom about place, and an ethic of place. Scientists bring scientific training. I have seen farmers, residents near a large Department of Energy facility, or women treated as if they were stupid by scientists or government agency staff simply because of their occupation or gender. No matter that they had a Ph.D. or had more direct experience with the problem than the scientist or bureaucrat. If we can create situations where gender and occupations (farmer or scientist) are valued because of the unique contributions that each can make to problem solving, we will have created a situation where real analysis and deliberation can take place.

### Co-problemsolvers Result in Better Science

The committee that wrote *Understanding Risk* had a grasp on why the analytic-deliberative model moves us in the direction of good science, but it didn't fully elaborate on *how* this model makes better science. Skeptics may rightly question the value of including citizens in research and the analytic process. However, another story, this time about scientific research, demonstrates how science and policy are enhanced when scientists solicit all relevant information.

Many readers are familiar with the experiment done by Raymond W. Tennant of the National Institute of Environmental Health Sciences (NIEHS), where seven groups of researchers predicted the outcome of rodent bioassays for 44 chemicals being tested by the National Toxicology Program for rodent carcinogenicity. The team of researchers that most accurately predicted which chemicals would cause cancer in the rodents used what is called "expert intuition." Expert intuition factored all available information about the chemicals into the prediction. Using all the available information was far more successful than using a single parameter or a limited combination of parameters (Raffensperger 1996).

Expert intuition is enhanced when experts have access to the information citizens have about the world in which they

live. Citizens bring information about environmental and public health problems to the table, which must be added to the scientific equation if the resulting decisions will have scientific credibility and political viability. There are many situations where observations by lay people mapped a new scientific landscape. The deformed frogs found by schoolchildren in Minnesota are but one example of how citizens open new dimensions of environmental science.

Science engaged in environmental and public health is being transformed from a process of investigating the natural world through predictive, replicated experiments on single organisms to a process of iterative, multi-disciplinary, probabilistic studies of complex systems. These require what Silvio Funtowicz and Jerome Ravetz (1993) call "post-normal science." Funtowicz and Ravetz discuss the requirements of the scientific method when complex issues are characterized by irreducible scientific uncertainty and numerous societal values. In such cases the scientific method must have a systemic perspective, be synthetic and humanistic, and incorporate a dialogue between stakeholders and scientists about the shape and structure of the scientific study. This demands that scientists tolerate the initial confused phases and ambiguity in problem solving, and engage in what is essentially an inductive process to establish the kind of scientific framework in which the research will be carried out. Some of the

Table 1  
Good Science: Two Paradigms (Raffensperger 1997)

Risk Characterization Model	Risk Prevention Model
Hero scientist (The Lone Ranger)	Scientist as team player (e.g. participatory research)
Reductionism	Context dependent
Certainty (Beyond a shadow of a doubt)	Precaution (Preponderance of the evidence)
Causes cancer?	Disrupts biological systems?
Replicability	Multiple lines of evidence
Empirical	Analytic
Quantitative	Qualitative and Quantitative (e.g., ecosystem "health")
Biochemical and organismic time frames	Ecologic and evolutionary time frames
Deductive	Inductive and Deductive
More Type II errors <sup>a</sup>	More Type I errors <sup>b</sup>
Peer Review	Peer Review

<sup>a</sup> A Type II error — the null hypothesis was in fact false, but you found it to be true. When testing a new chemical, the null hypothesis is usually that the chemical does not cause cancer (i.e., there is no effect.) If we make a Type II error, we fail to conclude that this chemical causes cancer.

<sup>b</sup> A Type I error — the null hypothesis was in fact true, but you found it to be false. For instance, the new chemical did not cause cancer, but you concluded that it did.

aspects of this kind of “post-normal science” are presented in Table 1.

Citizens may have different questions than scientists. Scientists may want to quantify the risk of a certain technology and citizens may want to prevent the risk. However, while citizens may redirect the scientific enterprise with these questions, it is essential for scientists to recognize the legitimacy of citizens’ questions or scientists will be increasingly marginalized in the democratic process.

Fully involving relevant stakeholders in post-normal science’s analytic and deliberative process makes better policy. Good public policy is a course of action which protects the public good and holds accountable those who harm the commons or the public. It is paternalistic to assume that a government agency or a scientist can understand a problem or hazard better than the public. Yet when a group of scientists and the public define the problem, and then solve it together, it is more likely that public resources (agency funding, natural resources, etc.) will be used wisely. This is particularly true when the problem has large scientific uncertainties and high societal stakes.

In conclusion, changing the process of environmental and public health decision-making from characterizing risk to learning and problem-solving honors the intent of the NRC report. It permits stakeholders, scientists and agency staff to come to the table as equals to resolve the issues together. It necessarily entails deliberation and analysis, but in a different culture. It leads to better science and better public policy. The questions and the tools may be entirely different than those needed to understand risk (risk characterization and management). I invite the NRC to write Volume Two of *Understanding Risk*, which would consider the scientists and public as co-learners addressing the twin issues of scientific uncertainty and risk reduction. Perhaps the title of Volume Two should be *Beyond Risk: Using Analysis and Deliberation to Implement the Precautionary Principle*.

### Endnote

1. Following the presentation of this paper, the Science and Environmental Health Network with the Johnson Foundation, W. Alton Jones Foundation, and the C. S. Fund convened a *Conference on Implementing the Precautionary Principle*. The participants issued a consensus statement, the *Wingspread Statement on the Precautionary Principle*:

The release and use of toxic substances, the exploitation of resources, and physical alterations of the environment have had substantial unintended consequences affecting human health and the environment. Some of these concerns are high rates of learning deficiencies, asthma, cancer, birth defects and species extinction; along with global climate change, stratospheric ozone depletion and worldwide contamination with toxic substances and nuclear materials.

We believe existing environmental regulations and other decisions, particularly those based on risk assessment, have failed to protect adequately human health and the environment — the larger system of which humans are but a part.

We believe there is compelling evidence that damage to humans and the worldwide environment is of such magnitude and seriousness that new principles for conducting human activities are necessary.

While we realize that human activities may involve hazards, people must proceed more carefully than has been the case in recent history. Corporations, government entities, organizations, communities, scientists and other individuals must adopt a precautionary approach to all human endeavors.

Therefore, it is necessary to implement the Precautionary Principle: When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

In this context the proponent of an activity, rather than the public, should bear the burden of proof.

The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action.

Wingspread Participants (Affiliations are noted for identification purposes only.):

Dr. Nicholas Ashford, Massachusetts Institute of Technology  
 Katherine Barrett, University of British Columbia  
 Anita Bernstein, Chicago-Kent College of Law  
 Dr. Robert Costanza, University of Maryland  
 Pat Costner, Greenpeace  
 Dr. Carl Cranor, University of California, Riverside  
 Dr. Peter deFur, Virginia Commonwealth University  
 Gordon Durnil, Attorney  
 Dr. Kenneth Geiser, Toxics Use Reduction Institute, University of Massachusetts, Lowell  
 Dr. Andrew Jordan, Centre for Social and Economic Research on the Global Environment, University Of East Anglia, United Kingdom  
 Andrew King, United Steelworkers of America, Canadian Office, Toronto, Canada  
 Dr. Frederick Kirschenmann, Farmer  
 Stephen Lester, Center for Health, Environment and Justice  
 Sue Maret, Union Institute  
 Dr. Michael M’Gonigle, University of Victoria, British Columbia, Canada  
 Dr. Peter Montague, Environmental Research Foundation  
 Dr. John Peterson Myers, W. Alton Jones Foundation  
 Dr. Mary O’Brien, Environmental consultant  
 Dr. David Ozonoff, Boston University  
 Carolyn Raffensperger, Science and Environmental Health Network  
 Dr. Philip Regal, University of Minnesota  
 Hon. Pamela Resor, Massachusetts House of Representatives  
 Florence Robinson, Louisiana Environmental Network  
 Dr. Ted Schettler, Physicians for Social Responsibility  
 Ted Smith, Silicon Valley Toxics Coalition  
 Dr. Klaus-Richard Sperling, Alfred-Wegener- Institut, Hamburg, Germany  
 Dr. Sandra Steingraber, Author

Diane Takvorian, Environmental Health Coalition  
Joel Tickner, University of Massachusetts, Lowell  
Dr. Konrad von Moltke, Dartmouth College  
Dr. Bo Wahlstrom, KEMI (National Chemical Inspectorate), Sweden  
Jackie Warledo, Indigenous Environmental Network

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## Expanding the Rationale for Analysis and Deliberation: Looking Beyond *Understanding Risk*

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Carolyn Raffensperger argues for an alternative role for scientists in risk-related policies other than that of “expert” and also for an expanded view of “good” science. She advocates the use of additional tools to risk characterization and portrays the ideal relationship between scientists and various publics in the image of a round table in which the main dish is not risk characterization but a stone soup to which all contribute. These are arguments and images which I strongly support; indeed, they are supported by a convergence of several schools of thought. In my view, however, the discussion draws on a limited body of this relevant literature. In the following pages, I outline several areas in which the author’s argument could be strengthened and I suggest a particular focus for the prospectus for Volume Two of the National Research Council’s (NRC) publication, *Understanding Risk*.

First, criticism of risk assessment is not confined to that of the environmental community and to those who criticize the technocratic, exclusionary nature of risk assessments. An additional critique has arisen, primarily from cultural theorists and sociologists in the field of science and technology studies, that focuses on the social institutions and the social and cultural context in which risk is assessed and managed. These scholars have emphasized that *all* knowledge, including that of the scientist, is socially constructed — that the creation of knowledge is a human endeavor that occurs within, and not outside of, society. Thus, science and scientists, as well as lay persons, are subject to social processes; they conduct science and interpret risk through the filter of values and social organization (e.g., Cetina 1995; Jasanoff 1987; Jasanoff, Markle, Peterson, and Pinch 1995; Rayner 1984; Schwartz and Thompson 1992). Wynne, also, has been a foremost contributor to the risk literature, in emphasizing that the key uncertainties in risk-related problems stem not simply from technical uncertainties in risk assessment but also from uncertainties about institutional dimensions such as the competence, trustworthiness, and independence of the societal institutions and their ability to manage risk in a way that preserves safety and other valued aspects of life (Wynne 1980; 1992; 1996). The need for negotiation among “alternative cultural perspectives” follows automatically from this view of risk (Rayner 1984, 160).

Second, as the case studies summarized in the Appendix to the NRC report demonstrate, the critique of risk assessment frequently serves as a surrogate for more deep-seated

social concerns. (Significantly, also, the NRC case studies encompass more than risk characterization.) A particular critique, from the philosophy of science perspective, extends to the broader issue of the relationship between science and democratic institutions. Drawing on the work of Habermas (1975; see also, McCarthy 1988), critical theorists have developed an extensive critique of the institutional structures that have created and maintain systems of domination and quiescence and have emphasized the role played by science and technology in furthering the disempowerment and alienation of citizens. Writers from this school criticize the over-reliance of modern society on the instrumental rationality of science and technology and the associated devaluation of other forms of knowing such as intuition and understanding. As reliance on scientific expertise increases, ordinary citizens are shut out of a broader discussion of means and ends: alternative ways of knowing and the value placed on human values such as creativity and friendship are ignored. Instrumental and strategic thinking distorts our understanding of what it means to be human and has displaced the broader, Aristotelian concept of practical reason as a means for achieving the good, moral life by a very narrow concept of objective scientific reason as an instrument for achieving specific ends. Critical theorists advocate communicative rationality in place of instrumental rationality — a reflective, participatory approach in which communication among scientists and the public is guided by four standards (comprehensibility, sincerity, ethics/legitimacy, and truthfulness).

Third, I would submit that, although welcome, the NRC report can hardly be characterized as making a “radical” contribution. Indeed, I would criticize the NRC for failing to recognize and incorporate at an earlier date the intellectual developments of the 1970s and 1980s in relation to science, technology, and risk. More than twenty years ago, the Office of Technology Assessment (OTA) questioned whether a new kind of assessment was needed that “looks at a human value system and how it impacts technology, rather than starts with technology” (OTA 1976, 203). Despite the work cited above, that expanded on this recommended OTA starting point, the NRC continued to endorse a two-step approach to risk that separated the facts of analysis from the social process of evaluation and encouraged a linear approach to communication (NRC 1989; for a critique, see Bradbury 1994; Rayner 1984; 1987).



Fourth, while justly criticizing the NRC report for not fully elaborating on *how* an analytic-deliberative process involving citizens and scientists makes better science, the author's own elaboration is limited. No reference is made to the long list of contributors to the growing awareness of the limitations of science in resolving complex policy problems without extensive communication among experts, government officials and the range of publics affected by policy (see, for example, Dryzek 1990; Robinson 1992). With the exception of the reference to Tennant's experiment (which examined results obtained by different groups of experts as opposed to results obtained among experts, officials, and various publics), the cited examples tend to be assertions rather than explanations of why better science may occur.

In my view, one of the most pertinent examples of how interaction between expert and laypersons leads to better science is provided by Wynne (1996). In the case cited by Wynne, British technical experts based their predictions of short term impacts of radioactive fallout on grazing land used by local sheep farmers following the Chernobyl accident on an assumption that the soil embodied the properties of alkaline clay. In reality, as the sheep farmers knew, local soils were primarily acid peaty soils that had a very different uptake of radiocesium than that of clay. The government policy that was adopted on the basis of the experts' predictions without benefit of local knowledge was disastrous for the sheep farmers. Wynne's analysis highlights the need for experts to be alert to the conditional nature of their knowledge, i.e., to consider whether assumptions embedded in their approach seem valid to the public who will be affected by a proposed policy. In this case, local and expert knowledge were complementary and both were essential to "good" science. Moreover, as Wynne concluded, political institutions that base their policy decisions on assumptions about human behavior that seem irrelevant to, or at odds with, the public's experiences of itself and the world, risk eroding the very legitimacy on which they rely to implement their policies.

Raffensperger's proposal for a Volume Two of *Understanding Risk* is sound. In particular, I believe that a more in-depth evaluation is needed of examples of scientists, government officials, and various publics as co-learners in addressing policies that incorporate scientific uncertainty and risk. The examples provided in the NRC report are not (nor were they intended to be) analytic in nature and, as such, have limited value as models to adopt. What factors contribute to an effective discourse? How transferable are the lessons from one context to another? Are there situations where structural constraints reduce the likelihood of an effective discourse? Currently, there is little in the published literature that fills this needed gap. One notable exception is Renn, Webler, and Wiedemann's book, *Fairness and Competence in*

*Citizen Participation*, which examines a variety of models for environmental discourse and includes a valuable chapter by Webler that lays out a procedural, normative model for evaluating such discourse (Renn et al. 1995). Also, in progress, is the work being conducted by myself and colleagues at Pacific Northwest National Laboratory that builds on Webler's approach in evaluating the discourse among scientists, government officials, and citizens in the 12 citizen advisory boards that have been established by the Department of Energy at radioactive cleanup sites around the nation. Much more is needed, however, before we can state with certainty that such co-production of knowledge leads both to better science and better policy.

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## Who Should Deliberate When?

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King Arthur and his 150 knights sitting around a 200' diameter table is a potent metaphor. Unfortunately, we do not see the image of "fellowship" among scientists and stakeholders that Carolyn Raffensperger (this volume) does. Rather, we see participatory problems akin to those encountered in environmental problem solving: What was the protocol for handling commoners who wanted to sit at the table? How did knights converse across that expanse? Did the table provide merely an illusion of equality? Undoubtedly King Arthur needed Merlin for a facilitator.

The National Research Council's (NRC) report *Understanding Risk* (Stern and Fineberg 1996) advocates that agencies consider *how* to involve stakeholders in the risk characterization process, rather than *whether* to do so. Agencies should operate from a default assumption that such deliberation is "necessary and appropriate" at each stage of the process, according to the NRC. However, the report does not provide much practical guidance to agencies that want to develop deliberative processes about risk characterization, let alone to approach environmental problems more broadly, as Raffensperger eloquently advocates. As the report acknowledges, there is little systematic knowledge about what works in public participation or other deliberative processes. Therefore, *Understanding Risk* does not include step-by-step instructions (which would be unsubstantiated).

Calls for scientist/citizen deliberation in environmental policy have been made since the passage of ground breaking environmental legislation in the 1970s (e.g., Cramer et al. 1980, Dietz 1984, 1988), including recently from prominent institutions other than the NRC (e.g., National Environmental Justice Advisory Commission 1996, Presidential/Congressional Commission on Risk Assessment and Risk Management 1997). Analysts have also provided compelling reasons for such deliberation,<sup>1</sup> not only around issues of risk, but around critical environmental issues, such as biodiversity (Dietz and Stern 1998), climate change and sustainable development (Jaeger 1998, Rothman and Robinson 1997). But with progress has come more responsibility for those advocating deliberation. Scientists and agency managers

point out they cannot possibly involve outsiders in all agency decisions, even if they wanted to. For example, routine functions, such as approving permit applications, would be unwieldy if review of each application required broad-based deliberation.

So agencies need guidance on when and how to deliberate. If we are to be true to the relative dearth of research on what kinds of deliberative processes work under what circumstances, we have to avoid glib answers that presume more knowledge than we have. But we also have to do more than mumble about the need for context sensitive approaches. Recently, members of a subcommittee of the Environmental Protection Agency's Science Advisory Board essentially told those of us advocating deliberation to "put up or shut up." Our colleagues accepted the potential of deliberation in the abstract, but noted that a broad recommendation of "deliberate early and often" was of little practical value.

Following is broad guidance about when and how agencies should deliberate. Our guidance consists of two key questions about the policy under consideration and a typology of deliberative processes that follow from the answers to those questions. It should be seen as a prologue to further discussion, research, and innovation rather than a rigid set of guidelines. In addition, because the guidance was developed to aid EPA, it may not generalize to other agencies and types of policies. However, we hope it is at least another step toward the critical task of helping practitioners implement deliberative processes.

We suggest that in selecting deliberative processes the agency should answer two questions:

1. *To what extent is the agreement on values (e.g., fairness, sustainability, efficiency etc.) and on appropriate trade-offs among them sufficient to reach a decision?*

The relative importance of efficiency, fairness, sustainability and other concerns may vary among scientists and stakeholders. When agency decisions require tradeoffs among these dimensions, and the decisions are likely to lead to conflict, agencies are often forced to make judgments that cannot be based solely on knowledge. The selection of an

appropriate type of deliberation will depend on where the extent of agreement falls on the continuum between high and low.

2. *To what extent is the state of knowledge sufficient to address the problem at hand?*

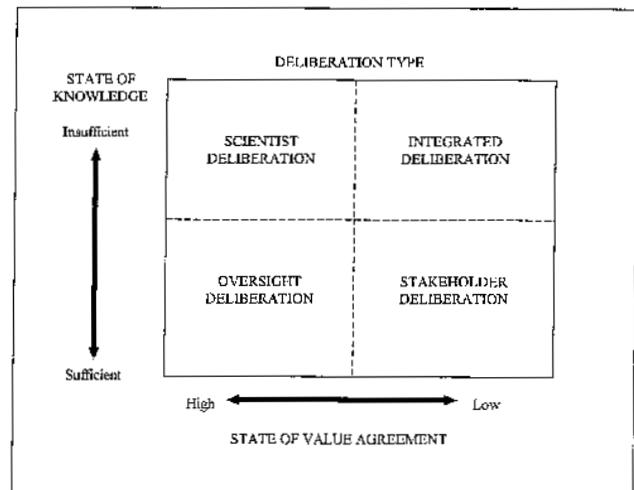
By knowledge we mean information and understanding from the biological and physical sciences, engineering, economics, human ecology and the other social sciences. The answer to this question depends on the extent of knowledge about information critical to making a particular decision. In many situations, knowledge from environmental sciences, such as information about environmental system processes and the nature of potential threats, may play a decisive role. In others, knowledge about economic costs and benefits may be decisive. Social science knowledge may also be decisive, for example by providing an understanding of communities where demographics or ethnic composition must be given serious consideration. It is also critical to differentiate knowledge about the local situation from more abstract knowledge developed in other locales. Agency diagnosis of a situation, and the form of deliberation needed, will depend, in part, on its assessment of the extent to which available information is adequate for making a decision. When the state of knowledge is insufficient or controversial, or when there is lack of agreement about the state of knowledge, more extensive deliberation will be needed.

We appreciate that agency decisions may be constrained by regulations, resources, and court decisions. These limitations should be made clear to participants in any deliberative process. Yet, agencies usually have latitude. Thus we believe agencies can use deliberative processes in most circumstances when they are needed, although, as the NAS report points out, deliberative processes can present formidable challenges. The following typology provide guidance as to what kinds of deliberation are appropriate under what circumstances, as shown in Figure 1.

### Oversight Deliberation

*When agreement about values is high and the state of knowledge (relevant science, economics, and social science) is sufficient (and/or non-controversial), agency decision making is likely to be routine. Deliberation will only be needed periodically for oversight.*

Most agency decisions are routine administrative ones that conform to existing regulations and policies. Such decisions may include non-controversial permitting and minor shifts in administrative procedures. In such situations, oversight deliberation, the periodic conferring of scientists to assess a program and potential modifications, is appropriate. However, if conflict develops around multi-dimensional



**Figure 1.** Typology of Deliberation Processes with Stakeholders and Scientists.

tradeoffs or the state of knowledge, the type of deliberation will need to move toward another quadrant.

### Stakeholder Deliberation

*When agreement about values is low, but the state of knowledge is sufficient (and/or non-controversial), agency decision making will require multi-dimensional tradeoffs.*

In such situations, the state of knowledge is sufficient to inform multi-dimensional tradeoffs, but there is little agreement about which tradeoffs to make. Because the conflict usually is based fundamentally on values, not knowledge, the deliberation can involve primarily stakeholders who will evaluate tradeoffs in light of their priorities. Stakeholders, informed by available knowledge, can craft options that vary in their mix of impacts and risks. Scientists may provide information about the potential impacts of various options, but they need not be as extensively involved as in integrated deliberation, noted below.

### Scientific Deliberation

*When agreement about values is high, and the state of knowledge is insufficient (and/or controversial), agency decision making is likely to be experimental and iterative.*

In such situations, making decisions is difficult primarily because of the state of knowledge. For example, there may be limited knowledge about the impact of human management on a particular environmental system. Scientific deliberation — on-going conferring among scientists (often from different disciplines, including social science) — is needed to develop appropriate monitoring processes and to interpret results. Based on the results, scientific deliberation may

result in recommendations for changes in management of the environmental system. The recommendation for such situations is adaptive management with scientific deliberation at intervals determined by the nature of the experiment. For example, monitoring the impact of reducing water flow to an environmental system may require scientists to confer at regular intervals to review monitoring data and determine if water flow should be changed. However, if value-based conflict arises over the results of such iterative decision making, the situation will require integrated deliberation, involving scientists and outside stakeholders working together to make multi-dimensional tradeoffs on the basis of limited knowledge.

### Integrated Deliberation

*When agreement about values is low and the state of knowledge is insufficient (and/or controversial), agency decision making is likely to require multi-dimensional tradeoffs based on insufficient knowledge. Then integrated deliberation involving both scientists and outside stakeholders is needed.*

These decisions are usually the most difficult for agencies because there is little confidence in the state of knowledge about the impacts of tradeoffs on economic efficiency, fairness, sustainability, risks and other concerns. In such situations integrated deliberation may be needed. By integrated deliberation we mean deliberation requiring on-going interaction among scientists and stakeholders. The involvement usually will be needed throughout the stages leading to decision making including problem formulation, collection of information, and development of options (Stern and Fineberg 1996, Presidential/ Congressional Commission on Risk Assessment and Risk Management 1997). Integrated deliberation may also be needed during implementation and may take the form of adaptive management with stakeholders and scientists reviewing the results and suggesting iterative changes. The nature of integrated deliberation depends on the situation, but, in general, the greater the conflict (or potential conflict), the more extensive the deliberation needed.

### Conclusions

No doubt King Arthur did not think about such issues when he convened his roundtable. Unfortunately social scientists cannot summon Merlin's abracadabras to make deliberation easier for agencies — although many of us have been asked for the equivalent many times. Now that institutions such as the NRC are calling for more deliberation (including most recently to inform priorities for medical research) (Institute of Medicine 1998) social scientists have an obliga-

tion to provide more empirical research about how to effectively implement such processes and ways to handle their limitations. In particular, further exploration of methods and criteria for evaluation of deliberation (e.g., Chess et al. 1995a, Dietz 1994, Dietz and Pfund 1988, Fiorino 1990, Rosener 1981, Webler 1993, 1995, 1997) will be essential to progress. To implement the suggestion of *Understanding Risk* — that agencies build organizational capability for deliberation — additional research on related issues will also be useful (e.g., Hadden 1989, Chess et al. 1995b, Chess 1997, Shannon 1989, forthcoming). Given the amount of research needed (and the limited funding for it), social scientists, including those of us in human ecology, may want to work with agency practitioners and stakeholders to develop tools so those involved in deliberative efforts can document them. Finally, more interaction is needed among the disciplines that contribute to the thinking on deliberation, such as sociology, social psychology, anthropology, political science, conflict analysis, communications, policy, and planning.

Those advocating benefit-cost and risk analysis have been successful in part because they have provided practical guidance to busy managers and scientists constrained by budget and regulation. Those advocating deliberative approaches need to do the same, based on empirical research and constructive self-criticism.

### Endnote

1. The NAS' report *Understanding Risk* explains the use of the term "deliberation" as a way to avoid connotations of the term "public participation": proforma efforts to ask for reactions from an unspecified population to agency proposals. However, the term public participation is still used in the research literature to imply, as the NAS does, meaningful involvement of interested and affected parties early in agency efforts to develop evaluations of environmental problems, proposals, policies, decisions, etc. (e.g., Renn et al. 1995). There are also similar discussions related to participatory risk communication efforts (e.g., Chess et al. 1995a). Hence in this commentary we refer to articles discussing similar issues, regardless of nomenclature.

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## Integrating Values Into Science: The View of an Unreconstructed Philosophical Realist

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It is hard to argue with Carolyn Raffensperger's main point — that even science benefits from a broader participatory base. Since I don't like doing hard things (unless I have to), I won't argue with it. But this wouldn't be much of a commentary if I left it at that, so rather than coming at her piece head on (too hard), I'll come at it obliquely, calling into question her too ready acceptance of the NRC Report, *Understanding Risk*. I think her argument could be made stronger by taking a harder look at one of its underlying concepts.

The picture that underlies the NRC report is essentially the same as advanced in the 1970s by Robert Lowrance in his book, *Of Acceptable Risk*, running in a straight line through the NRC's later influential Redbook of 1983 through to *Understanding Risk*. In this view, determining safety is neatly divisible into two parts: the "value-free" risk characterization part<sup>1</sup> that involves "science," whether informed by non-scientists or not; and a value-laden part, which Lowrance calls "judging safety" (i.e., what risks are acceptable?) and later was known as risk management. This second compartment is explicitly acknowledged to involve values and political considerations. It is, therefore, the province of managers and politicians, using input from the scientists (or scientists and the public, in Raffensperger's model). The only defect with this picture is that it is all wrong. As defects go, I guess this could be characterized as "serious."

There is nothing value-free about any of the steps in risk characterization. Let's take one example: characterizing conditions of exposure. This is the journalistic "What? Where? When? How?" question. We know that what is measured (and by whom), where it is measured, when it is measured, and how it is measured — sometimes even determined — are influenced by science and extra-scientific questions. Take the question of criteria air pollutant monitoring, for example. Where is the monitoring equipment for SO<sub>2</sub>? Usually on top of secure buildings, such as fire and police stations. Who determines what to measure and how to do it? Often those with a direct stake in the outcome of the measurement and a hand in developing the instrument itself. Why are some things measured and others not? The answer to that question is often a mixture of the technological, political, and ideological. It is not hard to go through all the other steps in a like manner (Why is there no national tumor registry in the

US, but for a small fee I can find out how many people commute everyday between Barnstable and Worcester counties in Massachusetts?). Before the "data" ever gets to the "risk manager" it has already been squeezed through a values sieve that lets some things through and not others.

How does this fit in with Raffensperger's argument? Consider Quantitative Risk Assessment (QRA). The principal reason most "environmentalists" (i.e., non-insiders) don't like QRA has nothing to do with its concept, but its use. Even the precautionary principle must use some ranking or qualitative assessment if it is to decide whether there is a possibility of "substantial" harm. What gets environmentalists riled up about QRA has little to do with its use as an assessment device, but its use as a decision justification device. The agency/industry/policy maker has shot the arrow, and the risk assessor obligingly paints the target around it, preferably with sophisticated paint using an abundance of integral signs and capital sigmas to make it look infallible. Part of the problem is that many assumptions and approximations are needed to make QRA work at all, and all of these assumptions and approximations are done "unblinded," i.e., with full knowledge by the assessor of their effect on the outcome, with consequent opportunity for conscious or unconscious bias. The other part of the problem is that the raw material going into the QRA is the product of the very same risk characterization steps discussed above.

The Raffensperger solution still works: Broaden the participatory base, consider other outcomes, force the collection of other data, weight the factors in other ways. But it seems to me this modification of Raffensperger's argument better allows it to be situated in current practice, while simultaneously subverting one of the principal foundations of that practice (the false dichotomy between the value-free and value laden components).

One concluding point. It would be easy to construe my remarks as weighing in on the side of the social constructionist view of all science. It is undeniably true that science is a social enterprise, but, as a scientist, I remain an unreconstructed philosophical realist. I believe there is a real world out there that exists independently of me, that I can know the world, and that Science is an important way to allow me to know it. Public participation is not a substitute for that scientific way of knowing, it is part of it.

### Endnote

1. Which can be summarized as follows: Characterize the conditions of exposure to an agent, identify the hazards, determine a quantitative dose-response relationship between the exposure and hazard, and then estimate the risk by applying the relationship to each hazard and condition of exposure.

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## A Citizen's View: The Nuts and Bolts of Co-Partnerships

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Table shapes, seating assignments, and Stone Soup analogies aside, Ms. Raffensperger's message in "Guess Who's Coming For Dinner: The Scientist And The Public Making Good Environmental Decisions" boils down to a well-founded recommendation to the National Research Council to extend its work, *Understanding Risk*, with a subsequent compendium, in which scientists, bureaucrats, and members of the public collaborate as true partners in the process of addressing the twin issues of scientific uncertainty and risk reduction.

As a person born and raised in a heavily radiation-exposed community adjacent to a major nuclear weapons facility, now considered one of the most polluted places on earth, I have attended endless meetings of the sort described by Ms. Raffensperger. Oftentimes, risk assessment forms the primary focus of discussion while a disenfranchised public listens to endless, complex bureaucratic and scientific monologues. While attempts have been made, of late, to hold public meetings in which scientific agendas are defined with public involvement, public attendance at these meetings has been disappointing. Public involvement and the sort of "partnership" advocated by Ms. Raffensperger truly require an examination of the factors which will facilitate establishment of a trusting relationship between the parties she envisions "coming for dinner" to make good environmental decisions.

Ms. Raffensperger advocates a very important shift of focus toward risk *reduction*, rather than risk *assessment*, in this new process for scientists, decision-makers and stakeholders. She discusses in detail the elements of Funtowicz and Ravetz's "post normal science," concentrating upon risk *prevention* rather than risk *characterization* (Funtowicz and Ravetz 1993).

Yet, lacking within this meaningful discussion, I feel, was an examination of the true, down to earth, "nuts and bolts" challenges to attainment of meaningful co-partnership among scientists, bureaucrats, and the public in decision making with regard to environmental problems with high societal stakes. As a citizen and person believed to have been significantly harmed by the radioactive toxins of a major nuclear weapons facility, allow me to bring to this discussion the wisdom (which the author herself describes in her article) of the citizen, "the wisdom and ethics of place."

### Understanding Harms to Stakeholders

This is one of the primary points made in the NRC book, *Understanding Risk*. What does this really entail?

First, it requires truly *LISTENING to the public*. This is not as easy as it may seem. For, "the public" is a broad-spectrum group consisting, potentially, of everyone and anyone—from people with very little education and a whole lot of life experience, to those with advanced training and very little of the coping skill it would take to survive in the very neighborhoods adjacent to the toxic exposure site in question. That is to say, the highly trained, Ivy League epidemiologist brought in to deal with public health impacts at a site of known or unknown radioactive or chemical exposures (often located in close proximity to neighborhoods largely populated by urban poor and minority group members) may well find him/herself faced with an inter-cultural experience of monumental proportions. Not even the Stone Soup referenced by Ms. Raffensperger could ease the extreme cultural adjustment required in such a situation.

So as Raffensperger, the NRC, and others easily recommend that scientists and bureaucrats adjust their thinking so that they function as co-partners with the public, they must think carefully through the realities of what they are suggesting. For, to function as a co-partner, the scientist or bureaucrat must be willing to:

- (1) abandon the use of scientific jargon to which he or she has become firmly wedded over the years, the use of which may have to that point provided for that person a sense of self-importance and academic superiority;
- (2) listen to angry outbursts and seemingly personal verbal attacks by members of the public who have been hurt by toxic exposures and who feel betrayed by their government, without taking these attacks personally;
- (3) listen to input from members of exposed communities which may be disjointed, difficult to understand, or otherwise may seem never to get to the point;
- (4) explain scientific principles in ways understandable to the lay public;
- (5) attend meetings in locations and at times convenient to members of the public (not, for example, during times convenient to one's *own* work schedules, which may conflict with work hours of public members);

(6) spend some time socializing at meetings, for this is of extreme importance in establishing and maintaining comfortable rapport;

(7) honestly feel in his or her heart that the public members “at the table” are equal partners in this process. This will require, for many, leaving learned prejudices behind.

Second, it requires understanding the full range of actual and perceived harms. Ms. Raffensperger and the NRC’s *Understanding Risk* both point to the importance of understanding the full range of harms suffered or perceived as suffered by the public. This understanding is essential to application of either of the alternatives to risk assessment proposed by Ms. Raffensperger and others: alternatives assessment and the precautionary principle.

Alternatives assessment requires, much like an Environmental Impact Statement under National Environmental Policy Act (NEPA), that all alternatives, including the “no action” alternative, be considered prior to a proposed action going forward. This approach, according to the author, offers an opportunity to avoid risk, rather than simply to manage it.

Some, in fact, consider alternatives assessment a method for implementing the precautionary principle, which says, in the face of scientific uncertainty, and with likelihood of societal or environmental harm, to act with prudence and caution.

Both of these approaches, which emphasize risk reduction rather than risk assessment and management, require scientists and bureaucrats, as equal partners at the table with public members, to gain a comprehensive understanding of the actual and perceived harms to the community in question.

These harms may be communicated by the public in indirect ways, or may need to be pulled out of lengthy dialogue or repeated meetings. The process may be slow and possibly painful for scientists and bureaucrats not experienced in this sort of public interaction. From my own experience as a person harmed by toxic exposures, and from the insights I have gained from extensive dialogue from others in my situation, the losses and harms which the public may suffer in toxic exposure scenarios include:

(1) *physical harm*: disabling illness (acute or chronic); terminal illness (e.g., cancers); physical disability (e.g., birth defects in offspring); concern over occurrence of physical disability in future generations due to exposure-caused genetic damage;

(2) *psychological/ psychiatric harm*: clinically diagnosed depression, affective disorders;

(3) *economic harm*: decreased income-producing potential due to disability, chronic illness, mounting medical bills (particularly if a family member is undergoing chemotherapy or radiation therapy), loss of employment due to extensive sick time, leading to inability to pay bills, possible loss of

home, possessions, and resulting harm to self-esteem, and standing in the community;

(4) *community harms*: plunging property values due to presence, whether perceived or real, of toxins, within community; ostracism of the exposed community by surrounding, non-exposed communities.

### Keeping Promises Made

Understanding the harms of stakeholders involves, as well, responding to expressed needs, and establishing trust between “co-partners,” scientists, bureaucrats, and public members. An issue not addressed within Ms. Raffensperger’s piece is the importance of scientists and bureaucrats offering meaningful feedback to expression of community concerns and keeping promises made.

Time and time again, at meetings with bureaucrats and scientists in attendance, I have heard angry members of the public ask: “Why should we believe that anything is going to happen after this meeting? Why should we believe you are going to do any of the things you say you are going to do? You always come and have these meetings and then go away and nothing happens.”

The importance of follow-through on actions promised is paramount. In order to establish trust, government agency representatives and members of the scientific community often need to overcome the poor track record of those who have been there before — agency representatives and “experts” who have promised to take action or have promised community members that change would ensue, but who never followed through with those promises. Trust with community members, for this reason, may be extremely difficult to establish.

### Consistency of “Co-Partners”

One aspect of the application of alternatives to risk assessment (i.e., alternatives assessment and precautionary principle) and an important element of the successful application of these approaches, is the need for consistent, long-term representation by the scientific and governmental representatives at a site.

While it is understood that professional and career responsibilities change, it is of utmost importance that those working as co-partners under the risk reduction principles espoused by NRC and Ms. Raffensperger do not suddenly “disappear” from the “team” gathered at the table. Unfortunately, it is frequently the case that public members receive letters from government agencies or other sources, bluntly notifying them that the people they have gotten to know over the months or years, the very people they have just

begun to trust, have moved on to new jobs, have suddenly been replaced by new people, people who may have very little knowledge of the community, of the expressed concerns of the public. Public members of the “team” at the table are not given any choice in this matter, not given the opportunity to make this a “team” decision. Rather, they are just told after the fact that the switch in personnel is a “done deal.” This is extremely destructive to the all-important process of work as “co-partners,” a process which requires time, trust, and investment by all co-partners in the process.

Instead, members of the “team,” upon becoming aware of a possible need to end involvement at a particular site, should give advance notice, thus allowing a smoother transition to their replacements and a new representative to gain early knowledge of the community’s concerns.

### **Risk Reduction and The Role of Scientific Uncertainty**

The precautionary principle states that, in the face of scientific uncertainty, and with likelihood of societal or environmental harm, the “co-partners” at the table should proceed with caution and prudence. Ms. Raffensperger defines the “fulcrum” of this principle as scientific uncertainty. She thus differentiates this principle of risk *reduction* from risk *assessment*, where certainty is sought before action can be taken. In contrast, risk assessment results in action *before* certainty is in place, if there is a possibility of substantial harm.

What exactly *is* “scientific uncertainty?” We, as members of the public at toxic exposure sites, are often told that many of the harms about which people are concerned will not be measurable by scientific criteria even though they are of great importance to people exposed at the site.

We are told that reconstructed “doses” of substances to which we were exposed are not really definable. Rather, they fall within an “uncertainty range,” which can often cover a very wide range of potential exposure, causing in and of itself, a great deal of worry over health outcomes of these exposures.

Explaining this concept of scientific uncertainty, especially when that uncertainty is great and public concerns are high, requires true team work on the part of scientists, government representatives, and the public. This makes the establishment of trust, through the principles discussed

above, and the open, extensive discussion of the harms of the exposed community, even more important to a successful effort at risk reduction, as advocated by Ms. Raffensperger.

### **Conclusions**

Ms. Raffensperger is on the right track in her advocacy for a turn away from risk analysis, which she pegs as a gamblers’ term, towards environmentalists’ preferred approaches of risk reduction and prevention, which she favors as common sense approaches.

Risk assessment, in Ms. Raffensperger’s view, can’t handle the values part of decision making; the concerns of real importance to the community which may not be measurable by scientific criteria. She and the NRC recommend that all relevant losses be considered in order to evoke true risk reduction rather than mere assessment without reduction of risk.

In my humble opinion, as a citizen, the table can be round, the table can be square. It is the willingness of those at that table to treat each other with respect and as equals which is what really counts. And, the Stone Soup will indeed feed the entire town if each contributor to the final product listens well to what the others bring to the mixture. Many meals must be taken together, for risk reduction is not the product of just one gathering, nor of uni-directional information flow. Upon consideration of all the essential elements requisite to true team collaboration, Ms. Raffensperger’s suggested title for a follow-up compendium by NRC, to its *Understanding Risk*, might be rephrased: “Beyond Risk Analysis: Scientific/Governmental/Public Collaboration Towards Effective Risk Reduction and Elimination.”

### **Endnote**

1. Currently, I am also a member of the Hanford Health Effects Subcommittee and Lawrence Livermore National Laboratory ATSDR Site Team.

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To win the Cold War, the U.S. Government produced nuclear weapons for approximately 50 years. In doing so, a vast military-industrial complex was created. This complex has had significant economic, social, and scientific influence on our nation. Today, we live with the legacies created by this effort. These include: environmental contamination which the Department of Energy estimates will cost over \$300 billion to clean up; a history of exposures to workers and communities; a history of mistrust; and, an incomplete understanding of health effects to workers and the public.

In attempting to plan and conduct public health research related to the nuclear weapons complex the Centers for Disease Control and Prevention (CDC) has had to confront this legacy. In doing so the role of the community in the planning and conduct of research has surfaced as a fundamental issue. Complicating the tensions described in the Raffensperger paper, "Guess Who's Coming for Dinner: The Scientist and the Public Making Good Environmental Decisions," is a history of: secrecy; decades of perceived government deception; documented and intentional radioactive releases; as well as, human radiation experiments. This legacy provides a dynamic whereby CDC must directly engage communities in the planning and conduct of health research. Community partnerships have become indispensable in addressing health research around the nuclear weapons complex; recently the Department of Health and Human Services developed recommendations and strategies for how they may be accomplished (Department of Health and Human Services 1998).

In order to address the need for developing community partnerships we have set a few goals:

- involve the community and scientists in a reciprocal learning process;
- build community capacity to participate in health studies;
- involve communities in helping to set the research agenda; and
- develop governmental and community networks to address radiation health concerns.

When implementing partnerships we have learned that we must fulfill commitments in five areas: involvement in decision making, education/training, outreach, participation in research and, addressing the concerns of individuals. Over the past few years, our experiences have helped us identify some of the essential issues that must be attended to in order to achieve these commitments. They include: ethics, openness, shared decision-making, scientific credibility, adequate resources, and accountability. Dialogue and negotiation in each of these areas is vital to building partnerships.

We are often asked: how have community partners improved the science? The answer is that we have too many examples to be described here. Community partners have influenced planning, agenda setting, policy making, and very practical aspects of the science. For instance, participation in protocol development has assisted in defining control groups and has stimulated the use of ultrasound in our thyroid studies. Participation by communities brings local knowledge to the table that assists in environmental pathway analysis and provides a context for our efforts in modeling.

To us the question is not "Who is coming to dinner?" but, "How to make the dinner a feast?" We believe that government, scientists, and communities must be partners at the table. These partnership are indispensable in the planning and conduct of this science. They require openness, commitment, dialogue, negotiation, and consistent effort. We also believe they provide a framework to build respect and promote democratic values.

### Endnote

1. The views expressed here do not necessarily reflect those of the Centers for Disease Control and Prevention or any other agency of the U.S. Government.

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## Understanding *Understanding Risk* and Moving Forward

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Carolyn Raffensperger (1998) makes some important points about the scientific basis for environmental decision making that can move the field a step beyond the National Research Council (1996) report, *Understanding Risk: Informing Decisions in a Democratic Society*. Before engaging in the discussion about what this next step should be, however, I wish to address two misconceptions of the report that appear in Raffensperger's paper.

One is that *Understanding Risk* presumed that risk assessment, as typically practiced, was the only tool available for informing risk decisions. It is true that the NRC study was originally framed in the language of risk assessment, but the study committee immediately broadened that frame, as noted in the preface. The report's title was carefully chosen to reflect the committee's view that its topic was how best to inform environmental and public health decisions, not how to improve quantitative risk assessment. The committee emphasized that risks and hazards are multidimensional and warned about the dangers of using any analytic technique that attempts to reduce these dimensions to one, without open deliberation about the value judgments that are inevitably involved. It specifically criticized "legislative proposals and agency guidances that call for using analytic techniques of benefit-cost analysis or risk analysis as the sole or primary basis for making 'comparative risk' judgments or for 'risk-based decision making,'" saying these approaches are not "appropriate for many of the highly controversial choices for which these proposals are being promoted" (ibid., 105-106). In keeping with this position, *Understanding Risk* advocated a synthesis of analysis and deliberation as the best way to understand risks, not just as the best way to do risk assessment. It advised government to resist the temptation to "use analytic techniques [including standard-issue risk assessment] as substitutes for informed and appropriately broad-based deliberation in weighing conflicting values" (ibid., 104).

It is important to mention in passing that Raffensperger's characterization of quantitative risk assessment (QRA) might raise hackles among some practitioners of the field. QRA does not by its nature focus only on death, even though in practice it typically does. There is respectable work on risk assessment coming out of the tradition of decision analysis that presumes that any undesirable and uncertain outcome deserves assessment. The difficulty occurs in the practice of risk assessment, when outcomes that cannot be estimated quantitatively by available techniques are ignored and then

treated as though they had been analyzed and their risk values found equal to zero. In promoting decision approaches that go beyond QRA, it is not worth alienating the most open-minded risk analysts by caricaturing their field. Their contributions are essential for decision making, if they are interpreted in the right social context.

The second misconception is that *Understanding Risk* advocated stakeholder involvement only because it makes better policy and not because it makes better science. In fact, the report makes a series of strong epistemic arguments that broadly based deliberation makes for better informed decisions (see, e.g., 79-81):

- deliberation helps formulate scientific questions so that the answers will be decision relevant;
- broadly based deliberation provides a more complete knowledge base for decisions by bringing to bear knowledge of local conditions, more likely to be possessed by nonscientists, so that analytic assumptions made in the absence of full knowledge are reasonable given real-world conditions (an example offered is the need to listen to people who work in farm fields when estimating the exposure of farm workers to pesticides);
- broad participation ensures that all the outcomes of concern receive consideration and not just those that are readily quantifiable, thus providing a more complete picture of the choices available and their implications;
- broadly based deliberation can help determine the appropriate uses for potentially controversial analytical techniques and the appropriate interpretations to put on their results;
- deliberation can help make sense of summaries of scientific information, which have the potential to create conflicting or mistaken impressions; and
- deliberation can help identify which disagreements among the parties interested in a decision might be resolved by gathering further information.

Thus, my understanding of *Understanding Risk* (and as co-editor of the book, I write as a sort of stakeholder) is that it is much more compatible with Raffensperger's position than her paper suggests. So, rather than debating the text further, it makes sense to think about next steps. A good place to begin is with two central points in Raffensperger's paper with which I agree.

One is an apparent paradox: that a scientific understanding of the choices available in environmental policy requires

the participation of nonscientists. This proposition holds true because environmental policy has the following characteristics: the outcomes of concern are multidimensional, the relevant science is uncertain, those affected by policy decisions have conflicting and sometimes changing values, many people mistrust available scientific analyses, and decisions must be made before scientific uncertainties decrease or value differences narrow (Dietz and Stern 1998). In any domain with these characteristics, science alone cannot provide all the needed knowledge in a timely manner; consequently, knowledge and wisdom from outside science must be integrated, in some sort of “analytic deliberation,” to get the highest quality information possible. The challenge is to figure out how, where, and when to achieve this integration.

Raffensperger’s other central point is that there is a pressing need to consider and carefully evaluate a variety of decision rules for acting under uncertainty in environmental policy. In fact, a variety of decision rules is already in use in U.S. environmental policy. Several of them depend on QRA, which is not itself a decision rule. QRA-based rules typically rely on so-called margins of safety: for example, under one rule, analysts provide a “best estimate” of the risk of a particular adverse outcome (e.g., death from cancer) and decision makers establish a “bright line” (e.g.,  $10^{-6}$  risk), and limit exposure to a set fraction of that level (e.g.,  $10^{-8}$ ) to account for uncertainty in the risk assessment and to leave a margin of safety. Other decision rules that use QRA balance risks (usually just a few undesirable health outcomes) against benefits, or against other risks (e.g., loss of jobs). Still other decision rules do not rely on QRA. Some are based only on risk identification. One such rule is to keep exposure to a hazard below the lowest level at which a negative effect has been observed. Another famous decision rule is to ban any food additive that has been determined to cause cancer in animals. Still others do not appear to require quantitative science to be implemented. One such is the precautionary principle that Raffensperger mentions — the rule that no new action should proceed until all the alternatives have been assessed. Because some of the conflict in environmental policy seems to focus on disagreement about the appropriateness of the decision rules now being used, it makes sense to look more closely at the decision rules.

These two points suggest two next steps for the field.

1. Initiate a program of systematic research on how to implement broadly-based analytic-deliberative processes more effectively for informing environmental decisions. Many government agencies and other decision makers are trying to involve stakeholders more fully and at earlier stages in informing their decisions, in the spirit of *Understanding Risk*. For the most part, each such actor is trying to learn the

techniques of analytic deliberation from its own experience — an admirable effort, but inferior in the long run to one based on systematic research. This approach can result, at best, in manuals that offer guidance on how to manage public participation, based on the personal experiences of the authors and a reading of some unsystematic case literature. Such manuals are beginning to proliferate, but there is no validation of the advice they offer (Webler 1997).

Public policy can benefit greatly from systematic empirical research on the new efforts at analytic deliberation. Such research can build a body of cumulative knowledge about which techniques work best in which situations that can free future decision makers from the burden of starting from scratch. *Understanding Risk* noted the absence of such research in 1996. Now, with analytic deliberation being tried more frequently, a body of case experience is starting to appear that could be used, if carefully interrogated, to build generic knowledge. Researchers in the field are just now beginning to develop the concepts needed for such work (e.g., Webler 1995; Tuler and Webler forthcoming). These concepts can be used to examine available case experience to identify the attributes of analytic deliberations, their topics, and their scientific, social, and political contexts that are associated with outcomes that various participants consider desirable. Such research would lead to some tentative findings and, no doubt, to conceptual refinements that would improve the ability to study future cases productively.

2. Initiate an analytic-deliberative process to consider the utility of various decision rules for environmental policy making under uncertainty. Government agencies use different decision rules for making different decisions, often because they are legislatively required to use particular rules. It may be that in each case, agencies use the rules that an intelligent and informed populace would select after careful consideration of all the implications of adopting one rule or another, but this may not be the case. Given the advances that have been made in decision science in the past quarter century, now may be a good time to examine the range of decision rules being used or proposed for environmental policy from two standpoints: the moral, ethical, and scientific assumptions they embody, and the practical effects that are likely to result from implementing them.

Participation of both scientists and nonscientists is necessary for careful consideration of the implications of decision rules. Nonscientists who have a strong concern with values may not fully comprehend the value assumptions behind a decision rule without first gaining a detailed understanding of how the rule actually operates in practice. Similarly, scientists who have a particular concern with the risk implications of using one or another decision rule may not fully

understand these implications unless they are acquainted with the various values and ethical concerns that animate those who may be affected by the decision.

Both of these proposed activities are simultaneously analytic and deliberative. Although the first is basically a research activity, it is likely to be most useful if it is informed by the concerns of the various participants in analytic deliberations. Thus, a participatory research approach to the activity would be advisable. The second is mainly a dialogic or discursive activity, but it will probably be most useful if the participants are in interaction with specialists in implementing particular decision rules. Each activity could significantly advance thinking along the lines set out by *Understanding Risk*.

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## Learning Through Participation

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In this short response to Carolyn Raffensberger's piece, I would like to pick up on the theme of learning. I strongly agree with Carolyn that all the participants in analytic-deliberative decision making processes should be given "new job descriptions and read from different scripts" and that "rather than characterizing risk we should strive for learning and problem solving." While she ends up focusing on scientists as needing to be co-learners and co-problem solvers, really we should pay attention to the roles and responsibilities of all participants: scientists, government agency staff, employees of corporations, and members of multiple publics (the "lay people"). I think it is also important that we consider the scale at which learning occurs and the content matter learned. I will briefly elaborate on these two points.

First, *Understanding Risk* identified learning at various scales: individual, group, institutional and, what we might call generally, societal. For example, the report discusses "building organizational capacity" necessary to implement analytic-deliberative processes (National Research Council 1996, 150-155). Societal learning occurs when we collectively learn and incorporate those lessons into how we do things on a macro scale (across multiple institutions, groups, and individuals). Recent research has addressed the issue of learning at all of these scales within the arena of environmental and risk policymaking (Chess et al. 1995, Laird 1993, Webler et al. 1995, Wynne 1992). An even larger body of literature and research exists about learning in other policy arenas.

Second, I also think that we need to pay more close attention to *what* we are learning. Substantive issues are important to any decision-making process. We engage in this type of learning when we ask, What are the technical issues? What is my vision for a future? What values are important to my community? Associated with substantive learning are the skills and practices related to how we do things: skills of problems solving, skills of argumentation, processes for doing "good" public involvement and collaborative decision-making.

This characterization of learning provides me the opportunity to introduce yet another taxonomy into the world. It is summarized in Table 1. The taxonomy is defined by *who* learns and *what* is learned. Illustrative examples of the types of learning for each category are given. There is no room here to elaborate on the issues, opportunities, and difficulties

associated with learning about substantive issues and process skills at each level. A diverse literature addresses many important issues that are worth exploring as we experiment with new ways of responding to the challenges posed by the *Understanding Risk* report, Carolyn Raffensberger's paper, and the commentaries featured in this Forum. As a small contribution to that effort I would like to present some insights that we can gain about how individuals might learn by *participating* in activities. To me, this is an important line of (applied) research because analytic-deliberative decision-making processes provide opportunities for all participants to learn by doing. These opportunities have not been fully taken advantage of by practitioners or participants.

Table 1  
Types Of Learning In Deliberative Policy Making Processes.

Who learns	What is learned	
	Substantive	Interactional
Individual	what is my opponent's interpretation of the data?	how can I make a forceful argument for my perspective?
Group	what are the primary values guiding our vision?	how can members be motivated to participate?
Institutional/ Organizational	what are the interests and values of different stakeholders that ought to inform this policy decision?	what are the best ways to structure meetings for gathering and evaluating all relevant information?
Societal	what are the implications of this issues (e.g., clean-up of a nuclear weapons facility) on other issues (e.g., safety of radioactive materials transportation)	what are the lessons for designing processes for shared decision making in other policy arenas?

While individual learning has been discussed in literature on environmental and risk policy making, the focus is generally on the substance of the issue (i.e., what the controversy is about or what people know about the issue) (Gale 1983, Laird 1993, Sinclair and Diduck 1995, Tuler 1995, Webler et al. 1995, Wynne 1992). Rarely discussed is the issue of learning the skills for discourse or thinking (Hartley 1998, Laird 1993, Webler et al. 1995). Moreover, even if such learning is mentioned, there is no discussion of the socio-psychological mechanisms by which it occurs.

One approach to study this issue is provided by socio-cultural psychology. A central claim of socio-cultural psy-



chology is that human action cannot be analyzed by reductive approaches that isolate individuals from the means by which individuals carry out an action (Wertsch 1998). How people talk, their problem-solving methods, the “frames” they use to represent and interpret phenomena, and other such mental functions must be understood as dialectical processes, between the means people have at their disposal for accomplishing these mental activities (e.g., particular languages, mental frames, etc.) and their unique use in specific interactions.

The unit of analysis in the socio-cultural framework, the person *and* the cultural tool, is based on the claim that actions, means, and goals are interconnected. Cultural (or psychological tools) mediate human mental action, in much the same way that technical tools mediate forms of physical activity (e.g., a lawn mower mediates the activity of mowing a lawn). For example, frames or worldviews can be understood as a type of cultural tool.<sup>1</sup>

Cultural tools do not by themselves *determine* action. They mediate an active process that is based on *use* of a cultural tool in an instrumental act. In this sense they are the means by which mental action is mediated. People are neither viewed as passive sponges who are deterministically controlled by their environment, nor are they viewed as atomistic, masterful selves in total control of their interaction with the environment. Instead, cultural tools can both empower and constrain human action.

In elaborating these claims, Wertsch suggests that individuals generally have access to a set of cultural tools, a tool kit, if you will. They draw on this resource to achieve a goal. Individuals select cultural tools, for example, when plotting an argumentative strategy in a dialogue. The use of one cultural tool, for example, does not imply that others are unavailable. Certain cultural tools may be viewed by particular individuals as more or less appropriate, given the context. Another way to say this is that these tools have a normative character with respect to specific social, cultural, institutional, or historical settings. This does not imply that selecting from one’s tool kit is always an active choice. Often the selection can be made unreflectively. In fact, cultural tools can be invisible to individuals who use them. For example, language and stereotyping frames are often treated as existing independently and abstracted from human use (Wertsch 1998). People also can privilege some tools over others. Privileging is related to the organization of cultural tools in some type of socially learned hierarchy (Vygotsky 1986). Moreover, the issue is not one of truth, accuracy, or efficiency. Instead, patterns of privileging can also reflect how an individual defines a situation or activity, including patterns of interest, power, status, and authority.

Vygotsky argued that two levels of social interaction are important for an individual to internalize or master a cultural tool. The first level has been termed the “interpsychological” or “intermental.” Here, communicative behavior occurs during concrete social interactions. These social processes are found in interactions among small groups of individuals. The second level is more impersonal. Interaction here is embedded in the social-institutional context in which an individual finds him/herself (e.g., private religious school, university classroom, state legislature). These include, for example, historically situated patterns of interaction which “operate independently of individual human plan or volition” (Wertsch 1985, 60).

Mastering and employing cultural tools can become more conscious activities. This leaves open the possibility that self-regulated, reflective change is possible. Viewing participation in deliberative policy making in this way (as a socio-cultural activity) opens the way to address how individuals may learn to interact (i.e., deliberate) in the practice of an activity (Rogoff 1995, Vygotsky 1986, Wertsch 1990, Wertsch and Minick 1990).

## Conclusions

By viewing participation in deliberative policy making as a socio-cultural activity, a way is open to address how individuals may learn to interact, think, and represent issues through their participation. I would want to go even further — this framework suggests that a goal of discursive policy-making processes should be to provide opportunities for learning of different sorts by the participants (i.e., thinking and argumentation skills, substantive issues).

Similar needs and opportunities for learning exist at group, organizational, and societal levels, as well. For example, organizations can learn how to conduct participatory processes by careful evaluation, both during and after the implementation of a process. Different theories and methods can be brought to bear about how to conduct such evaluations (Tuler and Webler 1995). Of course, while policy processes based on deliberative models can seek to facilitate learning, they may not always be successful. Nothing will ensure that participants learn about how to act in concrete, dialogically situated interactions, but attention to the micro-details of talk can prepare people for the opportunities and barriers to a successful deliberative policy making processes. Nothing will *ensure* that organizations conduct useful evaluations or apply their lessons, but integrating opportunities for “real time” reflection can increase the likelihood of identifying ways to improve people’s participation and process outcomes. Complexity and barriers to success do not mean impossible.

There is much room for improvement in the way that deliberative processes are designed and implemented. A focus on the processes of learning provides another avenue for improving their performance.

### Endnote

1. Examples of environmental discourses that function as cultural tools are described by John Dryzek in his recent book *The Politics Of The Earth: Environmental Discourses* (1997) which I have reviewed in this issue of Human Ecology Review.

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## Beyond Science: Deliberation and Analysis in Public Decision Making

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I agree very much with most of Carolyn Raffensperger's argument. *Understanding Risk* does stand out for its willingness to admit that we need to rethink our assumptions about the privileged role that scientists and "experts" play in public decision making on topics of risk and environment. Involving publics in meaningful ways with scientists *can* make better science, but only if the scientists allow this to happen. I agree with Carolyn when she writes that this might require scientists engaging in inductive reasoning — something many of them have been trained *not* to do! Surely the scientific method is powerful. Deductive reasoning *is* powerful. We do not need to abandon it in order to recognize that building a definition of the problem "from the ground up" might be a competent and politically expedient way to proceed. Still, I disagree that this is the main message to take from the report. The debate about why to involve lay people in public decision making may have matured, in a sense, via the status a National Research Council committee has, but *Understanding Risk* does not provide anything new to that debate.

What is noteworthy about the report is that it offers us an opportunity to replace the traditional facts/values dichotomy with a conceptual framework that is more closely related to what people actually do in decision making. At the heart of this are the twin ideas of analysis and deliberation. Two entrenched beliefs seems to prevent readers from gleaning this important message from the book.

The first miscomprehension is that people tend to readily believe that analysis = *science* and deliberation = *participation*. The second miscomprehension is that people tend to assume that we analyze *only* facts but deliberate *only* about values. We must set aside our tendencies to see science as a dispassionate activity in which scientists analyze facts; politics as an overly passionate activity in which lay people deliberate about values; and science and politics locked in an eternal conflict. Then we will find something truly valuable in this report. Getting beyond "facts vs. values" and "scientists vs. lay people" is essential if we are to move our collective understanding of participatory decision making forward (and thereby, its realization as well).

Both analysis and deliberation refer to ways of knowing the world — rationales, if you like.<sup>1</sup> In analysis people use

systematic ways of gathering and interpreting data. The overarching principle in analysis is that results can be validated. Customarily, we think of analysis as a scientific activity — usually natural sciences. One of the goals of the committee, I believe, was to validate forms of scientific analysis beyond the natural sciences and engineering.<sup>2</sup> For instance: ethical analysis, equity analysis, multiattribute utility analysis (a longer list is provided on pp.102-103, also see p. 158). Hopefully, this report will help change the prevailing common perception of analysis to a form of reasoning that is much more expansive and inclusive of all types of science. This is important, but, in my mind, it is not enough. Remember, we should not reduce analysis to science. For it is *not* only scientists who do analysis. Lay people also practice analysis! To be brief, I will merely point to two commonly known examples: popular epidemiology and lay monitoring (often of rivers or estuaries). Thus analysis is not *only* science as done by scientists, it is a systematic, rigorous, validatable way of learning about the world that can be done by lay people as well as by scientists. Moreover, analysis is not a value-free activity. Values clearly inform how analyses are done, who does them, and when they are done.<sup>3</sup>

Deliberation is a different way that we make sense of the world. Here people "confer, ponder, exchange views, consider evidence, reflect on matters of mutual interest, negotiate, and attempt to persuade each other" (National Research Council 1996, 73). Deliberation is not only about values. Anyone who has ever been in a courtroom knows that. Facts are also contestable. In addition, their meaning needs to be interpreted. I emphasize again: deliberation is *not only* about values, analysis is *not only* about facts. Likewise, deliberation is *not* performed only by decision makers and interested and affected parties. Scientists are *not* delegated to remain in the domain of analysis. They deliberate with other scientists. They deliberate with publics, with decision makers, with stakeholders.<sup>4</sup>

Figure 1 is an attempt to summarize the variety of ways that scientists and lay people are involved in analysis and deliberation. In box 1, lay people engage in analytical activities. For example, at the Nevada nuclear weapons test site the Western Shoshone are doing an oral history project and an exposure assessment, because a previous government dose

reconstruction study did not take into account their unique lifestyles. In box 2 scientists engage in analytical activities. For example, scientists from the Silent Spring Institute perform telephone interviews with women who lived on Cape Cod in order to estimate their exposure to possible carcinogens. In box 3 scientists engage in deliberation. For example, EPA's Science Advisory Board discusses the literature on dioxin and considers reassessing its dangerousness. In box 4, lay people engage in deliberation. For example, lay people in a village targeted for a prison deliberate about their concerns and mutual interests.

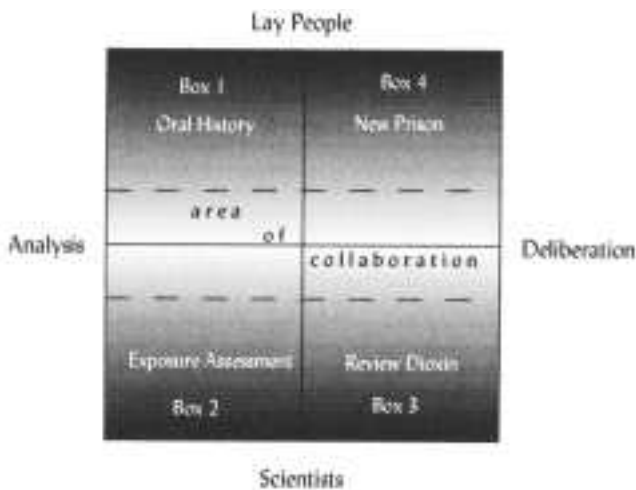


Figure 1 attempts to capture another important idea: that collaboration can occur among scientists and lay people in both analysis and deliberation. An example of collaboration in analysis is the Western Shoshone in Nevada. They, assisted by scientists at the Childhood Cancer Research Institute, are working with government scientists to help design future health studies. Collaboration in deliberation also occurs, such as when EPA convenes negotiated rulemaking committees. These typically involve scientists and stakeholders, who meet over the course of several months to review the literature and propose draft recommendations. (An example of negotiated rulemaking on disinfectant byproducts in drinking water is presented in the NRC report as an appendix.)

This Figure does not appear in the report, but I think it captures an idea that could readily lead to progress in this area. For too long we have conceptualized decision making in terms of science, politics, facts, and values. This has facilitated the gross misconceptions that science is value neutral and politics is empty rhetoric. When we think about scientists and lay people actively building shared understandings

via the activities of analysis and deliberation, we take a step forward.

Finally, the Figure suggests some diagnostic questions which, if truly contemplated by those organizing and participating in collaborative decision making, will produce processes that are both competent and just:

1. How could this process capitalize on the local knowledge of the lay people by engaging them in analytical activities?

2. How can the analytical work of scientists be informed and contextualized by the needs and preferences of the interested and affected parties?

3. How can we create venues for deliberation in which scientists and lay people can discuss how best to incorporate wisdom gained through analysis into the decision making process?

4. How can we create venues for deliberation among interested and affected parties in which shared and individual concerns emerge and become clarified, and which enables a discussion that moves toward closure in a respectful and productive manner?

Carolyn Raffensperger's paper for this Forum concentrates attention on bringing lay people into the science — roughly equivalent to question #1 above. In my opinion, the *Understanding Risk* report has given us the opportunity to address that and other important issues. In so doing, it offers the best chance we have had in a long time to move ahead toward a time when we make public decisions in a way that is both competent and just.

### Endnotes

1. "Both are processes for increasing understandings about existing phenomena and estimating future conditions" (National Research Council 1996, 118).
2. "We emphasize that analysis can be used for social questions about risk, including potential economic, social, political, and cultural harms... [...] Analysis therefore may involve more than the tools of the natural sciences and more than quantification. (ibid., 98)
3. *Understanding Risk* is very very clear about this. See chapter 2.
4. The report is much more clear about recognizing that scientists participate in deliberation (ibid., 74) and less clear that non-scientists participate in analysis.

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## Toward Just and Competent Decisions<sup>1</sup>

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One of the reasons I delight in this kind of exchange is the intellectual generosity extended by colleagues. My heartfelt thanks to all of the authors for their insights and contributions to the dialogue. I would especially like to thank Paul Stern for his expansive mind and commitment to the commonweal.

Before responding to the commenters, I would like to make two observations about this process. First, I have discovered that in evaluating a work like *Understanding Risk*, the evaluator tends to simplify the material whereas the authors have distilled the material. That is, many of the commenters were correct when they said that I mischaracterized the report or didn't fully represent its message. Caron Chess, Paul Stern and Tom Webler worked on *Understanding Risk* for over a year. It is certainly presumptuous of me to comment on it in such a short, and perhaps bulldozer-like way. I am sure I missed many nuances in my desire to build a new road through public policy. I appreciate their corrections and insights.

Second, I observe that all but one of those who responded to my paper are scientists or academics of one stripe or another, in spite of the best efforts of the editors to include more lay people. The difficulty they had, and the resulting tenor of the dialogue indicate one of the problems of creating a process of analysis and deliberation.

My substantive comments address two issues, the shift in power when deliberation is added to the equation and the recommendations made by the responders.

### Power

At its core, *Understanding Risk* is radical because if followed it fundamentally shifts power. It is no secret that environmental decision making is made in the crucible of money. And those with the money have the power. We cure disease rather than prevent it so someone can make a buck off the pill. We clean up pollution rather than prevent it for the same reasons. Decision-makers cloak themselves in the ever more remote rhetoric of sound science and risk assessment rather than the commonplace wisdom of "an ounce of prevention is worth a pound of cure." As Ozonoff aptly points out, "the agency/industry/policy maker has shot the arrow, and the risk assessor obligingly paints the target around it ..." In this world, power is coercive.

Barry Lopez, in his new book *About this Life: Journeys on the Threshold of Memory*, asserts, "...while American society continues to value local knowledge as a quaint part of its heritage, it continues to cut such people off from any real political power. This is as true for small farmers and illiterate cowboys as it is for American Indians, native Hawaiians, and Eskimos" (1998, 137). Webler recognizes this problem when he argues for a just and competent process which capitalizes on the local knowledge of affected parties. The power shift advocated in *Understanding Risk* is designed to institute justice.

The committee who wrote *Understanding Risk* understood that adding a deliberative component to the existing analytical framework of decision making would change the relationships of power, particularly if we invited the farmer and the American Indian to the table. Webler addresses this idea by saying we need to "rethink our assumptions about the privileged role" scientists play. Tuler also comments on the issues of power, status and authority in his discussion of "patterns of privileging." In my original paper, I argued that we needed to redefine the role of scientists and define it as sharing decision-making power. This notion of shared power inheres in the label "co-learner" rather than "expert." In this world, power is communion rather than coercion.

There will be resistance to sharing power and giving decision-making authority to those affected by a decision. The resistance will come from all parties — the scientists, the lay people and the agency employees.

Let me turn to the stakeholder's resistance. I hear a quiet voice in the back of my head — the voice of one of those farmers asked to join in yet another public participation process. (We might note that being asked would be a novel experience for the small farmer since she almost never flies to Washington DC, or even the state capitol to participate in decision-making. In the first place she's rarely asked. In the second place, the Farm Bureau is going to claim that it speaks for her.) The weary voice says, "Why? What would be different? Is it worth my time?" What indeed would be different if any of the recommendations or commentary were carried through in some risk situation?

### Recommendations

Chess, Dietz, Shannon, Bradbury and Stern propose more research into implementation of deliberative processes

and analysis of their limitations. (Tuler suggests a different line of inquiry: organizational learning.) Chess, Dietz and Shannon present the threshold questions agencies need to ask regarding the sufficiency of information and agreement on values prior to a deliberative process. Fortunately, the authors of all three papers are not advocating more research to delay action (as is too typical), but research to provide “practical guidance” to managers and scientists on how to implement these processes. I agree that any information that will assist agencies, scientists *and* stakeholders carry out successful analysis and deliberation will lead to better policy. One model for that guidance might be a book like, *Getting To Yes* which described a process for conflict resolution and was used by lay people, scientists, and agency staff (Fisher and Ury 1981). I would urge that this kind of guidance be accessible and available to all parties, including stakeholders.

Such guidance would be particularly useful if it dovetails with Paul Stern’s recommendation to consider the utility of various decision rules for environmental policy. The National Academy of Sciences has devoted years to risk assessment — certainly a method for “understanding risk” — but now has an opportunity to bring to the fore other decision rules, such as the precautionary principle, which expresses a different set of values than risk assessment as practiced by federal and state agencies.

Webler offers some diagnostic questions which can produce processes that, in his words, are “competent and just.” His elegant questions could be used as goals for establishing a process and used later to evaluate the process.

I would like to focus on one word (“respectful”) in Webler’s fourth question, which asks “How can we create venues for deliberation among interested and affected parties in which shared and individual concerns emerge and become clarified, and which enables a discussion that moves toward closure in a respectful and productive manner?” The notion of respect is the fulcrum for both the process and substance urged in my paper and the process described in *Understanding Risk*.

In contrast to the idea of respect, the idea of reason has dominated U.S. law and policy for 150 years. We use the “reasonable person standard” to judge civil offenses in our legal system. And the whole notion of analysis carries with it the philosophic tradition of reason. Some years ago I collaborated on a different legal standard to judge offenses

against dignity, particularly sexual harassment, and for occasions of uncertainty. That standard is the “Respectful Person” (Bernstein 1997). “To be a respectful person is to treat other human beings as persons who are as valuable as you are — even if you have had advantages that they have not had. It is to acknowledge their dignity and humanity, to recognize that they are like you, yet have their own goals and wishes” (Bernstein 1997, 523).

I offer it here again. *Understanding Risk* describes a process that is not only reasonable, but respectful of local knowledge and the insights of scientists. Just as an employer has a responsibility to provide a respectful place of employment, so too do policymakers have a responsibility to provide a respectful process for analysis and deliberation.

But Respect goes beyond process and also addresses substance. For example respect undergirds the notion of the precautionary principle and, as a decision rule, therefore, more appropriately fits the process described in *Understanding Risk*. Bernstein says, “The precautionary principle asserts that society should anticipate, rather than simply attempt to remedy, activities that harm the environment. Urging policymakers to err on the side on nonencroachment and distance, the precautionary principle expresses respect. [...] Like the ethical duty to refrain, the precautionary principle counsels hesitation; the respectful person understands the prudence of caution” (Bernstein 1997, 514-515).

Herein lies wisdom as well as just and competent decisions.

### Forum Editors’ Note

1. In writing her response to the commentaries, the author did not have the full set to review. Missing from the commentaries she reviewed were those by Trisha Pritikin and Mike Sage, and, therefore, she was unable to comment on the content of their contributions.

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## **The Politics of the Earth: Environmental Discourses**

**By John S. Dryzek**

**New York: Oxford University Press, 1997**

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This is a book about how we talk about the earth and our place on it. Hence, the idea of discourses, those shared, structured ways of speaking, thinking, interpreting, and representing things in the world (and which have been called by other names, such as frames, speech genres, or interpretive repertoires). Dryzek describes a set of discourses used in a "politics of the earth": deliberations about environmental policies and politics. In this easily read and highly engaging book his main goal is to "advance analysis in environmental affairs by promoting critical comparative scrutiny of competing discourses of environmental concerns" (pg. 20). In the context of his extensive writings and research, Dryzek is very much concerned with how the discourses interact and can play a role in what he has referred to as ecological democracy (Dryzek 1990). From a human ecology perspective, this book is important as it helps us to understand how human actions both reflect and create the complex characteristics of human systems and ecological systems.

In his introduction, Dryzek illustrates that environmental discourses are often in conflict. This is not a new observation. As he notes, "each discourse rests on assumptions, judgments, and contentions that provide the basic terms for analysis, debates, agreements, and disagreements in the environmental area no less than elsewhere" (pg. 8). In one discourse, the earth can be conceptualized as a living organism (the Gaia hypothesis) while in another nature is "brute matter." In another, experts and managers are thought best for guiding decision-making, which is contrasted with discourses that "leave it to the people."

Dryzek develops a taxonomy for organizing conflicting environmental discourses. Eight discourses are defined as arguments *against* industrialism, "the long-dominant discourse of industrial society" (pg. 12), and its commitment to unlimited growth in goods and services as part of the "good" life (this is the ninth discourse he describes). The taxonomy is defined according to two dimensions. The first dimension concerns the degree to which alternatives wish to move away from the conditions created by industrialism: reformist or

radical departures from the terms of the dominant discourse. The second dimension further defines the character of the alternatives proposed: prosaic or imaginative. Prosaic alternatives take the "political-economic chessboard set by industrial society as pretty much given" (pg. 13). On the other hand, imaginative alternatives "seek to redefine the chessboard" (pg. 13). These two dimensions give four categories of environmental discourses.

Chapters 2-10 describe the eight discourses defined by the four categories, along with the ninth, dominant discourse. Each chapter follows a similar structure. First, the historical origins of the discourse are described, placing it into context and identifying the key individuals or institutions who employ it. Dryzek then proceeds to his "discourse analysis." Discourses, as described in chapter 1, are understood as "shared ways of apprehending the world" (pg. 8). They are stories, built from specific kinds of structural elements. Dryzek defines four structural elements which he uses to define each of the environmental discourses in more detail. They are: 1) basic entities whose existence is recognized or constructed, 2) assumptions about natural relationships, 3) agents and their motives, and 4) key metaphors and other rhetorical devices (these are based on Dryzek 1988). Finally, Dryzek discusses effects that each discourse has had on environmental policy making (e.g., framing debates, limiting what are considered "reasonable" options, informing environmental management structures and policy-making processes). Within these chapters Dryzek also discusses how the discourses relate to each other; unfortunately, however, he is all too brief in this area and much of the comparative work is left for the reader to do on his or her own (the tables in each chapter summarizing the main elements of each discourse were helpful to this reader). Since comparative analysis was one of his main goals, I felt that he could have gone further in this direction.

Now, there is no room here to describe each discourse in enough detail to do them justice. Since this is what Dryzek does in the book I will limit my remarks to how each discourse fits into his taxonomy.

The radical and prosaic category is called *survivalism*, and is discussed in chapter 2. This is a discourse defined by its attention to limits and carrying capacities. It is radical because perpetual economic growth and power relations are challenged. It is prosaic because solutions are proposed within the constraints of industrialism (e.g., more administrative control and science-based decision-making). This discourse was popularized by the Club of Rome report in the 1970s. It stands in opposition to the dominant "no limits" "Promethean" discourse of industrialism, articulated forcefully by Julian Simon (1981) and Myers and Simon (1994). This Promethean response is discussed in chapter 3.

The reformist and prosaic category of discourses is termed *environmental problem solving*. The three discourses which make up this category are administrative rationalism, democratic pragmatism, and economic rationalism (chapters 4-6, respectively). These discourses are prosaic because the economic-political status quo of industrialism is taken as a given — albeit one in need of some pragmatic adjustment. But not too much adjustment — thus, they are considered reformist. The distinction between the three discourses rests on the agent that should be in control of environmental policies: experts, “the people,” or the market.

The reformist and imaginative category is defined by the quest for *sustainability*. Two types of discourses are defined: sustainable development and ecological modernization (chapters 7 and 8, respectively). Imaginative methods to “dissolve the conflicts between environmental and economic values that energize the discourses of problem solving and limits” are a characteristic feature of both. They use multiple images of sustainability which, according to Dryzek, do not include notions of limits. And, “without the imagery of apocalypse that defines the limits discourse, there is no inbuilt radicalism to the discourse” of sustainability (pg. 14).

The last category includes discourses which are imaginative and radical. These are discourses of *green radicalism*. This category includes the discourses Dryzek labels green romanticism and green rationalism (chapters 9 and 10, respectively). Those who employ these discourses reject the basic structure of industrial society. The discourses imagine radically different understandings of the environment, human-environment interactions, and human society. These two discourses include diverse ecologically-oriented political and social movements, including social ecology, deep ecology, bioregionalism, ecofeminism, and environmental justice; some, like ecofeminism and bioregionalism, exhibit elements of both green discourses.

While Dryzek’s discourse based approach to the study of environmental conflicts and politics has some unique features, his is not the only one employing this methodology. For example, others have discussed and identified discourses in environmental (and risk) policy arenas within specific, focused case studies (Buttimer 1992, Hajer 1995, Litfin 1994, Tuler and Webler 1998). Dryzek, though, takes a broader swipe at environmental discourses that are dominant in Europe, North America, Australasia, and the global arena. This broader approach may be one reason that he does not provide an analysis of the discourses backed-up by systematic data analysis; rather he seeks “vindication only in the plausibility of the stories I tell. These stories are backed by my own twenty years of working and teaching in the environmental field” (pg. 9). This is both a benefit — for Dryzek

does have extensive experience in this area and has written extensively on environmental and political discourse — and a limitation, for this reader, because I am left wondering why his “meta-view” of environmental discourses is any more compelling than that of others.

This limitation provides a challenge. There are many questions that can and should be addressed in further research. For example: can we empirically demonstrate that these discourses are used? Are there others? How do they emerge and interact, as individuals talk in concrete interactions? How are they learned by individuals? Who uses them, and in which contexts (e.g., decision arenas, interactional settings)? Are they employed strategically? Reflectively? Are some discourses more appropriate, useful, or insightful for certain kinds of environmental policy arenas? These are only some of the questions that I am left asking. Dryzek devotes a few concluding pages to an initial discussion of some of these questions. In particular, he is interested in how the nine discourses may inform and engage each other, thus leading to “social learning,” and how they can contribute constructively to a “politics of the earth.” In this regard, we are referred to Dryzek’s extensive earlier writings on discursive designs and ecological democracy. However, it is also worthwhile to look elsewhere in response to the challenge. Human ecologists, with their interdisciplinary approaches and close attention to human and environment interactions, can help respond with even more insights.

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## **Landscape in Sight: Looking at America**

**By John Brinckerhoff Jackson**

**Edited by Helen Lefkowitz Horowitz**

**New Haven: Yale University Press, 1997**

**ISBN 0-300-07116-7**

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John Brinckerhoff Jackson, who died in 1996, was among the most innovative and influential twentieth-century scholars of American landscape. During a long and productive career in which he published nearly 200 books, essays, and reviews, Jackson helped Americans to look more carefully, critically, and constructively at the way their modifications of the physical environment both expressed and inspired important changes in their cultural values. As the founder of *Landscape* magazine (and its editor from 1951 until 1968) and as a professor of geography and landscape architecture at the University of California, Berkeley and at Harvard University, Jackson was also largely responsible for helping the discipline of cultural geography achieve the academic credibility it enjoys today.

*Landscape in Sight: Looking at America*, edited and introduced by Helen Lefkowitz Horowitz, is the most complete available collection of J.B. Jackson's work. Although seven previous books have offered excerpts of Jackson's writing, none is as ambitious and comprehensive as *Landscape in Sight*. Contained here are selections not only from Jackson's major books — including the PEN prize-winning *A Sense of Place, a Sense of Time* (1994) — but also from the essays, reviews, editorial statements, and brief commentaries he published between 1951 and 1994. In addition, Horowitz has identified and added a number of Jackson's pseudonymous and unsigned pieces, thereby giving a more complete sense of his range both as a writer and as a critic of American landscape aesthetics and land use practices. "Places for Fun and Games," Jackson's geographical and historical study of how Americans organize cultural space for various kinds of play, was written shortly before his death and is here published for the first time. *Landscape in Sight* is also handsomely illustrated with Jackson's own drawings, sketches, and photographs of American landscapes, and the volume concludes with a comprehensive bibliography of his published works.

While the inhabitation and transformation of local environments has been an obsessive interest of American intel-

lectuals since the colonial period, J.B. Jackson's legacy to scholars of place is his particular focus upon what he called the "vernacular landscape": that matrix of quotidian landscapes so long shunned by an American culture that has preferred to discuss the monumental architecture of cities or the idyllic grandeur of wilderness. Rather than celebrate the modernist austerity of a New York City office tower or the sublime beauty of a Yosemite Valley waterfall, Jackson instead takes us into the houses, yards, cars, highways, gas stations, drive-throughs, shopping malls, supermarkets, and graveyards that contain and enable our daily existence. Believing strongly that the study of these everyday familial, civic, and architectural spaces is imperative to a full understanding of how a culture comprehends and modifies its environment, Jackson frequently chastised historians, landscape architects, and urban planners for their unwillingness to study a slum or truckstop with the same attention they would devote to a cathedral or museum. If in doing so he earned a well-deserved reputation as an iconoclast, he also anticipated by several decades the legitimate scholarly interests of cultural geography and cultural studies, disciplines now vital to our understanding of the human relationship to nonhuman nature.

Several examples from *Landscape in Sight* will illustrate Jackson's characteristic approach to the study of human-modified environments. In his superb essay, "The Westward Moving House," he uses historical changes in the physical and landscape architecture of the American dwellingplace as a means to explore changes in the social structure and environmental integrity of American communities. Deftly using the techniques of the novelist to create a narrative context for his analysis (he had actually published a novel, *Saints in Summertime*, in 1938) Jackson tells the story of three generations of farmers in the fictional Tinkham family: Nehemiah, a devout Puritan who settled the wilderness of Massachusetts in the mid-seventeenth century; Pliny, an enterprising pioneer who plowed the plains of Illinois in the mid-nineteenth century; and Ray, a trained agribusinessman who farmed the fields of Texas in the mid-twentieth century. For Nehemiah, the home was viewed as a shelter, a source of economic stability, a social meetingplace, a site of education, and an anchorage for the children of Israel in the New World, and was therefore constructed with a permanence reflective of the crucial familial and cultural purposes it was intended to serve. For Nehemiah's descendent Pliny, whose family lived a more secular life on the Midwestern prairie, the home was seen primarily as a domestic center, a means of communing with nature, and a place to live until either soil exhaustion or substantial wealth prompted the family to move farther west.

By 1953, when Pliny's descendent Ray began to work his Texas farm, the home had been physically separated from the now highly mechanized agribusiness, and was devoted primarily to the linked pursuits of convenience and leisure. In each generation Jackson analyzes, he describes precisely how the evolution of American civic, religious, and economic ideology was reflected in the design of the home and the transformation of the landscape surrounding it; by placing his analysis in the engaging context of an intergenerational family history, he helps readers visualize the vital, mutually constitutive relationship between cultural ideas and physical environments.

Additional examples of Jackson's critical approach to landscape studies may be enumerated more briefly. In "Ghosts at the Door" he reads the cultural institution of the front lawn as a rich text which encodes Americans' frustrated need for genuine attachment to landscape; unlike his predecessor Henry David Thoreau, who thought the lawn a poor excuse for both art and nature, Jackson defends the value of this vernacular space, arguing that the lawn allows suburban dwellers a valuable symbolic engagement with the land while also mediating between individual interests and the aesthetic sensibility of the larger community. "The Domestication of the Garage" examines changes in American domestic values by tracing the gradual incorporation of the automobile garage into the construction and functioning of the family dwelling; once a freestanding building affordable only by the rich, and later converted to a small but practical workshop for the maintenance of the automobile, the garage has at last been transformed into a large, physically connected element of the home, and one that serves a number of important domestic functions no longer associated with the automobile. In his essay on the landscape architecture of graveyards, "From Monument to Place," Jackson demonstrates how historical changes in American attitudes toward death have been manifested in the physical organization of the cultural space of the cemetery; while early American graveyards were cited prominently and intended to remind the living of their civic and religious duties, nineteenth-century cemeteries were secluded so as to put death both out of sight and out of mind, and the economic efficiency and architectural openness of the twentieth-century "memorial park" reflects an attempt to express death as an efficient, controlled process that results in a pastoral rather than an imposing landscape.

Jackson's work is often most valuable when it is most energetically devoted to defending and explaining such commonly reviled American cultural spaces as the highway strip ("Other Directed Houses"), trailer home ("The Movable Dwelling and How it Came to America"), or truck stop ("Truck City"). By compelling us to examine vernacular landscapes Jackson insists that we look closer to home, at the

world we've created rather than the one we've imagined — that we seek to understand how our very real transformation of the immediate physical environment necessarily reflects our cultural values. In particular, he offers a powerful and salutary critique of the way environmentalists have often celebrated wilderness while hesitating to acknowledge the vitality of the human-modified landscapes in which we live our daily lives. Anticipating the social constructionist approach of environmental historians William Cronon and Richard White, Jackson argues that popular environmentalism has committed "the error which proclaims that nature is something outside of us," and he instead asks us to adopt a more culturally informed definition of landscape as "a composition of man-made or man-modified spaces to serve as infrastructure or background for our collective existence" (339, 305). As *Landscape in Sight* demonstrates, Jackson was among the first cultural geographers to reject pastoral and romantic notions of landscape in favor of an understanding of landscape as a communally negotiated space in which we live, work, and express both our hopes and our anxieties.

Helen Lefkowitz Horowitz has done an admirable job selecting and editing J.B. Jackson's work for inclusion in this collection. Her careful choices give a good sense of Jackson's contributions as a cultural critic of American environments, and her liberal use of his earlier and lesser known pieces demonstrates the developmental trajectory of his ideas over more than four decades. Horowitz's introductory essay provides helpful context for understanding Jackson's professional life and accomplishments, and her comprehensive bibliography of his published works is invaluable. Unfortunately, minor problems with the structural organization of the book occasionally obstruct the otherwise smooth presentation of materials. The seven parts into which the book is divided sometimes appear out of balance, and the pieces in the final section, "Landscape Revisions," are not clearly identified by the titles under which Jackson published them. More troubling is the inexplicable inclusion of an "Editor's Introduction" to part 5, "Taking on the Modern Movement," but to no other part of the book. Despite these structural idiosyncrasies, *Landscape in Sight: Looking at America* is a valuable contribution to the interdisciplinary study of the dynamic human relationship to place, for it demonstrates the importance of the vernacular landscape J.B. Jackson called the "concrete, three-dimensional, shared reality" binding human culture to the environment which must sustain it (302).

## Briefly Noted

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*Res publica, Res communes, Res nullius, Res privatae*

### **The Global Commons: An Introduction**

By Susan J. Buck  
Washington, D.C.: Island Press, 1998  
ISBN 1-55963-550-9

*Antarctica ... the atmosphere ... the high seas ... the deep seabed ... space* — who rules these domains? The technology to claim and value these five global areas has developed much faster than legal ways of protecting them, creating the need for a comprehensive history of their development and an analysis of their legal and political states. *The Global Commons: An Introduction* does exactly this, examining how evolving legal and political regimes have affected the management of these global commons. Susan J. Buck considers human interactions with these areas, and provides a concise yet thorough account of the history of each area. She outlines historical underpinnings of international law, examines the stakeholders involved, and discusses current policy and the related problems. Buck's approach is narrative as well as analytic, with a specific focus on giving an overall perspective of the commons and demonstrating how our actions affect their environmental status. Buck introduces the reader to the basic concepts necessary to study global commons and then offers in-depth case studies on each of the five domains. Terms, definitions, and concepts are clearly delineated throughout the text, and each chapter concludes with a suggested reading list. In each case study, the development of legal and management regimes is described, with attention given to the role of law. Buck examines the history of resource exploitation in the domain, conflicts among nations over use of the commons, efforts to institutionalize access to and use of the domains, and the management regime that has arisen. All of the historical events are examined through the tools provided by regime theory and institutional analytical frameworks, beginning with the development of the law of nations from European feudal regimes, where decisions were based on personal loyalties and mercantile considerations, to the modern era in which international law is systemized and has contracts. Buck discusses influence of national politics, scientific uncertainty and interest groups on the formation of international regimes. For each area, history provides a useful perspective on present day issues of resource management.

*The Global Commons* concludes with what can be learned from historical exploration of the global commons and suggests where the management of each of the global commons is headed.

### **Oyster Wars and the Public Trust: Property, Law, and Ecology in New Jersey History**

By Bonnie J. McCay  
Tucson, AZ: The University of Arizona Press, 1998  
ISBN 0-8165-1804-1

Public access to our national lakes, rivers, and oceans has long been considered an American birthright. Unfortunately, unlimited access to these waterways has resulted in the pollution of the waters and the depopulation of edible fish. A victim of these forces, New Jersey's oyster industry has seen a rapid decline. The competition among fishermen for access to a shrinking resource has led to a cultural and legislative discussion of public property. Exactly who owns our nation's waters? And how do we maintain and protect those waters without limiting access? The implications of such public rights litigation over the oyster beds of New Jersey extend to current debates over the Northwest timberlands and the cattle-grazed national parks of the West. In *Oyster Wars and the Public Trust*, Bonnie J. McCay takes an historical and anthropological look at the legislation of property rights in America. It is a study focused on early court cases in New Jersey that defined and delimited the public's right to exploit and enjoy its environment. It is also a story of violence. The access to such beds ensured the livelihood of many fishermen who resorted to piracy to protect their rights and when that didn't work, armed conflict and guerrilla warfare. *Oyster Wars and The Public Trust* combines history, anthropology, and law into a unique and important story of political ecology and the commercialization of nature.

## Open Letter from the President of SHE

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*“Profession-bent students should be helped to understand that in the twenty-first century the world will not be run by those who possess mere information alone. The world will henceforth be run by synthesizers, people able to put together the right information at the right time, think critically about it, and make important choices wisely.”*

Edward O. Wilson<sup>1</sup>

*Consilience: The Unity of Knowledge*, 1998, 269

I am taking the liberty in writing this letter to the members of the Society for Human Ecology (and to others who may read this page) to express a sense of growing optimism about the future of our organization and the role of our journal *Human Ecology Review* in the domain of scholarly literature. Yes — optimism in the face of opportunity and challenge.

I realize that as we become swept up in the *fin de siècle* period and the Y2K hoopla it is much more fashionable to cite a litany of political, economic, and environmental problems that were either left incomplete or insurmountable ones that we will have to *directly* confront nationally and locally into the next century. This moody perspective brings to mind Robert Kaplan’s assessment of the challenges we would face in a future global environment:

*“It is time to understand ‘the environment’ for what it is: the national-security issue of the early twenty-first century. The political and strategic impact of surging populations, spreading disease, deforestation and soil erosion, water depletion, air pollution, and possibly, rising sea levels in critical, overcrowding regions ... developments that will prompt mass migrations and in turn, incite group conflicts — will be the core foreign policy challenge from which most others will ultimately emanate, arousing the public and uniting assorted interests left over from the Cold War.”<sup>2</sup>*

While this perspective may serve as a catalyst against apathy and a “call to arms” in the political arena, it also creates an image of the figure of Atlas being handed the collective burden of the world on tired and aging shoulders. We let out an exhaustive sigh ... and wonder what possible knowledge and solutions exist that would help us to understand such complexities of human-environmental interactions into the next century. Where to begin? What are our priorities? Is there any hope that our actions will make a difference?

E.O. Wilson has suggested that *what will make a difference* in the next century are the “synthesizers” or those “people able to put together the right information at the right time, think critically about it, and make important choices wisely.” I found this insight to be not unique and novel, but rather ironic, because it matches the philosophy and on-going work of the Society for Human Ecology since 1981.

In 1985, the first international conference of the Society for Human Ecology was held at the University of Maryland and the subsequent published conference proceedings were the result of a collaborative effort among a dedicated group of professionals (e.g., Wolfgang Preiser, Guido Francescato, Richard Borden, Gerald Young, faculty and staff at College of the Atlantic, Commonwealth Human Ecology Council, and the Nordic Society for Human Ecology) who were the pioneers in initiating the scholarly activities of human ecology. In the proceedings from the 2nd International Conference (1988) Richard Borden described the three major aims for SHE in its early formative years:

*“The hope was that within ten years we would have a sufficient nucleus of people to begin to establish ourselves as an important new movement in research, education and practice. The first aim was to schedule a series of thematic meetings to draw together professionals with interdisciplinary and ecologically-based interests in the complex problems of which humans are a part. Second, we wanted to create a set of publications that could unify such a group and also clarify our purposes to interested others. And finally, we recognized the necessity of undertaking the sizable task of networking individuals and institutions around an idea that was itself just forming. In sum, the founding of SHE in 1981 was indeed a timely event. The hope on which it was based — that an interdisciplinary and international community of interest might develop in time — was wrong in one respect only. The body of interest was already there, and just in need of crystallization!”<sup>3</sup>*

As we look back over the past seventeen years, the question is posed: have we met the goals established for SHE and followed through on the hope that was expressed in the early years?

Since the proceedings of SHE II in 1988, the Society for Human Ecology has sponsored eight additional conferences, co-sponsored several international conferences, published

numerous conference proceedings, and has created an official journal (*Human Ecology Review*) that publishes interdisciplinary peer-reviewed articles on the relationship between humans and the environment. The Society for Human Ecology has also been very fortunate to have the leadership and dedication of members such as Frederick Sargent, Wolfgang Preiser, Richard Borden, Gerald Young, Suzanne Sontag, Thomas Dietz, Peter Richerson, Joanne Vining, Melville Cote, and Jonathan Taylor to build and develop in incremental steps the professional quality of our organization. We have developed into a “community of interest” and have maintained a “sufficient nucleus” of members; however, we also want to expand the community now and into the near future to include new members as well.

I have had the fortunate experience of being associated with SHE since 1986 and I have also observed the progress of SHE (“the crystallization”) toward this point in time and I sense another *timely event*: SHE is now poised for the next level of professional growth and development as we move into the next century. There are other professional organizations that we belong to, there are other groups that we wish we could be a part of if not for perennial tight budgets, but when we go to where our hearts and minds *want to be*, and if we really want to address the complexities of Kaplan’s (1994) prognosis and other related examples ..., we return to this organization — the *Society for Human Ecology*.

We are actively engaged in the “synthesizing” and we have been addressing this activity since 1981, and Jerry (Young) I do hope that the “minor heresies”<sup>4</sup> that we espouse will soon find their way into the “mainstream” because SHE has the “*people able to put together the right information at the right time, think critically about it, and make important choices wisely.*”

Three significant events within *your* organization will help to carry the momentum of our mission into the next century. One is the SHE X conference to be held May 27–30, 1999 in Montreal, Canada under the able leadership of Thom Meredith. This conference theme reflects the optimistic approach that interdisciplinary research *can* contribute to the decisions — at the local and global level — that promote human well-being and ecological sustainability. Please tell your colleagues and associates about this meeting and

encourage them to join you and participate in a professional setting where *you can make a difference*. Two, the *Human Ecology Review* will move into the next stage of professional development with Linda Kalof serving as Editor for the next three years. We have already seen the fruits of her efforts at work. And on behalf of the entire membership I wish to thank Jonathan Taylor (who has served as Editor) for his dedication and sacrifice to raise the professional standard of our journal. The *Human Ecology Review* is the official journal of your organization and it is here that we can showcase high quality peer-reviewed research and open-dialogue on subjects relevant to the relationships between humans and the environment. The third event will be the development of the Society for Human Ecology internet site in the near future. The presence of SHE on the web is long overdue and we are going to maximize this opportunity to the fullest extent. This site will provide a common networking ground for SHE members to keep current with membership activities, publications, events, announcements, and *provide an opportunity for recruiting new members*. Look for updates and the latest information on this project at SHE X in Montreal (May 1999).

If the founding of SHE in 1981 was a “timely event,” and the crystallization has taken place, it is *now time* to expand the activities of SHE into the next level. With your support, your participation and involvement, and *your hope for making a difference*, SHE is then destined to thrive and be called upon to address the challenges ahead.

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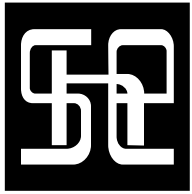
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The Society for Human Ecology (SHE) is an international interdisciplinary professional society that promotes the use of an ecological perspective in both research and application. SHE goals are to:

- Provide a forum through which scientists, scholars, educators, and practitioners may exchange ideas and information
- Promote the advancement of an ecological perspective in interdisciplinary studies and practice
- Identify problems, discover their origins, examine possible solutions and their implications, and then make recommendations for implementing those solutions
- Look ahead to the consequences of human action on our social, natural, and built environments
- Build cooperative arrangements among human ecology programs and organizations throughout the world
- Facilitate the exchange of this information throughout our international network of individuals interested in human ecology

The Society holds regular conferences, conducts workshops and symposia, and co-sponsors a variety of related activities to further integrate work among professionals in fields pertaining to human ecology. SHE is an affiliate of INTERCOL (International Association for Ecology) and IAIA (International Association for Impact Assessment) and works in a consortium with other national and regional human ecology organizations throughout the world. Members of SHE receive a subscription to *Human Ecology Review*; special purchase rates for the *International Directory of Human Ecologists* containing descriptions of the background, current work and areas of interest of human ecologists around the world; reduced rates on other selected journal publications; reduced registration fees at SHE conferences; the opportunity to join the society's special interest working groups on planning, health, modeling, theory, and education. Membership fees are \$50 for regular members, \$150 for contributing members, \$1,000 for sustaining members, and \$25 for student members. For membership information contact: Melville P. Cotè, College of the Atlantic, 105 Eden Street, Bar Harbor, ME 04609, USA.



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### **Sample References**

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