

setting. Do people tell you the same things about the two settings?

3. Look up an environmental psychology research article listed in the references. What methodology was used? How could the research be done using a different methodology?

4. Make a list of environmental problems you would like to see psychology try to solve. As this course progresses, annotate your list to include the psychological principles and research you think would be applicable to solving the problems you named.

## Nature and Human Nature

### INTRODUCTION

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## KEY TERMS

adaptation level (AL)	Environmental Quality Index (EQI)
affect	ethic
affective appraisals	homocentric, homocentrism
anthropocentric, anthropocentrism	land ethic
attitude	legibility
biophilia	mystery
biophobia	nativism
coherence	perceived control
collative stimulus properties	Perceived Environmental Quality Index (PEQI)
complexity	physical-perceptual approach
deep ecology	place attachment
descriptive approach	preservationism
diversive exploration	psychological approach
ecocentrism	resourcism
empiricism	restorative environment
environmental assessment	specific exploration
Environmental Emotional Reaction Index (EERI)	

## INTRODUCTION

Road trip! School is out, and before summer jobs begin, Danna and Andrea are setting out on a two-week vacation in the California Sierra Nevada; a sojourn to a land of calendar pictures—snow-capped peaks, dramatic glacial valleys, and roaring streams.

DANNA: "This is going to be so much fun it makes me smile just to think about it!"

ANDREA: "You bet, hanging out in the mountains with my best friend. What could be better?"

DANNA: "Yep, back to nature with Andi; I'm psyched!"

Upon their return two weeks later, much had changed. It began with their first night in the mountains. Andrea wanted to stay in an old lodge with a great view of the lake and a continental breakfast. Danna had planned on a

"leisurely" six-mile hike to a remote location as far as possible from any signs of human activity. Their compromise was to stay in an established U.S. Forest Service campground with a fire grate, picnic table, and a nearby shower facility. At breakfast Andrea leafed through advertisements for alpine slides and golf courses, while Danna tried to map out ways to avoid contact with "civilization." Later, in Yosemite National Park, Andrea was awestruck with the beauty of the glacial valley. Danna, on the other hand, could not recover from her disgust with the intrusions of humanity and human constructions into the landscape that was so dear to the wilderness advocate John Muir.

A sad ending would be the dissolution of their friendship, but this is not a sad story. What was clear was how different they were in their

expectations for the trip and in their definitions of nature and the natural. Friends they remain, but as Andrea said early in the trip, "I guess we'll just have to agree to disagree about nature."

A few years ago Stephen and Rachel Kaplan wrote a book with the intriguing title *Humanscape: Environments for People* (Kaplan & Kaplan, 1978). The book, an edited volume of readings from the 1970s, still has much to offer for those with interests in environmental psychology, but our present interest is primarily in its title. Consider it again: *Humanscape*. Ponder the word . . . , allow yourself to daydream a bit. If you were skilled enough to paint a picture of such an imaginary place, what would it look like? Perhaps the title implies a *humane* place, a place where humans live and prosper. Would it be a wilderness landscape like the nature images depicted on calendars gracing office walls? If so, (somewhat ironically) a humanscape would seem to be a place that is nearly unmodified by human activity. On the other hand, history convinces us that, at least in contemporary Europe and North America, wild landscapes are almost immediately modified when humans arrive. Perhaps the humanscape of your imagination is a place that reflects all sorts of human activity, like a farm, or even a city. Where do we belong? Our attitudes toward built, modified, or natural environments seem to reflect conflicts between positive and negative characteristics of each (see Figure 2-1). The city is a source of stimulation and opportunity, but also a place of noise, crime, and pollution. Wilderness may provide an escape from urban ills, but the price is often a loss of convenience and comfort, and a different set of dangers. Even pastoral landscapes of cultivated fields and small villages are difficult to distinguish reliably from suburbia—a place that is increasingly regarded with ambiguity (e.g., Altman & Chemers, 1980).

Many authorities report that natural land-



Figure 2-1 Attitudes toward environments reflect conflicts between positive and negative features.

scapes are preferred over urban scenes (e.g., Kaplan & Kaplan, 1982; Ulrich, 1986). But what is the definition of naturalness? Is nature found only in a true wilderness? As Wohlwill (1983) remarked, nature is at once a common intuitive category, and one that is very difficult to operationally define. He concluded that natural environments are defined more by what they are not than by what they are; that is, natural environments show few overt signs of human-caused processes. Actually, research in forest environments (Daniel & Boster, 1976; Herzog, 1984) suggests that aesthetic evaluations are sometimes higher in *managed* (i.e., human-manipulated) forests that are thinned to encourage larger diameter trees and that have less downed wood. Landscapes categorized as "natural" encompass many obviously manipulated environments such as golf courses and parks (Ulrich, 1986).

Why do we find nature attractive? It may be that natural scenes are fundamentally simpler than cityscapes and represent relief from the frenzy of city life. Perhaps natural scenes tend to create an optimal level of comfort, and this comfort may differ depending on our individual experience with either urban or

rural locations. It may be that people desire contact with the organic world because it exhibits growth and change, or because wilderness or other natural areas act as symbols of our individual value systems or culture (Wohlwill, 1983). In this chapter we will examine several perspectives on our views of nature. This

will include a look at whether our views are in part inborn or are largely influenced by experience. We will see how we form attitudes toward natural and built environments, how we assess environments, and how landscape elements influence our preferences for natural and built scenes.

## HUMAN NATURE

Before we investigate *humans in nature*, we might be wise to consider *human nature*. One issue is whether humans are part of nature, or somehow are separate from it. Consider this question: What are the characteristics of a wilderness? Many North Americans would agree with the view, codified by wilderness legislation, that wilderness exists only in places that show the absence of human activity. Is a city as wild as a campground? Is a campground with fire grates and privys as wild as a remote site with little evidence that it has ever been visited by humans? Perhaps we are left with a dichotomy of human versus wild that inevitably leads us to conclude that what is human is not wild. If so, how can we be part of nature, and if not part of nature, are we above it? The conclusion that we *are* above nature seems to have been the dominant perspective of European and North American politics since the Industrial Revolution. Perhaps it has gotten us into trouble (see Figure 2–2).

Even if humans are part of nature, what are the characteristics of our species? Even so-called primitive societies use fire, make clothing, and build shelter. It seems to be our nature to modify our surroundings. Even confirmed backpackers rely on tents, well-made boots, and other forms of technology. Again, it may be our nature that has gotten us into trouble, particularly in this century as our numbers have multiplied and our abil-

ity to use (or misuse) technology has grown. Thus we almost seem destined to an ambivalent relationship with wild areas. Perhaps they are nice places to visit, but few of us live there without making significant modifications.

One of the oldest controversies in psychology is whether human behavior comes to us fairly automatically (**nativism**) versus the view that it is highly dependent on either cognitive processes or learning (**empiricism**). The controversy extends to explanations for our feelings for natural places. Are our reactions to nature automatic and common to nearly all humans, or are they the result of our individual learning and our culture?

**Figure 2–2** Modern North American life seems to separate us from nature.



## EXPERIENCE: ATTITUDES AND ETHICS

What is your attitude toward air pollution, wilderness landscapes, or litter? If you found our question easy to answer, you must have an intuitive understanding of the term “attitude,” yet a formal definition has sometimes been elusive. Attitudes cannot be directly observed, but must be inferred from behavior, including self-reflections and reports. Most theorists would agree that **attitudes** represent a tendency to *evaluate* an entity such as an object or an idea in a positive or negative way (Eagly & Chaiken, 1993). The term “attitude” is typically used when our focus rests on the affective (emotional) reactions of an individual or class of individuals, particularly those we believe to be based on their beliefs and learning histories.

An ethic or ethical system is an even broader construct than attitude. An **ethic** represents a system of morals or standards held by a person, culture, or religion. Informally we might think of an ethic as based on a collection of related attitudes underlain by some abstract principle that gives the ethic both a generality and a moral tone that is not necessarily part of a mere collection of attitudes. As we proceed, we will discuss the changing attitudes of Americans toward nature and consider how these have led to several different value systems—or ethics—that underlie contemporary environmentalism. We will see how our attitudes and value systems change and color our relationships with the natural world.

### WHERE DO ATTITUDES AND ETHICS COME FROM?

For many years social psychologists have studied and theorized about the factors involved in attitude formation. For a much more thorough discussion of the area than we can give here, we refer you to any basic textbook in social psychology or to one of

several current reviews (e.g., Eagly & Chaiken, 1993; McGuire, 1985). Although evidence indicates that some attitudes may arise at least partly from genetic sources (e.g., Arvey et al., 1989; Keller et al., 1992) or may be triggered directly by sensory input (e.g., Zajonc, 1984), most theorists believe that attitudes are primarily learned (Baron & Byrne, 1994). Thus, attitude formation probably involves many of the principles of classical conditioning, instrumental conditioning, and social learning familiar to introductory psychology students. One important finding is that attitudes formed through direct experience are stronger than attitudes formed from observing or listening to others (Fazio et al., 1982). In environmental education, for example, direct experience would seem to be more useful than lectures, commercials, and written appeals in encouraging environmentally responsible behavior.

Of course, culture shapes our learning history, and thus, our attitudes. Culture is at least as important in influencing our broader ethical positions. American and Western European cultures are dominated by a Judeo-Christian religious heritage, enthusiasm for science, and a governmental tradition of economic capitalism. A sophisticated evaluation of these and other influences is generally beyond the scope of this text. On the other hand, the applied activities of environmental psychologists in natural environments require, at the very least, a sensitivity to the ethical differences that underlie our perceptions of natural environments and our actions toward them.

### DO ENVIRONMENTAL ATTITUDES PREDICT ENVIRONMENTAL BEHAVIOR?

We assume attitudes at least influence behavior. For example, if someone thinks that

wilderness landscapes are inviting, that person is more likely to engage in activities in wild landscapes. But how strong is the attitude-behavior link? For years, social psychologists were frustrated by findings that on the surface, at least, attitudes were not consistent with behaviors. With additional research, psychologists have begun to understand the attitude-behavior link, and (with some relief) can demonstrate that attitudes do predict a variety of social behaviors (Baron & Byrne, 1994). Perhaps an example will serve our examination of some of the complexities in linking attitudes and behavior. What do you suppose would be the result if you were to ask 50 of your friends whether unspoiled nature is (1) beautiful and (2) important? We will predict that most say that nature is both. Why then, is so much litter removed from almost every North American recreation area (Figure 2-3)?

**Figure 2-3** Parks and natural areas are, unfortunately, often despoiled by litter.



### Attitude Specificity

One answer is that specific attitudes are much better predictors of behavior than general ones. A more predictive question might have asked whether litter removal in public areas is best left to paid clean-up crews. Similarly, generally positive attitudes toward the environment may not ensure that a particular individual will consistently recycle, backpack, and avoid the overuse of garden chemicals.

### Normative Influences

According to Fishbein and his colleagues (Fishbein & Ajzen, 1975), expressed attitudes are also influenced by social norms. These norms, together with attitudes, determine behavioral intentions, which in turn predict overt behaviors. For example, it is normative today to express concern over environmental problems, although actual feelings about wildlands or pollution may not be as strong as the social norm. As a result of our attitude we may say that we intend to be environmentally conscious, and presumably, this makes us more likely to behave in environmentally sound ways. Initially, Fishbein and Ajzen (1975) expected that behavior and behavioral intentions would be nearly perfectly correlated. It is now clear that a number of variables affect our behavior directly without operating on behavioral intentions (Chaiken & Stangor, 1987). For example, Ajzen (e.g., Ajzen & Madden, 1986) adds a dimension of **perceived control** reflecting the degree to which an individual perceives obstacles that would limit his or her intended actions, or perceives that he or she has a degree of individual control over the situation (more on perceived control in Chapter 4). According to Fishbein and Ajzen (1975), a general attitude may not predict a specific behavior. Nevertheless, a multiple-item scale measuring components of an attitude can help predict a

class of behaviors. A pro-environmentalist may not keep the thermostat at 65 °F in the winter, but someone who adheres to several pro-environmental concepts probably does engage in more pro-environmental behaviors (recycling, carpooling, water conservation) than someone who is not concerned with the environment.

### Attitude Accessibility

Another research approach assumes that some sort of attitude activation is necessary before an attitude can direct behavior in a particular situation (Fazio, 1990; Fazio & Zanna, 1981; Fazio et al., 1986). According to this view, the strength of the association between an attitude and a particular attitude object or situation will determine the degree to which that attitude is activated and, thus, exert influence on behavior. This strength will vary depending upon such factors as direct experience with the attitude object and the number of times the attitude has been expressed (Baron & Byrne, 1994; Chaiken & Stangor, 1987). At the extreme, an attitude might be inaccessible or unformed in memory. It could even be that an otherwise dedicated environmentalist has never even considered the idea that trash left in an arena after a hockey game is a form of litter.

Finally, several researchers believe that attitudes actually *follow* behavior (Bem, 1971; Festinger, 1957). That is, it may be that if we first change behaviors, attitudes consistent with those behaviors will develop in order to maintain consistency between our behavior and our attitudes as we perceive them or wish them to be perceived by others. Although evidence indicates that attitudes do sometimes become more similar to actual behavior, this observation does not always hold true. Just because we are paying for pollution control devices on our cars does not mean that our attitudes toward air pollution are changing (O’Riordan, 1976). It

could be, of course, that attitudes both precede behaviors and follow from them.

The nature (if any) and strength of the relationships between environmental attitudes, ethics, and environmental behaviors are obviously very complex issues. It seems that attitudes are imperfect predictors of behavior, and that they sometimes precede behaviors and sometimes follow them. In the meantime, is it really worth the effort to try to change environmental attitudes in the direction of greater environmental consciousness? Given the consequences of continued environmentally destructive ways, we think the answer is obviously “Yes!” In Chapter 14 we will suggest some of the directions these efforts should take to reduce our use and misuse of resources.

## THE CHANGING MEANING OF NATURE IN NORTH AMERICA

In seeking to understand modern North American feelings toward nature in general, perhaps we should begin by examining the historic attitudes toward the wilderness held by Europeans (see Nash, 1982; Oelschlaeger, 1991; White, 1967, for reviews). Do the terms “gorgeous,” “inspiring,” “relaxing,” or “refreshing,” sound reasonable when describing the Alps? If so, you may be surprised to learn that in medieval Europe “terrible,” “horrible,” or even “disgusting” would be much more likely descriptors. In fact, Europeans so abhorred the wilderness that travelers sometimes insisted on being blindfolded so that they would not be confronted with the terror of untamed mountains and forests! Furthermore, European Christians inherited a biblical prejudice: The Garden of Eden was a paradise from which humanity was ejected, and the desert wilderness was the land of hardship to which humans were banished (see Nash, 1982). St. Francis of Assisi was a notable exception

who believed that wild creatures had souls and preached to them as equals. However, a rigid church government branded his views as heretical, perpetuating the dominant view of wilderness as profane (Nash, 1982).

During the period of Enlightenment, European attitudes moderated. Fueled partly by scientific discoveries, natural phenomena were seen by some as complex and marvelous manifestations of God's will. By the end of the 1600s European intellectuals were increasingly fascinated, rather than repulsed, by nature. Nevertheless, this attitude was primarily a luxury enjoyed by privileged city dwellers rather than those who were forced to contend more intimately with the dangers of untamed wild lands.

Eventually, some Europeans sailed for America seeking a land they had been told was a paradise; it was a land where Native Americans held strong spiritual values associated with nature—values usually emphasizing harmony with nature and with the spiritual power therein (e.g., McLuhan, 1971; Tuan, 1974). Most Europeans found anything but the “easy life.” Eastern North America was, of course, a wild forest before European settlers began clearing it for farming. Whatever their original attitude, early European settlers in North America found that the necessities of food, shelter, and safety depended on overcoming the new American wilderness.

The pioneer, in short, lived too close to the wilderness for appreciation. Understandably his attitude was hostile and his dominant criterion utilitarian. The *conquest* of wilderness was his major concern.

(Nash, 1982, p. 24)

Nash compared the environmental values of the Puritan settlers of New England with those held by the colonialists of the Mid-Atlantic and southern states. The Puritans

found themselves in a threatening environment of harsh winters and poor soil. The combination of this harsh environment and their conservative religious tradition led the Puritans to view the wilderness around them as a hostile, threatening landscape inhabited by servants of the devil (one of their unfortunate views of Native Americans). Thus, the Puritans saw themselves as envoys from God whose mission was to pacify the wilderness and break the power of evil. As their already poor farm land was exhausted by ill-advised farming practices, the descendants (both genetic and intellectual) of the Puritans moved westward, clearing forests and fencing prairies in an effort to conquer the vast American wilderness.

Although their principal attitude toward nature was also utilitarian, the settlers of the Middle Atlantic colonies benefited from a more hospitable environment and expressed somewhat different attitudes (Nash, 1982). Many were of the Anglican faith, and most were better educated, wealthier, and more likely to study and appreciate natural phenomena than were the Puritans of New England. Virginian Thomas Jefferson may have epitomized the attitudes of the late eighteenth-century gentleman-naturalist (Figure 2-4). He believed that nature could be better managed through understanding rather than conquest (Altman & Chemers, 1980). Under this premise, President Thomas Jefferson charged the Lewis and Clark expedition of 1803 with providing detailed reports of natural phenomena. In spite of his more benign attitude toward nature, the gentleman-naturalist still most appreciated pastoral vistas and rural landscapes of farms and country lanes, not the true wilderness. Yet in Jefferson, and those like him, we can see the beginnings of an attitude of conservation and curiosity rather than exploitation and loathing for nature and wild things.

It may have taken the development of Romanticism in Europe in the eighteenth,

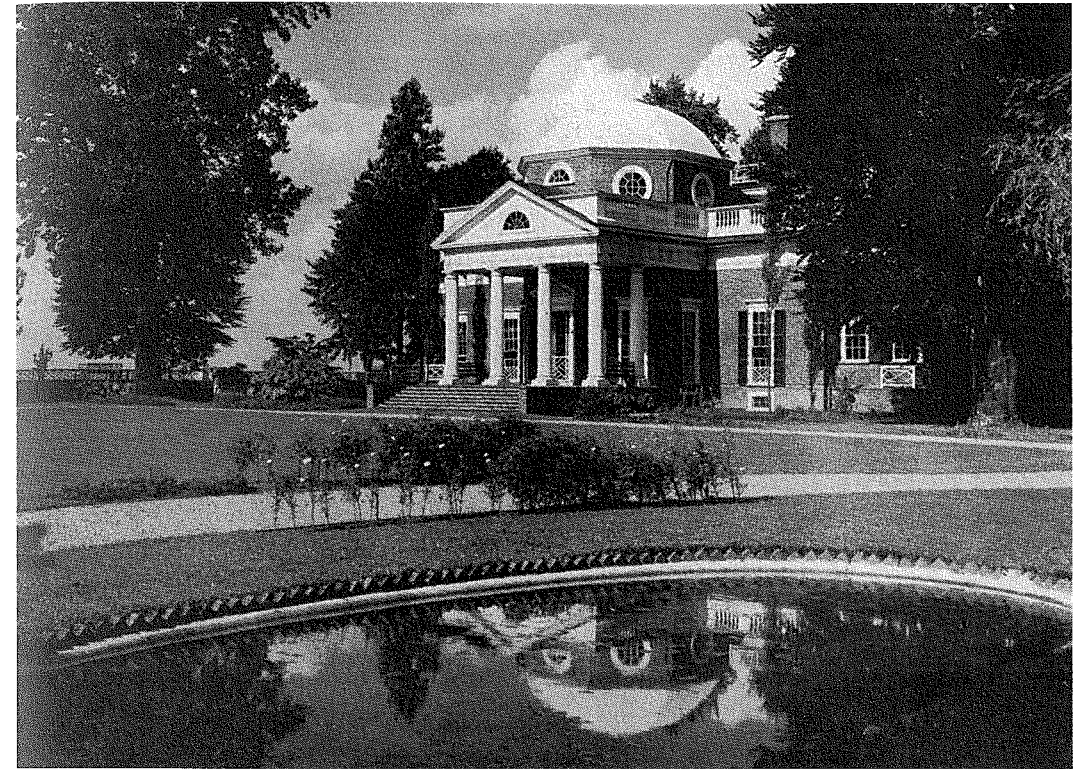


Figure 2-4 Thomas Jefferson's landscape at Monticello.

and early nineteenth centuries to persuade Americans to look at the true wilderness with pleasure rather than disdain. The Romantic tradition grew largely from an urban literary elite who found themselves attracted to the contrasting rugged vastness of wilderness. Wilderness was the inspiration for the evolving concept of the sublime: a sense of awe and reverence, sometimes mixed with elements of fear (e.g., Burke, 1757; Kant, 1790). America did not have the cultural traditions, material wealth, or power of the Europeans, but size and diversity of wilderness lands was one domain in which the New World could compare favorably with the older cultures (Nash, 1982). In the decades following the American Revolution, the wilderness became a source of national pride with at least a grow-

ing minority of Americans. Soon American writers like James Fenimore Cooper and painters like Thomas Cole and Albert Bierstadt (see Figure 2-5) began to celebrate and romanticize the vistas of the great untamed lands of North America. Those who celebrated wild lands were still a small minority compared with those who viewed them with hostility, but we can see, at least for some, the establishment of the wilderness as a place of beauty.

Clearly, North American attitudes toward wilderness landscapes have changed since the colonial period (Merchant, 1992; Nash, 1982; Oelschlaeger, 1991; White, 1967). Still, for Americans near the end of the twentieth century, reactions to the wilderness often remain ambivalent. We are



Figure 2-5 Albert Bierstadt's *Looking Up the Yosemite Valley*.

increasingly urban (see Chapter 10 for a discussion of some of the psychological implications of city life). We are also disproportionate users of technology and heavy consumers of natural resources and energy. Indeed, in Chapter 11 we will highlight various attempts to use architecture and design to modify environments for the benefit of humans. On the other hand there is a literary, artistic, and philosophical tradition that associates the wilderness with beauty and even religious experiences. An appreciation of wild lands is one legacy of leaders like Thomas Jefferson and artists like Thomas Cole. Late nineteenth-century writers like Henry David Thoreau and John Muir established a literary and philosophical tradition more recently articulated by modern environmentalists like Edward Abbey, Annie Dillard, Wendall Berry, Aldo Leopold, and Wallace Stegner. These North American authors are by no means the first to appreciate

nature, of course. Although their influences on North American attitudes are less apparent, the importance of both nature and culture are at least as well demonstrated by Chinese and Japanese painters who preceded Western artists in celebrating wilderness landscapes by more than a thousand years (Nash, 1982). Certainly the petroglyphs, totem poles, and oral history of Native American peoples are testimony to their appreciation of nature long before Europeans arrived in North America.

#### CONTEMPORARY WORLD VIEWS: THE ROLE OF HUMANS IN NATURE

Perhaps wild lands will always inspire both fear and appreciation. Even restricting ourselves to twentieth-century European and North American history, it seems clear that the appreciation of nature is heavily influenced by culture and fashion (e.g., Duncan,

1973; Hecht, 1975). If attitudes are so transitory, is there any reason to make the ethical leap to suggest that any particular relationship with nature is "best"? Although many psychologists might prefer to avoid such value-laden questions, the applied nature of environmental psychology makes it difficult for us to maintain such reserve. Briefly, one reason (which we will elaborate shortly) is because there is biological evidence that contact with certain natural landscapes can have restorative effects on modern humans. More in line with our present discussion, however, is the conviction that our planet is facing a global ecological crisis and that our survival depends on our ability to change human behavior NOW! Much of Chapter 14 is devoted to examining ways in which psychology can promote environmentally sensitive changes in individual behaviors and attitudes. For our present discussion we will take a more global approach. We wish to better un-

derstand differing ethical views of our relationship with nature and the wilderness.

We might begin at the end of the nineteenth century with a convergence between the appreciation of nature sparked by Romanticism and the new realization that humans were part of an interconnected web of life, a view fostered by Darwin's *Origin of Species* (1859). Americans began to realize that the supply of natural resources was finite. Under President Theodore Roosevelt's leadership, the federal government began efforts to manage natural resources to *conserve* them for human use. According to Oelschlaeger (1991), this became entrenched as **resourcism** (resource conservation), which remains the dominant American perspective on natural lands. Notice the **homocentric** or **anthropocentric** assumption (see Figure 2-6) of this view that natural landscapes are stockpiles of raw material to be transformed into the wants and needs of *humans*

Figure 2-6 Can natural landscapes be "managed" as measurable (economic) commodities?



(Merchant, 1992; Oelschlaeger, 1991). A resource manager's job is to use rational means such as scientific discoveries to maximize the output of natural resources for human use.

**Preservationism** is a less common, but still influential view that differs from resource conservation in emphasizing a holistic view of nature that assumes that an intact ecosystem is greater than the sum of its parts. An ecosystem has evolved into a complex system of interdependent parts, and changes to any one of these may have devastating effects on any of the others. Thus, preservationists value programs that maintain intact ecosystems such as wilderness areas. According to Oelschlaeger, preservationism rejects a strictly economic approach to valuing nature in favor of species diversity, rarity, or beauty. Nevertheless, critics charge that preservationists retain an essentially anthropocentric world view in their advocacy of preservation of intact ecosystems. For example, you may have heard the argument that we should preserve tropical rainforests in order to avoid unwittingly destroying some plant or animal with as yet undiscovered uses, such as a cure for cancer. Without belittling the goal, we must point out that this argument still assumes the anthropocentric goal of managing nature for the benefit of humans.

Finally, **ecocentrism** maintains that natural ecosystems possess value in their own right, independent of their value to humans. Humans have no special standing, and ethical human actions will be those that promote all life on earth. Aldo Leopold's (1949) **land ethic** is the best known example of an ecocentric world view.

In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land community to plain member and citizen of it.

(Leopold, 1949, p. 204)

Leopold's land ethic is remarkable in its simplicity. Unlike the sometimes piecemeal aggregation of specific attitudes that may or may not result in consistently pro-environmental behaviors, adoption of a land ethic (if successful) could result in a complete restructuring of a person's or a culture's values in an ecocentric direction.

You may also have heard of the increasingly popular term **deep ecology** which is a form of ecocentrism that emphasizes a critique of modern technology, science, and political structures. Many deep ecologists would assert that we have arrived at a global crisis because our culture is dominated by a mechanistic world view that is perpetuated by science and adapted to serve the domination of capitalism (e.g., Merchant, 1992). If they are correct, humankind endangers the natural world, so we must promote socio-cultural change.

A recent movement which attempts to rectify damage humans have caused to natural environments is termed *green justice* or *environmental justice*. Adherents of this movement seek a balance of the interests of nature and ecology over mere anthropocentric interests. The interested reader is referred to the Fall 1994 *Journal of Social Issues*, which is devoted entirely to the topic.

We have moved quite far from the traditional posture of psychology to at least attempt to remain objective and "value free," yet we maintain that a familiarity with contemporary environmental thought is both instructive and necessary for an understanding of our culture's view of nature. We are left with a question: Is the appreciation of wilderness (and nature in general) *entirely* culturally determined? Many would say "yes" or "nearly so." Yet recent evidence from biology and biological psychology suggests that natural environments may affect us in a more direct way that is less filtered by culture and learning.

## BIOLOGICAL INFLUENCES: BIOPHOBIA AND BIOPHILIA

In 1984, Edward O. Wilson used the term **biophilia** to describe what he believed to be a human need for contact with nature. According to Wilson, this need is a modern manifestation of a genetic predisposition to be attracted to other living organisms. Steeped in evolutionary theory, this view emphasizes that human history did not begin in the relatively short period of the last ten thousand years for which we have evidence of settlements and agriculture. If the history of our species is short, the history of civilization is much shorter still—perhaps only the most recent 1 percent of human history (Altman & Chemers, 1980; Wilson, 1993). Thus, Wilson asserts that humans are a species whose bodies, and especially whose brains, evolved in an environment dominated by the need to survive in nature. It would be surprising if the influence of these earlier environments has already vanished in the short time since the advent of urban environments. Psychologically, humans may behave in accordance with functional-evolutionary principles (e.g., Kaplan & Kaplan, 1982; Ulrich, 1979, 1981, 1983, 1993); that is, the function of much of human behavior is to further our chances of survival and is guided by inherited behavioral tendencies acquired by our species through evolution. What causes us to behave in a functional manner? Such behaviors in humans, like in other animals, are presumably based not on some rational evaluation of a situation, but instead, on a predisposition to *like* environments in which we are prepared to function well.

### BIOPHOBIA

One of the strongest arguments for biophilia is presented by its converse, **biophobia** (Ul-

rich, 1993). Biophobia might be understood as an example of prepared learning (Seligman, 1970). Prepared learning refers to a propensity to learn quickly and to retain aversions to certain objects and situations that have threatened humans throughout evolution. Although modern technology has minimized the dangers of encounters with spiders or snakes, a propensity to quickly learn or to retain learned fears might persist in the gene pool. Research generally supports this proposition for humans and other primates (Cook & Mineka, 1989, 1990; Kendler et al., 1992; McNally, 1987; Ulrich, 1993), especially the proposal that learned fears of certain biophobic objects or situations will be resistant to extinction.

Not all humans fear spiders or snakes, and relatively few of the individuals who do have themselves been bitten. According to Ulrich (1993), whether particular individuals develop these fears will depend on their own experiences or on those of people around them. Fear may never be learned if the object is never encountered. On the other hand, there is ample evidence that humans can learn vicariously; that is, by observing the reactions of others. Thus, one of the important functions of human culture and communication may be to allow individuals to learn of natural dangers without themselves being endangered.

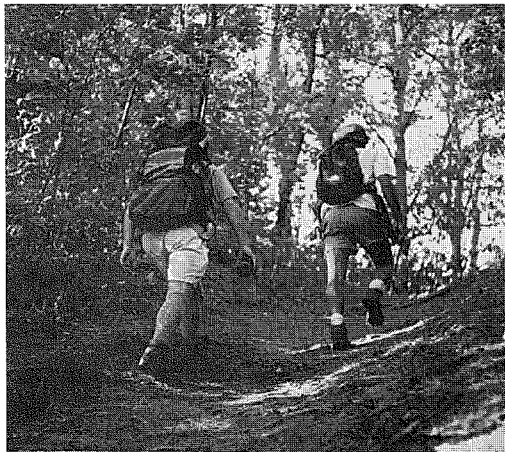
### BIOPHILIA

The positive effects of biophilia are not as well documented as their phobic converses, and research on these effects most commonly targets reactions to natural physical environments rather than to animals (Ulrich, 1993). The general argument for biophilia is similar to its phobic counterpart: Because our

species evolved in a natural environment, we may have a biologically prepared readiness to learn and to retain positive responses to certain aspects of nature. Ulrich proposes three potential responses to biophilic nature: attention/approach/liking; physical and psychological restoration; and enhanced cognitive performance. Evidence for the final category remains limited, and we will delay our examination of positive or liking responses for our general discussion of landscape aesthetics.

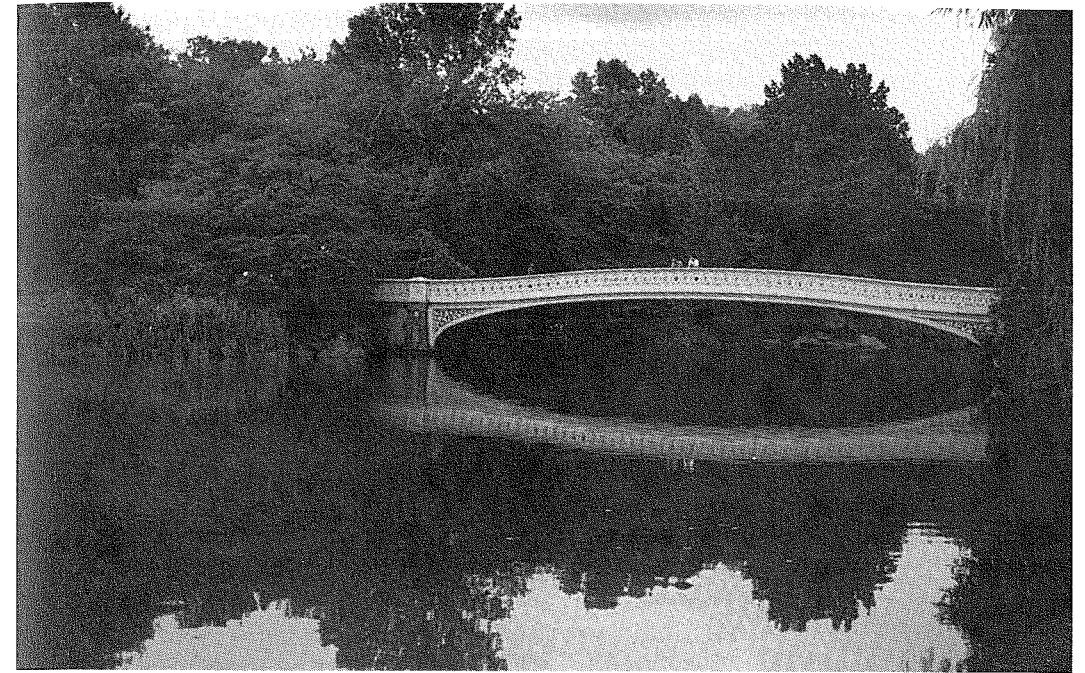
Some of the most direct support for biophilia comes from studies showing that contacts with certain types of nature create what are called *restorative responses*; settings which foster these responses are termed **restorative environments** (see Figure 2-7). Perhaps life has included high levels of stress in all eras of human existence. Whether the source is a dangerous predator or the pressure of a deadline, humans always seem to pay a price for their stressful existence (see Chapter 4). Countering this stress, restorative responses may include reduced physiological stress, reduced aggression, and a

**Figure 2-7** Perhaps natural environments can help to restore physical and psychological health.



restoration of energy and health. According to the functional-evolutionary perspective, humans should have a biologically prepared affiliation for certain restorative natural settings, but no such prepared response to urban environments since these have generally affected only a few generations of human experience.

Whatever the reason for our affinity to natural elements, evidence shows that natural scenes may possess restorative powers. For example, Ulrich (1979) demonstrated that viewing a series of nature scenes could lessen the effects of the stress induced by a college course examination. A subsequent study (Ulrich, 1984) compared the postsurgical recovery rates for hospitalized patients whose rooms overlooked either a small stand of trees or a brown brick wall. Those with the more natural view had fewer postsurgical complications, faster recovery times, and required fewer painkillers. Other studies suggest that exposure to natural scenes can reduce presurgical tension and anxiety (Ulrich, 1986). One recent study is particularly instructive (Ulrich et al., 1991). The study investigated the effects of viewing videotapes of natural or urban scenes during a short recovery period following a stressful video. The stress-inducing video, a 10-minute black and white film which was originally intended to reduce industrial accidents, depicted simulated blood and mutilation. After viewing the film, participants watched one of six 10-minute color videos of everyday nature or urban scenes. Viewing scenes of water or a parklike setting not only resulted in more positive feelings, but was also associated with lower levels of several measures of stressful arousal (including blood pressure, skin conductance, and muscle tension; see Figure 2-8). Unlike nature-dominated videos, urban scenes failed to show stress recovery effects. Perhaps most interestingly, both the stress-inducing movie and the nature video



**Figure 2-8** Scenes of water or parklike settings are associated with lower levels of stressful arousal.

were associated with cardiac deceleration (a response that is characteristic of heightened attention), whereas the urban scenes were not. According to Ulrich, the results are consistent with the hypothesis that attention-holding properties of scenes can work two ways. As a component of dangerous encounters with nature, attention may be paired with stress, whereas attention to other natural environments may result in calmative, restorative physiological effects.

We have highlighted two extreme viewpoints regarding the role of nature in the lives of modern humans. Even our limited excursion into Western European and American attitudes has provided ample evidence that nature plays a unique role in different societies, demonstrating the importance of learning and culture. On the other hand, the biological view emphasizes commonalities across cultures based on our

shared biological heritage as *Homo sapiens*. Of course, it seems likely that human reactions to nature involve both biology and learning. No matter what the underlying source, the research on physiological reactions to natural scenes makes it clear that the effects of natural environments are anything but trivial. Of course the term "natural" might be used to refer to anything from the deepest wilderness to an isolated tree in the middle of a brick plaza. In Chapter 10 we present a limited examination of natural elements such as parks and playgrounds in urban environments, and in Chapter 13 we will consider management of public lands to facilitate outdoor recreation. For the balance of this chapter, however, we will review some of the contributions of environmental psychology to the assessment of the quality and attractiveness of natural and constructed landscapes.



## ENVIRONMENTAL ASSESSMENT

### QUALITY ASSESSMENTS

**Environmental assessment** broadly encompasses efforts to describe environments or their components (Craik & Feimer, 1987). In the United States, for example, the National Environmental Policy Act of 1969 (NEPA) has been one factor stimulating the development of programs to assess environmental dimensions such as air and water quality. Monitoring these and other characteristics of environments can assist in documenting the effects of historic environmental changes and in predicting the future impacts of proposed projects.

#### Indices of Environmental Quality

Using modern technology, we can assess pollution levels, noise levels, property deterioration, and other directly measurable aspects of the environment. Such measures can be incorporated into an objective indicator or **Environmental Quality Index (EQI)**. Although these indices themselves are presumably objective physical measures, the term "quality" implies a subjective evaluation. For example, the concentration of a known chemical toxin considered acceptable by one person or organization may be quite different from that acceptable to another. These differences of opinion reflect contrasting attitudes based on the beliefs or feelings that reflect our individual learning and background.

In some instances the goal of assessment is not to determine the presence or level of some physical constituent of environmental quality but rather the perceived environmental quality as estimated by a human observer. This assessment method may not require sophisticated technology, although it does require careful attention to psychological measurement techniques. Typically, some

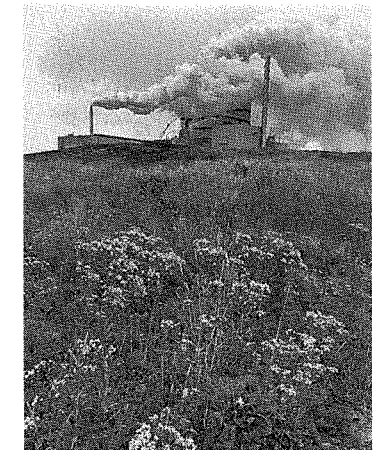
sort of self-report scale asking for subjective assessment of the environmental quality is employed, and results in a **Perceived Environmental Quality Index (PEQI)** (Craik & Zube, 1976). The PEQI (pronounced PEE-kwee) is designed to serve a number of assessment purposes. As a measure of average responses of an affected population it may be one component of environmental impact statements or provide baseline data for evaluating environmental intervention programs. It also facilitates comparison of trends in the same environment over time, comparison of different environments at the same time, and detection of aspects of the environment that observers use in assessing quality. A somewhat different analysis may demonstrate individual or group differences in environmental perception. Currently, PEQIs exist for assessing air, water, and noise pollution, residential quality, landscapes, scenic resources, outdoor recreation facilities, transportation systems, and institutional or work environments (Craik & Feimer, 1987; Craik & Zube, 1976).

PEQIs provide an estimate of the perceived presence of environmental qualities, but not our feelings or emotional reactions to them (Craik & Feimer, 1987; Ward & Russell, 1981). Instead, **Environmental Emotional Reaction Indices (EERIs)** assess emotional responses such as annoyance or pleasure (e.g., Russell & Lanius, 1984; Russell & Pratt, 1980; Russell, Ward, & Pratt, 1981). Thus, the absolute measured level of sound might be reflected in an EQI, the human perception of this sound in the environment would result in a PEQI, and the emotional reactions engendered by these perceptions would be best characterized by an EERI. These indices may yield very different results. For example, a moderate level of sound might prompt an extremely negative

### AN EXAMPLE OF ENVIRONMENTAL ASSESSMENT: Visibility and the Perception of Air Pollution

As we will see in Chapter 7, air pollution has a number of negative effects on human health. One additional concern that has received increased attention is the need to protect visual air quality (e.g., Stewart, 1987; Stewart et al., 1983). In the United States, the National Park Service, the U.S. Forest Service, and others are concerned about the impact of air pollution on the scenic vistas in parks and wilderness areas (Figure 2-9). As part of the amended Clean Air Act of 1977, the United States Congress sought to protect and even enhance the visual air quality (defined as the absence of discoloration or human-caused haze) of many pristine areas.

The federal land manager is charged with the complex problem of determining whether a given change in visual air quality will have an impact on visitor enjoyment. Since visual air quality is based on human perceptions and emotional reactions, measures of this phenomenon must be based on or validated against human responses (Craik, 1983; Stewart et al., 1983). Two critical issues parallel the distinction we have drawn between PEQIs and EERIs. First it is necessary to determine how much of an increase in haze is required to cause a perceptible change in the environment. In addition to the concentration and composition of pollution, the detectability of haze is dependent on factors such as color, whether it is layered in a band (layered haze does not occur naturally), and the angle of the sun. However, according to the Clean Air Act legislation, demonstrating that haze is detectable is not enough. The second critical issue is to determine whether haze, even if it is detectable, significantly changes a visitor's experience. As you might expect, different individuals and different organizations disagree on the definition of "significant."



**Figure 2-9** Impact of air pollution on scenic vistas

emotional reaction if the respondent wished quiet for study, but high levels might enliven a party (the box on this page discusses some of the issues in assessing air quality, just one example of the distinction between different types of environmental assessment).

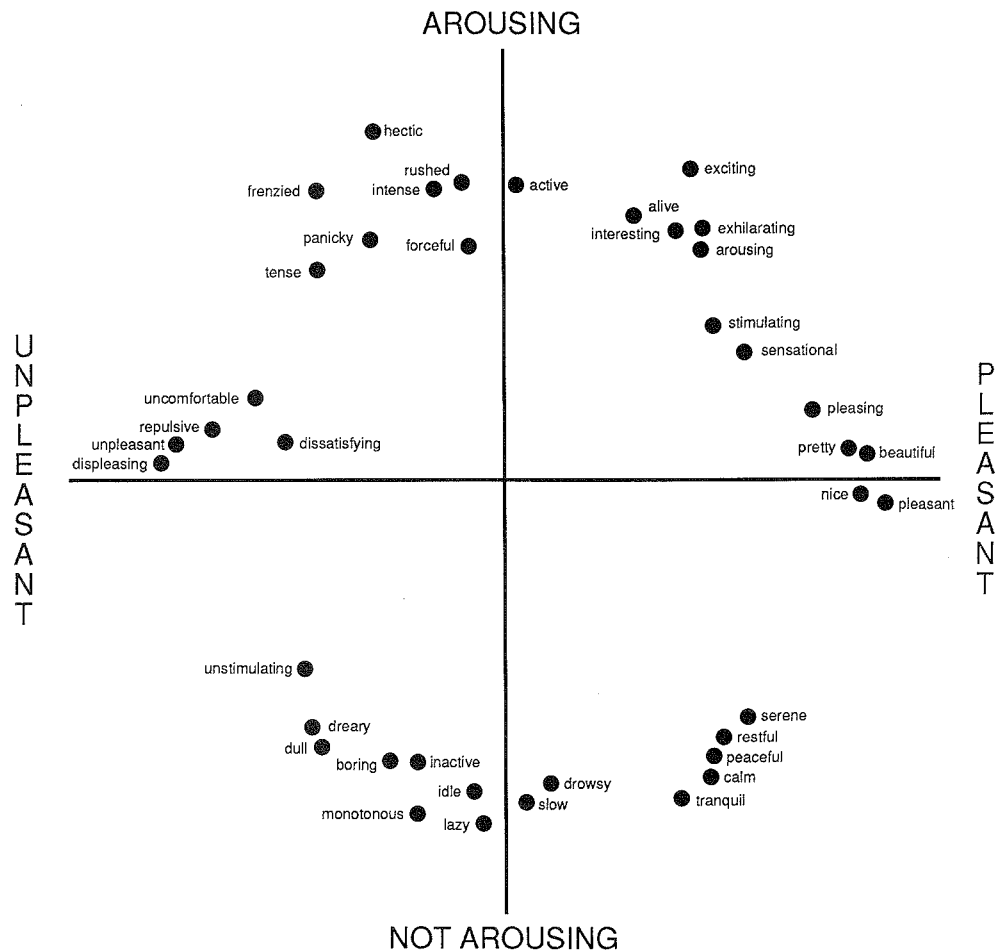
#### Affective Appraisals

Just what are the emotional reactions to environments? Russell and Snodgrass (1987) observe that definitions of emotions (often referred to by psychologists as **affect**) are

ambiguous. Emotional reactions may be relatively long-term tendencies to feel love toward some individual, or short-term affective states. In the present discussion, we will focus on **affective appraisals**, which are emotions directed toward something in the environment. How many terms could be used to create an EEQI describing the affective quality of a place? We can think of

dozens, perhaps hundreds, but Russell and his colleagues (e.g., Russell & Lanius, 1984) have developed a circular ordering of 40 descriptors of places (see Figure 2-10) that include many commonly used emotional terms. Notice that these adjectives can be represented as a circular array in a space defined by two underlying bipolar dimensions. The horizontal axis ranges from un-

**Figure 2-10** According to the Russell and Lanius model of the affective quality of places, emotional reactions to environments can be described by their relative position on unpleasant-pleasant and arousing-not arousing continua. Note that we have few words for emotional neutrality. Adapted from Russell, J. A., and Lanius, U. F., 1984. *Adaptation level and the affective appraisal of environments*. *Journal of Environmental Psychology*, 4, 119-135.



pleasant to pleasant, and the vertical axis ranges from sleepy to arousing. To pick two examples, the model implies that a serene environment should be pleasant, but somewhat unarousing, whereas a frenzied environment is both arousing and unpleasant.

How might we account for the fact that in using the same psychological dimensions for evaluating identical environments, individuals often differ in their preferences? One answer lies in the concept of **adaptation level** (Helson, 1964; Wohlwill, 1974). We will describe the concept of adaptation level in more detail in Chapter 4, but for now we can think of *adaptation* as "getting used to" a component of an environment and *adaptation level* as our preferred level of stimulation from that component. Individuals may have different levels of preference for complexity, causing the objectively measurable level of complexity in one scene to be too low for one individual, but too high for another. In other words, experience may lead different individuals to prefer different levels of complexity. Wohlwill refers to an individual's optimum level on any one dimension as his or

her adaptation level, and deviations from that optimum lead us to change things (e.g., through arousal reduction or sensation seeking). Russell and Lanius (1984) provide an interesting example of the effects of adaptation on emotional appraisals of landscape scenes. Recall the model of affective appraisal of environments presented earlier in which emotional reactions could be described by a model composed of two independent dimensions, pleasure and arousal (Russell & Snodgrass, 1987). Russell and Lanius (1984) found that exposure to a slide of known emotional appraisal (say, gloomy and unarousing) would be associated with a tendency to evaluate a subsequent target scene in a direction emotionally away from the first stimulus (in our example, toward exciting and less gloomy). Stated simply, adaptation to one landscape is likely to bias affective evaluations of subsequent scenes in a predictable fashion. In Chapter 4 we will see how adaptation level can be used to explain not only individual differences in environmental evaluation but also individual differences in responses to environmental stimulation.

### THE SCENIC ENVIRONMENT: LANDSCAPE AESTHETICS AND PREFERENCE

Picture what you consider to be a beautiful landscape. Is your imaginary scene one of snow-capped peaks? A rocky seashore? Perhaps a pastoral scene of rolling hills, covered wooden bridges, and rustic fences? Do you think the scene you are imagining is much like that imagined by people the world over when responding to the same question, or are there differences between individuals and cultures? What can we learn about humans as a species from their landscape preferences? Theoretical questions like these have attracted the attention of a number of environmental psychologists and other be-

havioral scientists (see Daniel & Vining, 1983; Kaplan, 1987, 1989; Kaplan & Kaplan, 1989; Ulrich, 1986; Zube, Sell, & Taylor, 1982, for reviews).

A primary impetus for investigations of landscape aesthetics was provided by governmental legislation of the 1960s and 1970s that required the inventory and preservation of scenic resources (Zube et al., 1982). As an example, suppose we are building a new road to a remote forest recreation area. We want the new roadway to provide access and attractive vistas; but we do not want it to become an unpleasant intrusion for either the

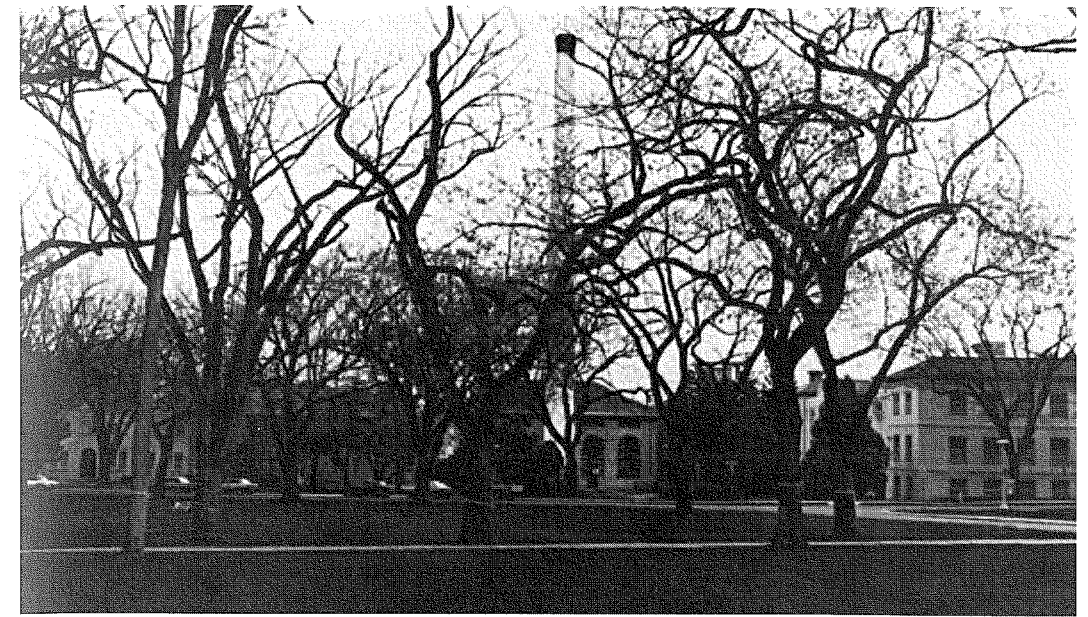
motorists or for hikers and campers in the recreation area. How do we provide access and maintain scenic quality?

#### THE DESCRIPTIVE APPROACH: USING EXPERIENCE AND ARTISTIC JUDGMENT

Not surprisingly, many of the most widely applied principles for landscape assessment and management evolved from the design tradition of landscape architecture. This approach, which we call the **descriptive approach**, emphasizes design principles derived from experience and artistic judgment. In particular, vast areas of public lands such as national parks, national forests, and national wilderness areas have been assessed using descriptive landscape inventory, an ap-

proach derived from the writings of Burton Litton (1972). The basic elements of perception are said to be line, form, color, and texture. Patterns of these dominance elements and contrasts created by these patterns are thought to be organized by the viewer's perceptual system, causing a focus of attention on a particular component of a landscape vista. For example, two nearly parallel lines form an axial landscape which focuses one's attention at the distant point where the lines seem to converge (see Figure 2-11). Similarly, contrasts in lines, forms, colors or textures are likely to draw attention (Figure 2-12). This description is not inconsistent with the more empirically derived perceptual data. In Chapter 3 we will see that the human visual processing system is specialized for the detection of contrasts

**Figure 2-11** In an axial landscape such as this photograph of the Mall in Washington, D.C., attention is drawn by converging lines on a focal point, in this instance, the Washington Monument.



**Figure 2-12** Contrasts in lines, forms, colors, and textures are likely to draw attention.

and is particularly "hard-wired" to detect certain simple lines or shapes (e.g., Goldstein, 1989; Heft, 1983; Hubel & Wiesel, 1979) and to seek a focal point or other source of organization (Ulrich, 1979).

Given that these principles help to determine what will receive attention, what determines whether the scene is evaluated as pleasant or unpleasant? In general, experts surmise that natural landscape components are preferred to those that are the result of human activity. For example, natural scenes in which contrast is high often receive positive evaluations. The contrast of snow-capped mountain peaks with the green valleys at their feet probably heightens their visual appeal. Similarly, many of the scenic areas of the American Southwest are particularly striking because they showcase the brilliant hues of desert sandstone. On the other hand, one would probably wish to minimize contrasts that draw attention to utility lines, mines, and commercial establishments. Again, we have introduced empirical data

supporting the importance of nature in human responses to landscapes (e.g., Heerwagen & Orians, 1993; Kaplan & Kaplan, 1989; Ulrich, 1993).

It seems safe to assume that landscape architects and other natural resource specialists are among the most sensitive and knowledgeable observers of landscapes, but their design training may have also led them to perceive landscapes in ways that differ from the general public's (Kaplan & Kaplan, 1989). In relying on the artistic tradition, the descriptive approach may also be deficient in terms of formal demonstrations of reliability and validity (Daniel & Vining, 1983; Kaplan & Kaplan, 1989; Ulrich, 1986). For the past two decades, interest has increasingly focused on supplementing expert opinions with preference models based on the responses of recreationists and other users (Ulrich, 1986). Enter psychologists and other behavioral scientists. In the United States, for instance, some of the most consistent support for behavioral research has been

provided by the U.S. Department of Agriculture's Forest Service (Kaplan & Kaplan, 1989; Ulrich, 1993). How might behavioral scientists differ from design professionals addressing issues of landscape aesthetics? The term "scientist" suggests that method is the source of one difference. Although we have made it clear that environmental psychologists are quite eclectic in their methodology, most would gravitate to an *empirical* approach emphasizing objective observations of individual users rather than design professionals. In addition, we can assume that psychologists are likely to be most interested in investigating psychological variables: behaviors or mental events that reveal the environment as it is filtered and focused by perception (see Chapter 3). As you might have predicted, psychologists have contributed both

methods and psychologically-based variables to the literature of landscape assessment.

#### PHYSICAL-PERCEPTUAL APPROACHES TO SCENIC EVALUATION

One of the most direct extensions of psychological methodology is represented by what we will call the **physical-perceptual approach**. These strategies emphasize characteristics of the physical environment that can be related statistically to judgments of preference or landscape quality. Naturalness and the presence of water or vegetation are examples of physical landscape characteristics that might be used to predict negative or positive evaluations of scenic quality (see Figure 2-13). In an early study, Shafer, Hamilton, and Schmidt (1969) assessed the

preferences of individuals for landscapes in the Adirondack Mountains of New York State and found that preferences were associated with such factors as the area of immediate vegetation multiplied by the area of distant vegetation, vegetation multiplied by the area of water, and so on. In another study, Zube, Pitt, and Anderson (1974) studied scenes of the Connecticut River Valley and found that scenic quality was related to such components as land-use compatibility, absolute relative relief (i.e., differences in height, such as from valley to mountain top or canyon rim to the valley floor), height contrast, and density of edges of bodies of water. Other features that have been found to be important include debris in stream beds, width and height of a stream valley, and stream velocity (Pitt, 1976), as well as natural water area, ruggedness, naturalism (Palmer & Zube, 1976), and forest management practices (Daniel & Boster, 1976).

Vining, Daniel, and Schroeder (1984) have extended the same basic model to forested residential landscapes. Presumably, identification of manageable characteristics that are likely to be perceived as unsightly (as may be the case in our example of building a new roadway) may help to avoid conflicts in areas of high visibility or quality. Similarly, Im (1984) applied the physical-perceptual approach to study the relationship between landscape characteristics and visual preferences in the enclosed environment of a college campus. In this instance, visual preferences were most positively affected by the slope of the ground and tree canopy or vegetation coverage, whereas the height ratio (described as the height of the landscaped "walls" in the scene) was negatively related to preference.

The physical-perceptual approach is empirically based, and more in keeping with the traditions of behavioral science than art or professional practice. This approach has probably received the most extensive evalua-

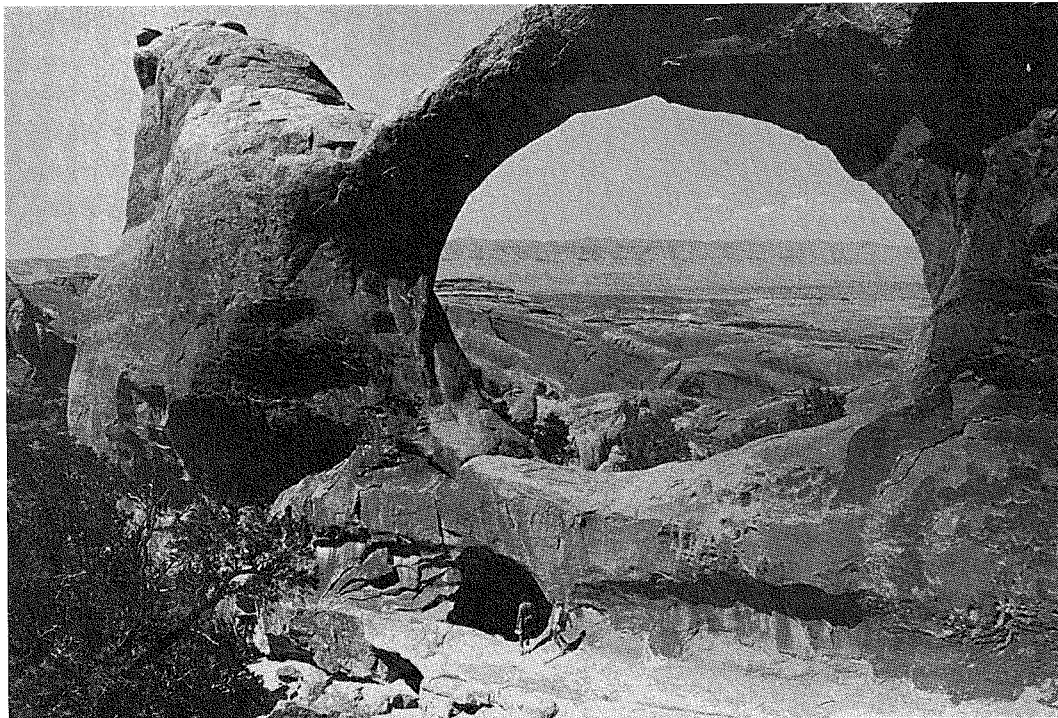
tion (Daniel & Vining, 1983), partly because these researchers are quite unambiguous in specifying measurable characteristics of the physical landscape as predictors of scenic quality. Overall, their statistical models do a very respectable job of predicting assessments of scenes (Daniel & Schroeder, 1979; Daniel & Vining, 1983; Pitt & Zube, 1979) and have been frequently applied by resource managers, though rarely by designers (Im, 1984).

A shortcoming of the physical-perceptual approach is that the predictors it generates do not always make intuitive or theoretical sense (S. Kaplan, 1975; Ulrich, 1986.) This criticism is not terminal (who says reality has to be easily understood?), but the predictive equations developed in one setting may only be appropriate for a specific type of landscape. Although the model is attractive because it emphasizes objective characteristics of the environment, psychologists are also intrigued by the possibility that more purely psychological variables might arrive at constructs that are more easily applied to human experience.

#### PSYCHOLOGICAL VARIABLES IN LANDSCAPE ASSESSMENT

Our emphasis will now move from quantification of physical features of the environment to an examination of psychological or cognitive processes that underlie aesthetic judgments. In this **psychological approach**, predictors such as complexity and coherence are typical, and these variables are primarily located in human perception and cognition rather than the objective landscape. Physical measures of complexity or similar psychological predictors in a scene are difficult to obtain, so measures of these factors must usually be obtained from subjective judgments. In a typical procedure, a panel of judges evaluates scenes on dimensions such as complexity, ambiguity, spaciousness, or uniqueness,

Figure 2-13 Physical landscape characteristics may predict evaluation of scenic quality.



and then the same or another panel judges the quality or beauty of the scene.

### Berlyne's Aesthetics: Formalizing Beauty

Berlyne (1960, 1974) was among the very first modern psychologists to develop a general model of aesthetics—a model that has more recently been applied to questions of environmental aesthetics (e.g., Mehrabian & Russell, 1974; Wohlwill, 1976a). Two concepts central to Berlyne's notions of aesthetics are *collative stimulus properties* and the dynamics of *specific exploration* versus *diversive exploration*. **Collative stimulus properties** elicit comparative or investigatory responses. That is, they involve some sort of perceptual conflict that causes us to compare the collative stimulus with other present or past stimuli in order to resolve the conflict. Included among Berlyne's collative properties are complexity, or the extent to which a variety of components make up an environment; novelty, or the extent to which an environment contains new or previously unnoticed characteristics; incongruity, or the extent to which there is a mismatch between our environmental factor and its context; and surprisingness, defined as the extent to which our expectations about an environment are disconfirmed.

Berlyne also distinguishes between two types of exploration. **Diversive exploration** occurs when one is understimulated and seeks arousing stimuli in the environment, as when one is "trying to find something to do." **Specific exploration** occurs when one is aroused by a particular stimulus and investigates it to reduce the uncertainty or to satisfy the curiosity associated with the arousal. Originally, Berlyne formulated his notions of collative properties as adjuncts to his notions of exploration, and showed through considerable research that exploration of a stimulus was a function of its complexity, novelty, incongruity, and surprisingness.

Later work by Berlyne (1974) suggested that aesthetic judgments are related to collative properties and exploration along two

dimensions. The first dimension is called *uncertainty-arousal*. Research suggests that as uncertainty or conflict increases, arousal associated with specific exploration increases. The second factor is called *hedonic tone*. This factor is related in a curvilinear (inverted-U) fashion to uncertainty. As uncertainty increases, hedonic tone (degree of pleasantness) first increases, then decreases. The latter dimension is closely related to *diversive exploration*. Apparently, we are happiest with intermediate levels of stimulation or uncertainty and do not care for excessive stimulation or excessive arousal. Berlyne contended that aesthetic judgments are related to a combination of these two factors: uncertainty-arousal and hedonic tone. Consequently, those environments that are intermediate on the scale of collative properties and thus intermediate in terms of uncertainty, conflict, or arousal should be the environments judged most beautiful. Likewise, environments that are intermediate in complexity and novelty and surprisingness should be judged as the most beautiful, whereas environments that are extremely high or low in terms of these collative properties should be judged as less beautiful or even ugly.

Although Berlyne's suggestion of a curvilinear relationship between uncertainty and beauty is supported somewhat by research on nonenvironmental stimuli (e.g., paintings, music), Wohlwill (1976a) pointed out that data on environmental aesthetics are mixed with respect to corroboration of Berlyne's ideas. The property of complexity appears to offer the strongest support for the validity of Berlyne's position as applied to environmental aesthetics. Schwartz and Werbik (1971), for example, made films of simulated trips along a scale-model street in which complexity was varied by manipulating the distance of houses from the street and the angle of houses to the street. Aesthetic judgments were highest at intermediate levels of complexity. Wohlwill (1976a) reported similar results by exposing subjects

to slides of human-built environments that varied in terms of complexity: Scenes with intermediate complexity were the most liked. Interestingly, it is difficult to test this hypothesis with natural scenes because they do not have as high a level of complexity as scenes of human-built environments (Kaplan, Kaplan, & Wendt, 1972; Wohlwill, 1976a).

With respect to novelty, incongruity, and surprisingness, Wohlwill (1976a) reported that a curvilinear relationship between aesthetic judgments and these collative properties in environments is difficult to find. Indeed, current research suggests that a rectilinear (direct or straight line) relationship is more correct: The greater the novelty and surprisingness and the less the incongruity, the more liked the environment. Incongruity in this respect has implications for site location of human-built structures in natural environments. Generally, a mix of human-built and natural elements is seen as incongruous, but if there is a predominance of natural elements, such a scene can still be viewed as aesthetically pleasing. For example, a number of buildings dotting a hillside tends to be less pleasing aesthetically than a single dwelling on the hillside. A final note on Berlyne's aesthetics: Just as we stated that extreme complexity cannot be found in natural environments, current research has not found aesthetic judgments curvilinearly related to the collative properties of novelty, incongruity, and surprisingness, possibly because it has not employed high enough levels of these properties in the environmental scenes that were used.

### The Kaplan and Kaplan Preference Model

Berlyne assumed that identifiable properties in an objective array of stimuli (complexity, for instance) allow predictable judgments of beauty or ugliness. On the other hand, there are considerable individual differences in perceptions of environments, and people react quite differently to scenes based on

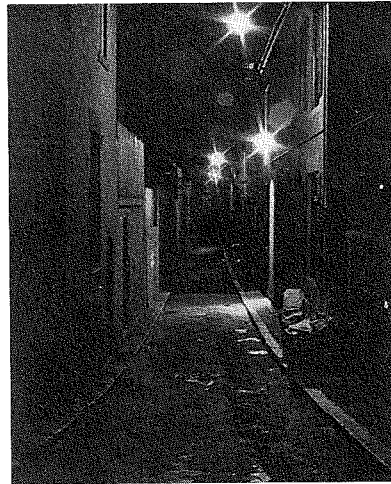
their content. For example, it seems plausible to generate two scenes, one urban and one depicting wilderness, that are about the same on all of Berlyne's collative properties. Yet we know that there is a large research literature attesting to the importance—perhaps based on our genetic history—of nature. Culture and experience probably affect other preferences. Some people, if given a choice, would live in upstate New York, others in tropical Florida, and others in the desert of Arizona.

Steven Kaplan (1975, 1987) and Rachel Kaplan (1975) describe the procedures they used in constructing their model of environmental preference. These researchers collected a large number of photographs of various landscapes and asked respondents to classify them according to certain schemes, similar-dissimilar, like-dislike, and so on. Next, the researchers statistically identified the elements in the scenes that led to this classification and evaluation. In this way, they derived two general dimensions that account for preferences for various types of *environmental content* and *spatial configuration* (Kaplan & Kaplan, 1989). Apparently, one of the most striking aspects of content is the presence of nature. For instance, in groups of photographs depicting natural scenes, those with any sign of human activity are usually singled out in the classification process. In scenes of urban environments, those with even modest natural elements are identified. The second major dimension is spatial configuration, characterized by the bipolar qualities of openness versus closeness and defined versus undefined space. We seem to prefer scenes that facilitate travel by being neither too open and without definition nor by being so closed in that they obstruct our vision and travel.

The Kaplans postulate that humans will like or prefer those landscapes in which the traits of our particular species are most useful. That is, we will be attracted to environments that are—or were during most of

### IS ONE PERSON'S MYSTERY ANOTHER PERSON'S BUG-EYED MONSTER?

According to the Kaplans' (Kaplan & Kaplan, 1982; S. Kaplan, 1987) model of landscape preference, mystery is an element that increases interest and involvement in a scene by providing the promise of further comprehensive information. Typical examples of scenes with high mystery are those featuring paths curving out of sight or in which part of the environment is obscured or shadowed (Gimblett et al., 1985; Kaplan, 1987; Kaplan & Kaplan, 1982). But perhaps you are wondering whether high mystery is always a positive predictor of preference. Ulrich (1977) provides an example for thought: Imagine yourself walking alone at night past a dark, curving alley (see Figure 2-14A). Would the scene possess mystery? Would the dark, unknown quality of the scene enhance your preference?



**Figure 2-14A** Although mystery is heightened by hidden information, dangerous scenes are not preferred.

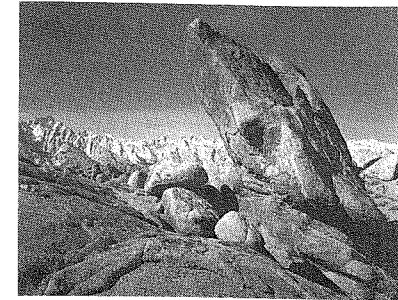
You may not be surprised to learn that Herzog (1987) found that deep, narrow canyons and, especially, urban alleys are exceptions to the general pattern of positive association between preference and mystery. There are several ways to deal with this ambiguity. For example, Kaplan and Kaplan (1982) essentially refine their definition of mystery. They suggest that the term is properly applied in instances in which new information is not forced upon the perceiver, but is only suggested or implied (see Figure 2-14B). They emphasize that the viewer must have

human evolution—survivable. Certainly humans, like other animals, have a pressing need for food, water, and shelter. What are our other characteristics? We are neither the strongest nor fastest animal. We have a poor sense of smell. We are awkward swimmers, and (without technology) fly very poorly. Are we particularly good at anything? Perhaps you have already answered our question and are thinking that humans seem to place a higher emphasis on thought and learning than at least most of the animal kingdom. If so, then perhaps you agree that hu-

mans are good at, and even like, processing information. Although some students question the proposal that they find processing information pleasant, the popularity of games of knowledge and skill indicates otherwise. This information-processing focus is a cognitive perspective about which we will learn more in Chapter 3. Indeed, humans do seem to be good at processing and remembering information about the content of a setting and making opportunistic use of this information. What type of scene would be most consistent with our skills?

the ability to control the incoming information by choosing whether or not to move physically into a scene. Having control should reduce or eliminate fear (see Chapters 4 and 5 for a more complete discussion of the importance of perceived control in a variety of environmental situations).

Ulrich (1977) took an alternate perspective when he suggested that mystery will be positively related to preference in situations with little risk, but inversely related in threatening situations. A recent study of the relationship between mystery and danger by Herzog and Smith (1988) concluded that danger undermines preference for scenes and mystery enhances it, but that the two variables act independently of each other. In sum, they conclude that the effect of mystery is nearly always positive, but that in some instances danger may be a more salient cue which overwhelms any positive effect of mystery. Finally, Bernaldez et al. (1987) report some interesting differences in the way mysterious elements are evaluated by people of different ages. According to these researchers, whether a scene exhibiting darkness and shadows is perceived primarily as mysterious or risky and dangerous differs with age. It appears that a childhood fear of darkness and the unknown shifts, until by young adulthood such environments take on a stimulating or artistic quality.



**Figure 2-14B** In this instance, the rock formations may intrigue the viewer, inviting him or her to move into the landscape to acquire more information.

In this context our primary conclusion might be that humans have a fondness for environments that provide generous amounts of comprehensive information. On the other hand, humans are not particularly fast or strong without the aid of technology so we may need a fairly safe place to retreat. Scenes that exhibit both information and safety are said to provide *prospect* and *refuge*. (Appleton, 1975; Greenbie, 1982). Prospect is the ability to gain an open, unobstructed view of the environment, whereas refuge is provided by safe, sheltered places where a person might

hide. Prospect and refuge are simultaneously high in parklike scenes that show open but bounded space. Some researchers (e.g., Balling & Falk, 1982; Heerwagen & Orians, 1993) note the resemblance between these landscapes and the African savanna where many believe our species evolved. Perhaps our parks, cemeteries, and campuses are constructed approximations of the ancient environment that shaped the evolution of our species.

So, if the Kaplans and others are correct, people will be attracted to scenes in which human abilities to process information are

stimulated and in which this processing will be successful. In more psychological or information-based terms, people will like scenes which are understandable and make sense. In addition, however, people will also prefer scenes that are not too simple or dull. We like scenes that are engaging and involving—scenes that contain some mystery, for example (see the box on pages 52–53).

The Kaplans have organized these information contents of landscapes into a preference matrix with four main components:

1. **Coherence**, or the degree to which a scene “hangs together” or has organization—the more coherence, the greater the preference for the scene. (Figure 2–15A)
2. **Legibility**, or the degree of distinctiveness that enables the viewer to understand or categorize the con-

tents of a scene—the greater the legibility, the greater the preference. (Figure 2–15B)

3. **Complexity**, or the number and variety of elements in a scene—the greater the complexity (at least for natural scenes), the greater the preference. (Figure 2–16A)
4. **Mystery**, or the degree to which a scene contains hidden information so that one is drawn into the scene to try to find this information (e.g., a roadway bending out of sight on the horizon)—the more mystery, the greater the preference. (Figure 2–16B)

At least two of these content categories, complexity and coherence, are very similar to Berlyne’s collative properties. A distinction between the Kaplan and Kaplan model and the Berlyne perspective, however, is that

Figure 2–15A Coherence

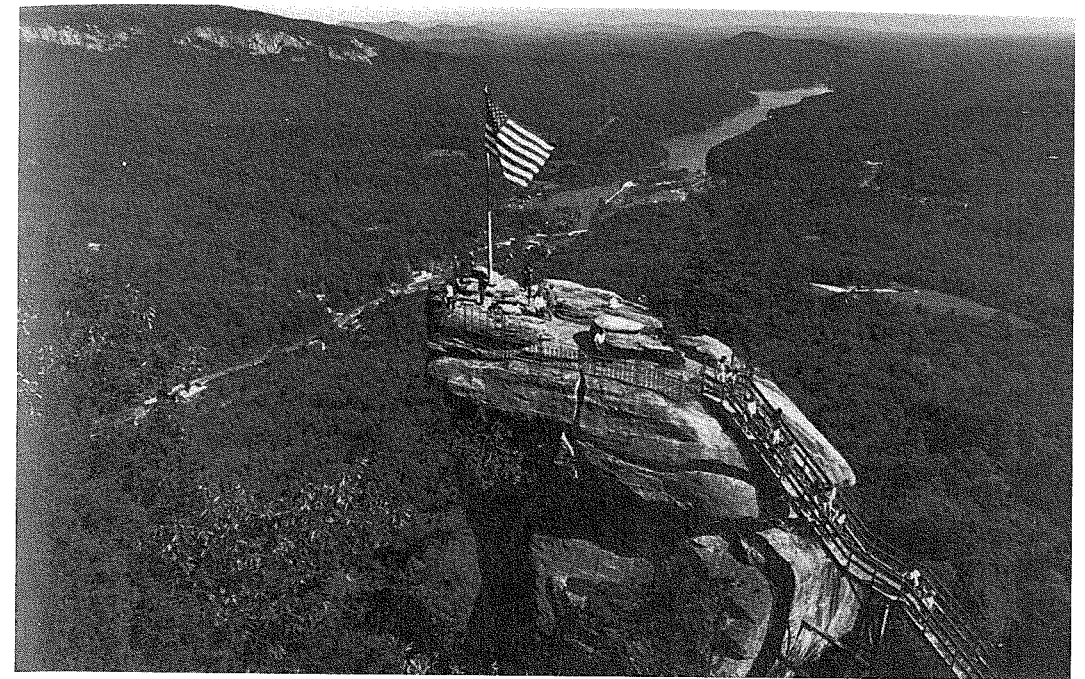
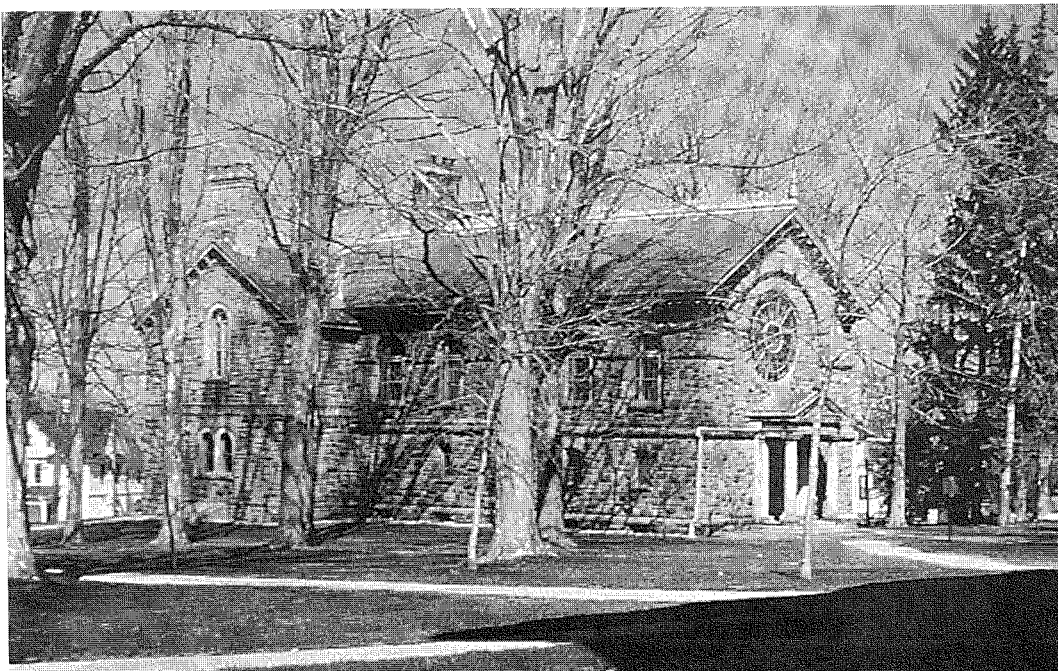


Figure 2–15B Legibility

the Kaplans emphasize the informational content of a scene in a functional or ecological sense as one basis of preference judgments. For example, coherence and legibility relate to understanding or “making sense” out of the environment. Complexity and mystery can be considered aspects of “involvement” with the environment, or the degree to which one is stimulated or motivated to explore and comprehend it. Table 2–1 represents the tension between the need to understand and the need to explore in the Kaplan and Kaplan model (S. Kaplan, 1987). We might also think about these components in terms of the degree of effort required to process environmental information or the immediacy of information presented by the landscape. That is, coherence and complexity are thought to require less inference or analysis, whereas legibility and mystery seem to require more cognitive processing. Although the relative importance of each ele-

ment is not clear, we may need only moderate levels of coherence and complexity in order to facilitate information processing, whereas the more legibility and mystery in a scene, the better in terms of preference judgments.

#### Individual Differences in Preference

Even the most biologically oriented researchers do not suppose that we all have identical landscape preferences. For example, there may be age-related variation in landscape preferences (Balling & Falk, 1982; Bernaldez et al., 1987; Lyons, 1983; Zube et al., 1983). Balling and Falk (1982) report that children prefer savanna-like environments, but that these preferences can be modified and become less and less powerful over a lifetime. Perhaps eventually, familiarity with other types of environments, especially those of “home,” supersedes childhood preferences for savanna. In her critique of Balling and Falk, Lyons (1983) agrees that landscape

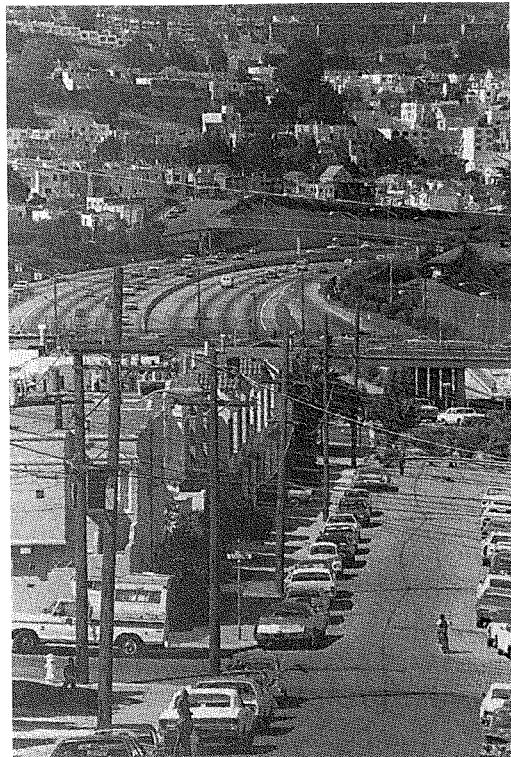


Figure 2-16A Complexity

preferences diverge with age as well as sex and place of residence, but suggests that the functional-evolutionary perspective underestimates the importance of culture in determining preferences.

Kaplan and Kaplan also emphasize the role of familiarity in assessing scenic value. In general, the familiar, especially the “old

Table 2 - 1 Organization of the Kaplan and Kaplan Model of Environmental Preference\*

Characteristics of Information	Understanding	Exploration
Immediate	Coherence	Complexity
Inferred or Predicted	Legibility	Mystery

\*Adapted from S. Kaplan, 1987.

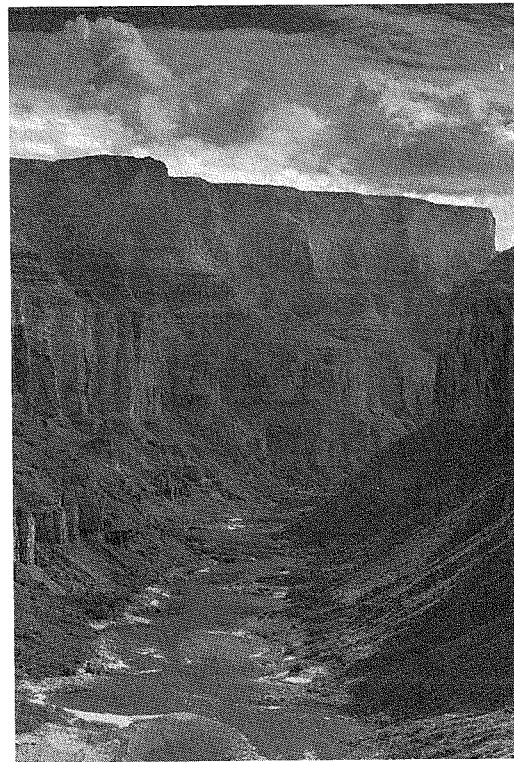


Figure 2-16B Mystery

and genuine” aspects of a scene make it more desirable. Furthermore, those who are more familiar with a landscape may include locals as opposed to tourists, and, in a different sense, experts as opposed to laypersons. Ultimately, we await a theory of landscape aesthetics that successfully accounts for both culture and biology.

**Evaluation of the Psychological Approach**

The Berlyne conceptualization of aesthetics and the Kaplan and Kaplan preference model are but two specific examples of what we have termed the psychological approach to assessment. Daniel and Vining (1983), Heerwagen and Orians (1993), Ulrich (1986), and Zube et al. (1982) review other psychological models. It is encouraging to note that in most

cases dimensions such as complexity, coherence, ambiguity, mystery, and especially naturalness are found to predict scenic value by researchers using different methodologies. Unfortunately, there is as yet insufficient agreement on how many of these dimensions we need to assess a scene adequately, and the way we combine the dimensions in judging one scene is not always universal. That is, complexity may best predict quality in one scene and mystery may best predict quality in another.

Although the Kaplan and Kaplan model hypothesizes that content and spatial organization have their underlying roots in human evolution, another criticism of their theory comes from Ulrich’s research on biophilia discussed earlier in this chapter. Like the Kaplans, Ulrich (1991, 1993) emphasizes the importance of nature as a content in landscape judgments. For Ulrich, however, these judgments seem to be more purely based on biology and classically conditioned learned associations. Affective reactions would occur almost instantaneously, without the need for the more cognitive processing implied by dimensions such as legibility or mystery.

**CONCLUSIONS FROM STUDIES OF LANDSCAPE AESTHETICS**

Both the physical-perceptual and psychological approaches are consistent with the scientific tradition of which most of psychology is a part. We have devoted more time to the psychological approach because it provides a richer set of ideas or constructs than

the physical-perceptual research, not because it has been shown to be more theoretically correct. In fact, by demonstrating direct relationships between objective characteristics of the physical environment and judgments of scenic beauty, the physical-perceptual approach may be easier to apply to problems of landscape management.

Although there are clearly differences between the descriptive, physical-perceptual, and psychological approaches to landscape assessment, some commonalities are remarkable. The similarity of landscape evaluations by people from different cultures has been demonstrated in a number of studies (e.g., Hull & Revell, 1989). Some landscape features—water for instance—are consistently tied to positive evaluations (Coss & Moore, 1990; Herzog, 1985). There is a general and consistent finding that people from a variety of cultures value *natural* landscapes (e.g., Ulrich, 1993). Sensibly, naturalness—the absence of obvious signs of human intervention—is also a predictive component common to all three of the approaches to landscape evaluation (e.g., Daniel & Vining, 1983; Kaplan & Kaplan, 1989; Ulrich, 1986, 1993; Wohlwill, 1983). To return to our discussion of nature versus nurture, there may be some perceptual similarities common to all humans that underlie scenic beauty evaluations. On the other hand, there is also ample evidence that individuals and cultures differ in the meaning they assign to *particular* landscapes or places, and these differences probably modify those landscape responses that might otherwise be generic to humans.

**NATURAL LANDSCAPES AS PLACES**

Sometimes affective evaluations are attached to specific geographic locations or settings which have acquired special meaning (e.g.,

Steele, 1981; Stokols, 1990; Tognoli, 1987; Tuan, 1974). The term **place attachment** refers to the sense of rootedness people feel

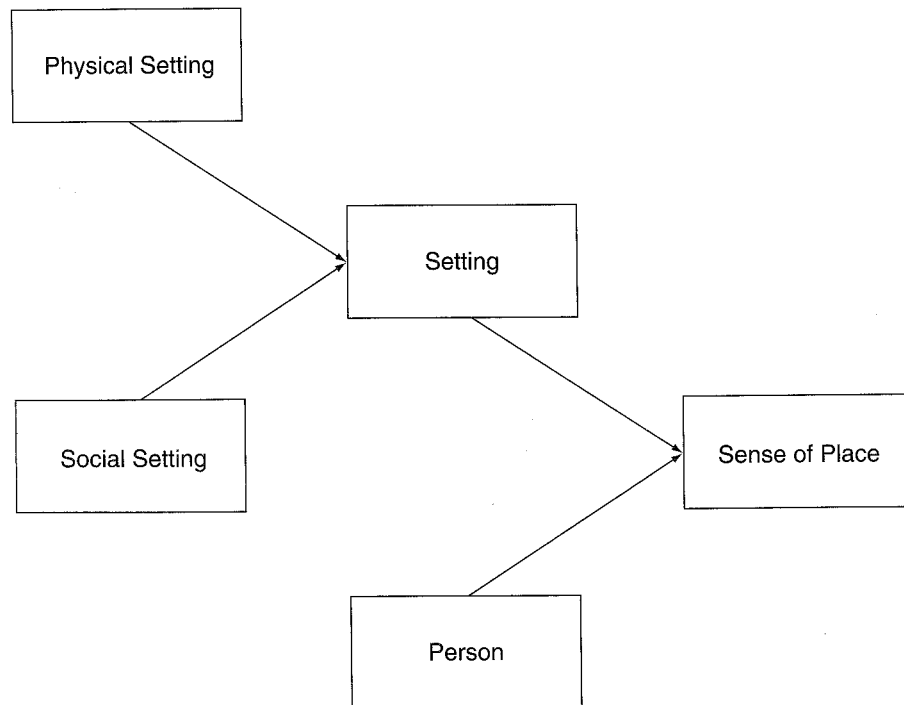


toward certain places. To illustrate, consider the difference between “house” and “home.” Place-centered attitudes are personal, highly valued, and may even be perceived as spiritual or religious (Mazumdar & Mazumdar, 1993; Roberts, 1995). Many researchers emphasize that these components of place are complex, with dynamic interrelationships that defy simplification into cause-effect relationships between discrete, deterministic components (e.g., Low & Altman, 1992; Steele, 1981). The experience of place is likely to be private and different from one person to the next. Many examinations of place are *phenomenological*, that is, based on a person’s subjective description of their experiences, and thus, at odds with the empiricism that dominates behavioral science. Of course, important phenomena are not only

those that are conveniently studied. It would be hard to deny the importance of home (see Chapter 12), the effects of forced relocation of the poor or elderly, or the special relationship some people feel for a particular landscape.

What do we know about natural places? They are permeated by affect, partly because of their aesthetic character but also because of their association in memory with events, persons or feelings. Think of a place that has special meaning for you; a place, perhaps, where you would like to take your closest friend. Is part of what makes the place special its aesthetic appeal? Is part of your affection based on the accumulated memories that you associate with it? As you see in Figure 2–17, the meaning of a place results from the accumulated interactions between an in-

**Figure 2–17** Meaning of a place involves interactions between life history, the physical and cultural setting, and managerial actions.



dividual’s life history and a setting (Steele, 1981). Place experiences often include some feeling of ownership. Ownership in this case is a psychological phenomenon that does not require legal title to a piece of land or a building, but rather, a sense that the person has some uncommon, special relationship with that particular setting. This quality of psychological ownership has taken many names. It may be termed “territory” (Altman & Chemers, 1980), “kinship” (Mitchell et al., 1991), or drawn as a distinction between the landscapes of “insiders” or “outsiders” (Relph, 1976; Riley, 1992). Although much of what characterizes a place may be very personal, groups and even entire communities can develop place attachments. In fact, an attachment to place is often based more on the history of social interactions at a particular location than on its distinctive landscape or architectural character. Furthermore, the importance of place may vary from individual to individual. Whether or not a person

develops a deep affective relationship with a particular place is based partly on the whims of history, but some individuals seem more likely to develop place attachments. As research continues, it may be that we will identify “place people” as a personality type (e.g., Mitchell et al., 1991; Steele, 1981; Williams & Roggenbuck, 1984). In one investigation of forest landscapes that we will revisit in Chapter 13, Mitchell et al. distinguished between use-oriented visitors and attachment-oriented users. Whereas use orientation resulted in a focus on activities and activity-based experiences, attachment indicated an emotional bond with the setting.

What seems clear is that places are both the *objects* of people’s interest, and the *causes* of moods, feelings, etc. Thus, places might best be understood in terms of systems involving physical settings and people acting in them. In the last third of the book, our focus will be on specific places such as residences, institutions, and leisure environments.

## CHAPTER SUMMARY

We have covered much ground in our examination of the relationship between humans and nature. For each of us this relationship may be based on both learning and biological predisposition. Much of the learned component may be understood in terms of the affect and beliefs that comprise attitudes. Although the link between attitude and behavior is imperfect, we believe that specific attitudes predict behavior. We also briefly reviewed several contemporary attitudes or ethical positions with regard to the relationship between humans and nature. Increasingly, there is evidence for a fairly direct effect of certain forms of nature on our physiological function, and a companion biological influence on landscape preferences.

In addition to these theoretical issues,

we reviewed contributions from environmental psychology to the assessment of natural environments. Appraisals may include the assessment of physical qualities (EQIs), perceived qualities (PEQIs), or emotional reactions prompted by a particular setting (EERIs). In particular, we examined contemporary approaches to the assessment of visual quality and landscape preferences. The descriptive approach emphasizes artistic elements. The physical-perceptual approach emphasizes quantifying elements such as water and amount of wood. The psychological approach emphasizes dimensions such as coherence, legibility, complexity, and mystery that are more “in the mind” than in the physical components of the scene itself. Finally, we introduced a discussion of place.

The concept of place attempts to integrate the character of a setting with the personal, often powerful, emotions and memories an individual associates with it.

### SUGGESTED PROJECTS

1. Ask a few friends to provide adjectives to describe several campus environments. Can you place each of the adjectives generated by your friends into the bipolar model of affective reactions suggested by Russell and his colleagues (refer to Figure 2-10)? Is there any difference between the assessments of

friends from uptempo city environments and those from more rural homes?

2. Ask several friends to describe a "special place." To what degree are their descriptions based on physical characteristics of the setting? Do they also report personal experiences and emotional associations?

3. Review the discussion of resourcism, preservationism, and ecocentrism. Which of these three ethics is closest to your own view? Hypothetically, how would your experience of nature and your behavior change if you were to adopt one of the other ethical perspectives?

# Environmental Perception and Cognition

## INTRODUCTION

### CHARACTERIZING ENVIRONMENTAL PERCEPTION

#### Perspectives on Environmental Perception

*Traditional Approaches to the Perception of Size, Depth, and Distance*

*Holistic Analysis*

Gestalt Psychology

#### Nativism Versus Learning

*Brunswik's Probabilism*

*Ecological Perception of the Environment*

Perception of Affordances

*Some Implications for Environmental Perception*

#### Habituation and the Perception of Change

*Habituation or Adaptation*

*Perception of Change*

## ENVIRONMENTAL COGNITION

### AN INFORMAL MODEL OF SPATIAL COGNITION

#### COGNITIVE MAPS

##### History of Cognitive Mapping

*An Image of the City: Kevin Lynch*

*Elements of Cognitive Maps*

*Additional Early Observations*

##### Current Perspectives