

Public Attitudes Toward Ecological Restoration in the Chicago Metropolitan Region

ALAN D. BRIGHT

Department of Natural Resource Recreation and Tourism
Colorado State University
Fort Collins, Colorado, USA

SUSAN C. BARRO

North Central Research Station
USDA Forest Service
St. Paul, Minnesota, USA

RANDALL T. BURTZ

Department of Recreation, Park & Tourism Sciences
Texas A&M University
College Station, Texas, USA

We examined the relationship between attitudes toward urban ecological restoration and cognitive (perceived outcomes, value orientation, and objective knowledge), affective (emotional responses), and behavioral factors using residents of the Chicago Metropolitan Region. Positive and negative attitudes were both related to perceived outcomes of ecological restoration. In addition, positive attitudes were related to values while negative attitudes were related to emotions. Attitudes of high and low importance groups were connected to perceived outcomes of ecological restoration; however, attitudes of the high importance group were also related to values, emotions, and behavior. Positive and negative attitude groups differed on perceived outcomes, basic beliefs, knowledge, and behavior. Implications lie in understanding of complex attitudes toward natural resource issues and improved communication efforts to influence or educate the public.

Keywords affective factors, attitudes, attitude direction, behavioral factors, cognitive factors, ecological restoration, issue importance, knowledge, value orientations

Received 29 January 2001, accepted 26 September 2001.

This article was made possible by funding from the North Central Research Station of the USDA Forest Service, joint venture agreement 23–97–35-RJVA.

Address correspondence to Alan D. Bright, Department of Natural Resource Recreation and Tourism, Colorado State University, 241 Forestry Building, Fort Collins, CO 80523, USA.
E-mail: abright@cnr.colostate.edu

Bright, Alan D.; Barro, Susan C.; Burtz, Randall T. 2002. Public attitudes toward ecological restoration in the Chicago metropolitan region. *Society and Natural Resources*. 15(9): 763-785.

Restoring the ecology of open space in and around metropolitan areas is a growing and controversial issue. Supported by a grass-roots environmental movement, individuals, scientists, and organizations involved in ecological restoration seek to change the way people view the natural world in urban and urban-proximate areas (Stevens 1995). Ecological restoration involves active management using techniques such as controlled burns, cutting out nonnative trees and brush, wildlife control, herbicide application, and replanting native grasses, shrubs, trees, and flowers in order to restore open space to a healthy natural state that thrives on a diversity of and interaction among flora and fauna. Many arguments for and against the restoration of nature have been put forth. Many researchers believe that the effects of human activity on natural ecosystems have so altered the composition of those ecosystems that restoration activities must be conducted in order to allow natural processes to move forward (Bonnicksen and Stone 1985; Grumbine 1994) resulting in healthy natural ecosystems. Healthy ecosystems can provide (1) sustained integrity of complex ecological relationships, (2) realization of economic and health benefits, (3) provision of recreational opportunities, (4) recognition of the intrinsic value of other species of flora and fauna, and (5) recognition of aesthetic values (Barnes 1993). Arguments against ecological restoration center around issues such as monetary costs to the public, loss of aesthetic and recreation values related to the existence of trees and brush targeted for removal in a restoration activity, and the philosophical notion that restoration is another example of human interference with nature (Gobster 2000).

Ecological restoration has experienced controversy in the Chicago Metropolitan Region, where restoration occurred for 30 years (Stevens 1995). However, land managers and scientists acknowledge that the ecological integrity of forest preserves and other open space in the region is compromised due to a hands-off management policy (Shore 1997). Tall-grass prairie and oak savanna ecosystems are of particular concern, and fire suppression and invasion by exotic plants and native trees have altered these diverse systems (Kline 1997). To address this concern, private citizens, scientists, and land managers are working to restore prairies, savannas, woodlands, and wetlands. While the benefits of ecological restoration are recognized by many, the success of long-term restoration efforts will require the support of the public who owns and values urban open space. Controversies in metropolitan Chicago over how the forest preserves are managed suggest that gaining public support for such actions may be difficult. For example, in 1996 restoration activities such as removal of trees and brush in some forest preserves drew the ire of residents in adjacent neighborhoods. In response to citizen concern about restoration activities, several hearings were conducted before the Cook County Board of Commissioners in three different locations across the Chicago area. While many who testified at the hearings spoke in favor of restoration, some neighborhoods provided significant opposition (Shore 1997). In an evaluation of newspaper articles and letters to the editor, hearing transcripts, and other public documents, Gobster (1997; 2000) noted that much of the controversy surrounding ecological restoration in Chicago was rooted less in opposition to restoring nature and more in the specific practices involved in ecological restoration, such as removing or killing healthy trees, using herbicides, setting prescribed fires, and removing fauna. Vining, Tyler, and Kweon (2000) systematically examined the opinions and emotions related to ecological restoration held by a sample of Chicago area residents. They found that while the public was generally aware of restoration activities, it was unaware that controversy surrounded those activities. Furthermore, the public believes that the most important reasons for

intervening in nature were for the benefit of nature, as opposed to human utility. Finally, Vining et al. (2000) found no systematic relationships between emotions and specific restoration decisions.

Scientists, researchers, and professionals are required to identify ecological restoration techniques that not only are ecologically sound and cost effective, but also are supported by the public. Such support of management strategies can be predicted through an understanding of public values and attitudes toward such management (Bright and Manfredi 1996). An understanding of public values and attitudes toward ecological restoration can aid in (1) developing outreach and management programs that consider human preferences and needs along side those of nature and (2) identifying areas of and the nature of opposition to ecological restoration.

Study Goals

This study expanded on previous work on attitudes and perceptions of ecological restoration in the Chicago Metropolitan Region. The first goal of the study was to test the suitability of a tripartite model of attitudes by systematically examining the conceptual nature of attitudes toward ecological restoration. We adopted a conceptual model of the nature of attitudes toward natural resource issues (Bright and Manfredi 1996). A tripartite analysis suggests that attitudes can be inferred from cognitive, affective, and behavioral responses to the attitude-object (Eagly and Chaiken 1993). Objectives were:

1. To determine if attitudes toward ecological restoration were related to perceptions of outcomes, objective knowledge, and value orientations related to ecological restoration (cognitive factors).
2. To determine if attitudes toward ecological restoration were related to emotions elicited by ecological restoration (affective factors).
3. To determine if attitudes toward ecological restoration were related to specific behaviors individuals do that are related to the environment and ecological restoration (behavioral factors).

The second goal was to determine if the cognitive, affective, and behavioral nature of attitudes toward ecological restoration are influenced by the direction of attitudes. Objectives were:

4. To determine if individuals with positive attitudes toward ecological restoration differed from those with negative attitudes on the relationship between cognitive, affective, and behavioral factors and attitudes toward ecological restoration.
5. To determine if individuals for whom the issue of ecological restoration is important differed from those for whom the issue is not important on the relationship between cognitive, affective, and behavioral factors and attitudes toward ecological restoration.

The third goal was to examine how individuals with positive attitudes toward ecological restoration differed from those with negative attitudes in their (a) perceptions about outcomes to, (b) objective knowledge of, (c) orientation of values toward, (d) emotions elicited by, and (e) behavior related to the environment and ecological restoration.

Conceptual Background

The conceptual model for this study (Figure 1) has two parts. The first part addresses goal 1 of the study. Attitudes toward ecological restoration in the Chicago Metropolitan Region are posited to contain three underlying components. The cognitive component includes factors related to perceived outcomes of ecological restoration, orientation of values related to ecological restoration, and objective knowledge related to ecological restoration. The affective component represents emotional responses to ecological restoration. The behavioral component measures actions related to ecological restoration and the environment. The second part of the model addresses goal 2 of the study. It proposes that the relationship between attitudes toward ecological restoration and the cognitive, affective, and behavioral factors will be moderated by the direction of attitude toward the issue and the personal importance of the issue.

The Cognitive Component of Attitudes

Attitude theorists typically call cognitions *beliefs*. Beliefs are associations that people establish between the object of an attitude and attributes that they ascribe to that object (Eagly and Chaiken 1998). We measured three belief types: perceived outcomes of ecological restoration, value orientations toward ecological restoration, and objective knowledge about the environment and ecological restoration.

Perceived Outcomes

Models in social psychology suggest attitudes are influenced by what people perceive as outcomes of behaviors or characteristics of objects (Anderson 1971; 1991;

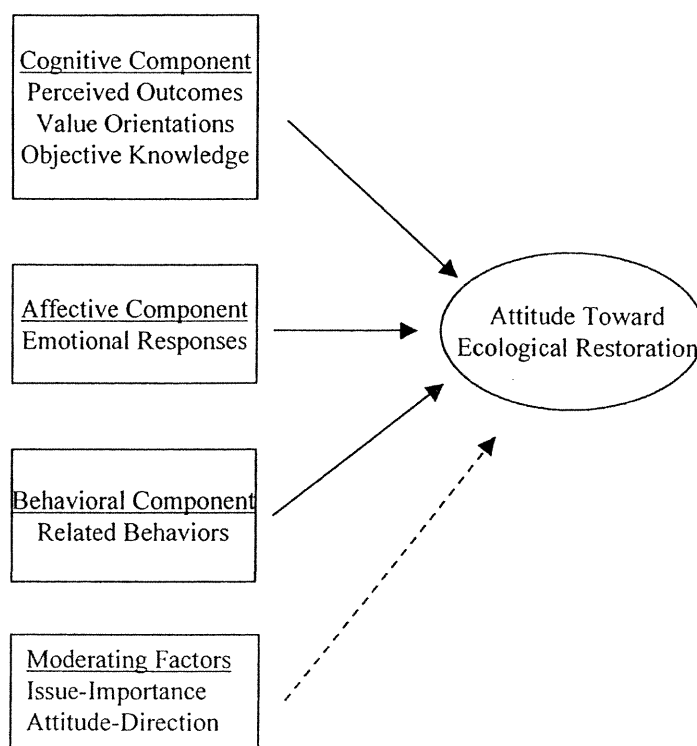


FIGURE 1 Conceptual model of attitudes toward ecological restoration.

Fishbein and Ajzen 1975). We measured perceptions of outcomes that occur as a result of ecological restoration. Bright and Manfredi (1996) found that perceptions of outcomes to reintroducing wolves were significant predictors of attitudes toward wolf reintroduction. The perceptions of outcomes/attitude relationship has been applied in a variety of other areas such as attitudes toward prescribed burns (Manfredi et al. 1990), trapping (Fulton et al. 1995), limits on national park visitation (Kang and Kim 1996), and the use of agricultural land (Carr and Tait 1991).

Value Orientations

Individuals have thoughts other than perceptions of outcomes of restoration. One type of thought includes value-based beliefs about ecological restoration and the environment. Value orientation represents a measure of the pattern of these basic beliefs. Research supports the importance of value orientations in attitude prediction (Bright and Manfredi 1996; Bright et al. 2000; Burtz and Bright 1998; Fulton et al. 1996; Vaske and Donnelly 1999). Bright and Manfredi (1996) and Burtz and Bright (1998) found that the most important predictors of attitudes toward reintroducing wolves were the orientation of values toward wolves.

Objective Knowledge

Research on the relationship between knowledge and attitudes generally focuses on the effect of knowledge on attitude change (Eagly and Chaiken 1998). However, researchers in natural resource fields have explored whether knowledge is connected to attitude direction. Research on wolf reintroduction found that high knowledge about wolves and wolf reintroduction resulted in positive attitudes toward reintroducing wolves in the West (Bath 1989; Hook and Robinson 1982; Kellert 1985). However, Bright and Manfredi (1996) found that when perceived outcomes, values, and emotions were considered, the relationship between knowledge and attitudes toward wolf reintroduction disappeared.

The Affective Component of Attitudes

The affective component of attitudes consists of feelings, moods, emotions, and sympathetic nervous system activity that people experience in relation to an object or behavior (Eagly and Chaiken 1998). Feelings may produce positive or negative evaluation without impacting beliefs about the attitude object. Bright and Manfredi (1996) found that emotional responses to reintroducing wolves in Colorado were important predictors of attitudes toward wolf reintroduction. Vining et al. (2000) found that while ecological restoration elicited a variety of emotions, systematic relationships with specific decisions regarding ecological restoration required further study.

The Behavioral Component of Attitudes

Bem (1972) suggested that people hold attitudes consistent with prior volitional behavior. For example, if an individual previously voted in support of spring bear hunting on a statewide ballot initiative, this previous vote would be more closely connected to the person's current attitude toward the issue if the vote was based on his or her own love of hunting rather than how someone close to the person told him or her to vote. In this study, the behavioral component was the extent to which respondents engaged in certain behaviors related to environmental protection and ecological restoration.

Methods

Sampling and Data Collection

A questionnaire was sent to 2000 residents of the Chicago Metropolitan Region in late 1996, randomly selected by a private survey research firm. This was followed by a reminder postcard and re mailing of the questionnaire. Of the 2000 questionnaires mailed, 1580 were deliverable and 881 returned (55.8%). A telephone survey of 60 nonrespondents showed no difference between respondents and nonrespondents on attitudes toward ecological restoration.

Questionnaire Items Used to Measure Model Components

Prior to responding to questions about ecological restoration, respondents read a passage about ecological restoration developed in collaboration with USDA Forest Service personnel in the Chicago region.

A key issue in the Chicago area is restoring open space “as nearly as possible” to conditions that existed prior to European settlement. This includes areas such as prairies, savannas, woodlands, and wetlands. Ecological restoration involves active management using controlled burns, cutting out non-native trees and brush, wildlife control, herbicides, and replanting native grasses, shrubs, trees, and flowers. Open space along streams, vacant lots, current standing forests, and other open areas are candidates for restoration. Some people believe these areas should be restored to a pre-settlement state. Others believe they are best left alone or developed.

Respondents then answered questions measuring attitudes toward ecological restoration, perceived outcomes, value orientations, objective knowledge, emotional responses, and issue importance.

Attitudes Toward Ecological Restoration

Attitudes toward ecological restoration were measured using two 7-point scales. Respondents were asked if restoring natural areas in and around Chicago would be extremely, moderately, or slightly “good or bad” and “beneficial or harmful.” These two items were used as observed variables measuring a latent attitude factor in the structural modeling technique used to explore goals 1 and 2. In addition, respondents were placed into either the positive or negative attitude group based on an index of these two items in exploring goal 3 of the study.

Perceived Outcomes of Ecological Restoration

Perceived outcomes were measured using 16 items developed from results of content analysis conducted on a variety of texts written about ecological restoration including local newspaper and magazine articles, books, and other writings about the ecological restoration issue in the Chicago metropolitan region. Respondents indicated whether they agreed, disagreed, or neither with each of the statements on a 7-point scale.

Objective Knowledge

Objective knowledge was measured using seven fact-based statements about ecological restoration and the environment in the Chicago Metropolitan Region. Using a 5-point scale, respondents indicated whether each statement was “definitely”

true/false, “probably” true/false, or that they did not know. Responses were scored + 2 for being correct with a response of “definitely,” 1 for being correct with a response of “probably,” 0 for indicating they did not know, -1 for being incorrect with responses of “probably,” and -2 for being incorrect with “definitely.” This was done to curtail guessing and allow respondents to indicate certainty of their response. Scores on all statements were summed to create a knowledge score (ranging from -14 to + 14).

Value Orientations

Value orientations were measured using 17 basic belief statements. Respondents indicated whether they agreed, disagreed, or neither on a 7-point scale. These basic beliefs were derived from results of focus-group discussions conducted in three different metropolitan regions in the United States to determine what people thought about the environment and restoration (Belden and Russonello 1995).

Emotional Responses

Plutchik (1980) identified eight basic emotions humans feel. After reading a hypothetical scenario where trees were removed from an urban natural area near them, respondents indicated whether they would feel each emotion (happy, fearful, surprised, angry, interested, disgusted, sad, and agreeable) on a scale of “not at all” (0) to “extremely” (6).

Behavior

Using a yes/no format, respondents indicated whether they have done or currently do a variety of activities. These activities included decreasing the use of pesticides, planting a garden, volunteering in community restoration projects, writing letters to elected officials, recycling, supporting environmental groups, and growing or collecting seeds of native plants to be used in restoration projects.

Issue Importance

On a 5-point unipolar scale, respondents were asked: (1) How important is the issue of restoring natural areas in and around Chicago to you personally? (2) How important is it that you know as much as possible about the issue? After indexing these questions, respondents were placed into either a “high” (mean importance = 6–10), or “low” (mean importance = 2–5) importance group.

Analyses

Factor analyses, using unweighted least-squares extraction and varimax rotation, identified dimensions of (a) perceived outcomes to ecological restoration, (b) basic beliefs regarding ecological restoration and the environment, and (c) behavior. A structural equation model (Amos 3.6) (Arbuckle 1997) examined the relationship between the cognitive, affective, and behavioral factors (observed variables) with attitude (unobserved variable). A structural model was run for each of the high issue importance, the low issue importance, the positive attitude, and the negative attitude groups, resulting in four models. Model fit was examined using a goodness-of-fit index (GFI) and a relative chi-square measure (χ^2/df). The model for the high-importance group was compared to the low-importance group, and the positive-attitude group model was compared to the negative-attitude group. Independent samples *t*-tests compared the positive attitude group to the negative attitude group

on perceived outcomes, basic beliefs, objective knowledge, emotions, and behavior using a significance level of $p < .05$ adjusted for multiple comparisons and Bonferroni's adjustment. Knowledge used in the structural analyses were based on *knowledge scores* that ranged from -14 to $+14$, giving different weights to "definitely" and "probably" responses. To compare the number of correct and incorrect answers between positive and negative attitude groups, the "definitely" and "probably" true or false responses were counted as equally correct or incorrect, resulting in a "number correct" scale of 0 to 7.

Results

Demographics

More than 8 of 10 respondents were white (85.7%), over one-half were male (57.3%), and the median age was 48.0 years. This differs from the U.S. Census statistics for the Chicago Metropolitan Statistical Area (65.8% white, 48.9% male, median age of 33.7%). Over one-half of the respondents held at least a 4-year college degree (54.0%). The median household income was \$40,000 to \$74,999 per year. Less than one-half currently reside in (47.5%) and/or grew up in (46.1%) a large city of 250,000 residents or more. More than one-fifth currently reside in a town of 10,000–49,999 residents (24.7%) and/or grew up in such a community (21.0%).

Factor Analyses and Internal Consistency Tests

Factor analyses were conducted on perceived outcomes to ecological restoration (Table 1), basic beliefs (value orientations) (Table 2), and behavior (Table 3). Items were assigned to factors if the loading on the factor was at least .400. Three separate factors were identified for the perceived outcomes. These were subjectively labeled *Benefits*, *Negative Conditions*, and *Resource Availability*. Basic belief reduced into four factors labeled *Species Primacy*, *Species Loss*, *Species Value*, and *Human Primacy*. Three behavior factors included *Gardening and Restoration*, *Political Action*, and *Household Environmental*. Scores on each dimension were the factor scores obtained using the regression method in SPSS 9.0. The items measuring attitude toward ecological restoration ($r = .87$, $p < .001$) and issue importance ($r = .70$, $p < .001$) showed adequate correlation to justify creating indices for appropriate analyses.

The Nature of Attitudes Toward Ecological Restoration

The first two goals were to examine the conceptual nature of attitudes toward ecological restoration in the Chicago Metropolitan Region and the moderating effects of issue importance and attitude direction (Table 4).

Moderating Effects of Issue-Importance

The theoretical models were good fits for the data for both importance groups. The relative effects of cognitive, affective, and behavioral factors on attitudes were moderated by issue importance. Perceived outcomes were strong predictors of attitudes toward ecological restoration for the high- and low-importance groups. For both groups, perceived benefits to Chicago and resource availability were key predictors. The natures of attitudes for the two groups diverge concerning the predictability of value orientations and behavior. The issue is highly value laden for

TABLE 1 Factor Loadings for Perceived Outcomes to Ecological Restoration in the Chicago Metropolitan Region

Items	Benefit to Chicago ($\alpha = .88$)	Negative conditions ($\alpha = .68$)	Resource availability ($\alpha = .73$)
Restoring natural areas to presettlement conditions would improve the quality of life of local residents.	<u>.766</u>	.053	-.095
Restoring natural areas to presettlement conditions would create healthy ecosystems within the Chicago metropolitan area.	<u>.763</u>	.034	-.129
Restoring natural areas to presettlement conditions would make the Chicago metropolitan area more attractive.	<u>.756</u>	.010	-.067
Restoring natural areas to presettlement conditions would be a wise use of tax dollars.	<u>.797</u>	-.081	-.174
Restoring natural areas to presettlement conditions would be a good way for us to care for the environment of the Chicago metropolitan area.	<u>.801</u>	-.121	-.245
Restoring natural areas to presettlement conditions would preserve plant and animal species that are in danger of becoming extinct.	<u>.697</u>	.029	-.133
Restoring natural areas in and around Chicago would increase tourism to the city.	<u>.698</u>	.054	.108
Restoring natural areas to presettlement conditions should not be done if it means cutting down mature trees.	<u>.131</u>	<u>.640</u>	.194
Restoring natural areas to presettlement conditions should be avoided if it would result in a loss of some wildlife habitat that already exists.	.121	<u>.709</u>	.142
Restoring natural areas to presettlement conditions by cutting or burning would result in areas looking unattractive.	-.180	<u>.549</u>	.202
Restoring natural areas to presettlement conditions should be avoided if it results in the use of herbicides.	.001	<u>.673</u>	-.088
Restoring natural areas to presettlement conditions would place too many restrictions on how land could be used.	-.217	.214	<u>.518</u>

TABLE 1 Continued

Items	Benefit to Chicago ($\alpha = .88$)	Negative conditions ($\alpha = .68$)	Resource availability ($\alpha = .73$)
Natural areas in and around Chicago could never really be restored to the way they were before Europeans arrived.	-.162	.250	<u>.564</u>
Natural areas in and around Chicago should be left alone rather than actively restored.	-.261	.203	<u>.619</u>
Restoring natural areas to presettlement conditions is not necessary since there are plenty of natural areas outside the Chicago metropolitan area.	-.246	.202	<u>.551</u>
Acquiring more open land to be set aside as natural areas is more important than restoring existing natural areas.	.177	-.199	<u>.720</u>

Note. Underlined items represent factors item loaded on most strongly ($> .400$). The internal consistency of all scales were tested using Cronbach's alpha; all achieved $\alpha > .60$; adequate for new scale development (Nunnally and Bernstein 1994).

the high-importance group, with values related to species primacy, species loss, and human primacy being important predictors of attitudes. None of the value orientations for the low-importance group were high predictors of attitudes relative to perceived outcomes. Emotions influenced attitudes for the high-importance group much more than for the low-importance group. A positive relationship was found between household environmental behaviors and attitudes for the high-importance group.

Moderating Effects of Attitude Direction

The theoretical model was a good fit of the data for both attitude groups. Further examination of the models revealed differences in the nature of attitudes toward ecological restoration. Perceptions of resource availability were an important predictor of both positive and negative attitudes. Positive attitudes were strongly predicted by perceived benefits to Chicago, while negative conditions influenced negative attitudes. Positive attitudes were influenced more by held values related to species primacy, species value, and human primacy than were negative attitudes; however, negative attitudes were more driven by emotions.

The Effects of Attitude Direction on Cognitive and Affective Factors

The third goal was to compare respondents with positive attitudes with those with negative attitudes on perceived outcomes, basic beliefs, emotional responses, objective knowledge, and behavior.

Perceived Outcomes of Ecological Restoration

Directional differences existed for all the Benefits to Chicago (Table 5). The positive-attitude group agreed that restoring natural areas would (a) improve the

TABLE 2 Factor Loadings for Value Orientations Related to Ecological Restoration in the Chicago Metropolitan Region

Basic belief items	Species Primacy ($\alpha = .82$)	Species Loss ($\alpha = .68$)	Species Value ($\alpha = .76$)	Human Primacy ($\alpha = .72$)
If economic development would result in a plant or animal species becoming extinct, the development should be stopped.	<u>.702</u>	.146	-.188	-.233
An endangered plant or animal species should be preserved whether or not that species directly benefits humans.	<u>.692</u>	.177	-.275	-.212
Even if a plant or animal species is in danger of going extinct by natural causes humans should try to save the species.	<u>.735</u>	-.117	-.067	-.120
It is unacceptable when humans cause extinction.	<u>.738</u>	.242	-.025	-.072
The best way to protect individual plant and animal species is to ensure their natural habitat is undisturbed by humans.	<u>.543</u>	.270	-.063	.112
We should try to save all wild plant and animal species since many have benefits to humans that we still don't know about.	.605	.276	-.231	-.083
One of the most serious problems for wild plants and animals is the loss of their natural habitat.	.221	<u>.587</u>	.088	.145
The extinction of wildlife and plant species could have harmful effects on the well-being of humans.	.236	<u>.702</u>	-.167	-.071
The loss of wildlife or plant species in nature could have harmful effects on the ability of other wildlife and plant species to survive.	.273	<u>.654</u>	-.244	-.059
The loss of natural habitats for wild animals is not serious as long as there are zoos available for these animals to live in.	.003	-.714	.177	.240
The loss of wildlife and plant species has no effect on the ability of humans to survive.	.041	-. <u>.573</u>	.122	.244
I can think of some species of mammals, reptiles, fish, insects, or plants that I would like to see go extinct.	-.100	-.068	<u>.775</u>	.216
Some species of plants and animals are undesirable and it would be good if they did go extinct.	-.075	-.058	<u>.762</u>	.325

TABLE 2 Continued

Basic belief items	Species Primacy ($\alpha = .82$)	Species Loss ($\alpha = .68$)	Species Value ($\alpha = .76$)	Human Primacy ($\alpha = .72$)
There is no such thing as a good or bad plant or animal species since they all perform a function in the natural environment.	.191	.277	<u>-.714</u>	.176
A wildlife or plant species should be protected or saved from extinction only if it can be shown to directly benefit humans.	-.098	-.284	.202	<u>.545</u>
Humans are part of the natural environment therefore some human-caused extinction should be expected.	-.169	.024	-.082	<u>.724</u>
When human needs conflict with protecting habitat of a plant or animal species, human needs take precedence over habitat.	-.177	-.210	.232	<u>.627</u>

Note. Underlined items represent factors item loaded on most strongly ($>.400$). Internal consistency of factors given as α value.

quality of life of local residents, (b) make the Chicago area more attractive, (c) be a wise use of tax dollars, (d) be a good way to care for Chicago's environment, (e) preserve endangered species, and (f) increase tourism to the city. The negative-attitude group disagreed that these outcomes would occur.

Perceptions of negative conditions were similar across attitude groups. The negative-attitude group agreed more strongly that restoring natural areas by cutting and burning would result in areas looking unattractive. There were also differences for perceptions of resource availability. The negative-attitude group agreed more strongly that restoring natural areas would place too many restrictions on how land could be used. In addition, while the negative-attitude group agreed that natural areas in and around Chicago should be left alone and that restoring natural areas is unnecessary given other existing areas outside of Chicago, those in the positive-attitude group disagreed with these statements.

Basic Beliefs

Differences existed between attitude groups on basic beliefs (Table 6). For Species Primacy the positive-attitude group believed more strongly that (a) economic development should be stopped if it results in a plant or animal species going extinct, (b) an endangered plant or animal species should be saved whether or not it benefits humans, (c) human-caused extinction is unacceptable, (d) the best way to protect plant and animal species is to protect habitat, and (e) all wild plant and animals should be saved since many have unknown benefits. There was one directional difference. The positive-attitude group agreed that extinction by natural causes should be avoided, while the negative-attitude group disagreed with this statement. For Species Loss, the positive-attitude group agreed more strongly that (a) loss of

TABLE 3 Factor Loadings for Behavior Related to Ecological Restoration in the Chicago Metropolitan Region

Individual behaviors	Gardening and restoration ($\phi = .389$, $p < .001$)	Political action ($\alpha = .72$)	Household environmental ($\phi = .339$, $p < .001$)
Planted a prairie or wildflower garden in your yard.	<u>.758</u>	-.089	.265
Grew or collected seeds of native plants to be used in restoration of natural areas.	<u>.751</u>	.229	-.047
Volunteered in community projects to maintain or restore natural areas such as prairies, savannas, woodlands, or wetlands.	.416	<u>.644</u>	-.068
Wrote letters to elected officials in support of environmental issues.	-.032	<u>.786</u>	.102
Supported environmental groups working to preserve species and habitat.	.030	<u>.606</u>	.254
Decreased the use of pesticides, herbicides, and fertilizers in your yard.	.327	.086	<u>.657</u>
Recycled items such as glass, newspaper, etc.	-.060	.092	<u>.796</u>

Note. Underlined items represent factors item loaded on most strongly ($>.400$). Creating the two-item "Gardening and Restoration" and "Household Environmental" indices was supported using chi-square analysis. Correlation between the two items for both indices was deemed high enough to justify indexing.

natural habitat is a species's most serious problem, (b) extinction of plant and animal species could harm humans, and (c) extinction of plant and animal species could harm plant and wildlife. The positive-attitude group disagreed more strongly that loss of habitat is not a problem if zoos are available. For Species Value, the positive-attitude group disagreed more strongly that some species of plants and animals were undesirable and should go extinct and agreed more strongly that there is no such thing as a good or bad species. For Human Primacy, the positive-attitude group agreed less strongly that we should expect some human-caused extinction. The positive group disagreed more strongly that plant and animal species should only be saved if humans benefit. The positive-attitude group disagreed that human needs take precedence over protecting plant and animal habitat, while the negative-attitude group agreed with this.

Emotional Responses

There were no significant differences between positive- and negative-attitude groups on the level of emotional responses to ecological restoration. While a correlation existed between the attitude and the direction of emotions, with the positive-attitude group expressing positive emotions while the negative attitude group expressed negative emotions ($r = .84$, $p < .001$), there was no difference between the two groups on the level of emotional response ($t = .910$, $p = .363$).

TABLE 4 Relationships Between Cognitive, Affective, and Behavioral Factors and Attitudes Toward Ecological Restoration—A Comparison Across Issue Importance and Attitude Direction Groups

Cognitive, affective, and behavioral factors	Standardized regression weights			
	Moderating effects of issue importance		Moderating effects of attitude direction	
	High importance (<i>n</i> = 518)	Low importance (<i>n</i> = 343)	Positive attitudes (<i>n</i> = 753)	Negative attitudes (<i>n</i> = 108)
Perceived outcomes				
Benefits to Chicago	.678	.935	.622	.219
Negative Conditions	-.183	.096	-.146	.471
Resource Availability	-.440	-.574	-.431	.679
Value Orientations:				
Species Primacy	.603	.178	.360	-.284
Species Loss	.541	.068	.263	.276
Species Value	-.212	-.113	-.207	.024
Human Primacy	-.646	-.181	-.261	.074
Objective knowledge	.191	.168	.290	.142
Emotional responses	.391	.113	.290	.458
Behavior				
Gardening and restoration	-.017	.008	.238	.047
Political action	.161	.102	.156	.308
Household environmental	.434	.088	.245	.368
Goodness of fit statistics:				
GFI ^a	.940	.943	.963	.972
Relative chi-square ^b	3.89	2.36	3.80	2.29

^aGFI (goodness-of-fit index) = $1 - F/F_b$, where F is the minimum value of the discrepancy function and F_b is obtained by evaluating F with $\Sigma(\epsilon) = 0, g = 1, 2, \dots, G$.

^bIn light of large sample sizes, a "relative chi-square" (χ^2/df) has been suggested as an appropriate measure of fit. Values ranging from 2.0 to 5.0 have been suggested as upper thresholds for adequate fit by a variety of researchers (Byrne 1989; Carmines and McIver 1981; Wheaton et al. 1997). Given strong GFI statistics, a $\chi^2/\text{df} < 4.0$ was deemed acceptable for this study.

TABLE 5 Comparison of Perceived Outcomes to Ecological Restoration Between Positive and Negative Attitude Groups

Belief dimensions/items	Mean scores ^a			<i>t</i> value
	Positive attitude group	Negative attitude group		
Benefits to Chicago:				
Restoring natural areas to presettlement condition would improve the quality of life.	4.67	2.60		10.96 ^b
Restoring natural areas to presettlement condition would make the Chicago metropolitan area more attractive.	5.16	3.36		9.98 ^b
Restoring natural areas to presettlement condition would be a wise use of tax-dollars.	4.32	1.76		15.88 ^b
Restoring natural areas to presettlement condition would be a good way for us to care for the environment of the Chicago metropolitan area.	4.95	2.63		12.09 ^b
Restoring natural areas to presettlement condition would preserve plant and animal species that are in danger of becoming extinct.	5.03	3.49		8.37 ^b
Restoring natural areas in and around Chicago would increase tourism to the city.	4.39	2.59		10.47 ^b
Negative Conditions:				
Restoring natural areas to presettlement condition should not be done if it means cutting down mature trees.	5.48	5.25		0.96
Restoring natural areas to presettlement condition should be avoided if it would result in a loss of some wildlife habitat that already exists.	5.40	5.13		1.53
Restoring natural areas to presettlement condition by cutting or burning would result in areas looking unattractive.	4.45	5.41		9.98 ^b
Restoring natural areas to presettlement condition should be avoided if it results in the use of herbicides.	5.40	4.95		2.29
Resource Availability:				
Restoring natural areas to presettlement condition would place too many restrictions on how land could be used.	4.40	5.45		5.35 ^b

TABLE 5 Continued

Belief dimensions/items	Mean scores ^a		
	Positive attitude group	Negative attitude group	<i>t</i> value
Natural areas in and around Chicago could never really be restored to the way they were before Europeans arrived.	5.43	5.92	2.80
Natural areas in and around Chicago should be left alone rather than actively restored.	3.81	5.64	10.15 ^b
Restoring natural areas to presettlement condition is not necessary since there are plenty of natural areas outside the Chicago metropolitan area.	3.30	5.08	9.37 ^b
Acquiring more open land to be set aside as natural areas is more important than restoring existing natural areas.	4.74	4.59	0.65

^a1 = "Strongly disagree," 2 = "moderately disagree," 3 = "slightly disagree," 4 = "neither agree nor disagree," 5 = "slightly agree," 6 = "moderately agree," 7 = "strongly agree."

^bSignificant differences at $p \leq .003$, computed using Bonferroni's adjustment in order to guard against Type I error.

TABLE 6 Comparison of Mean Value Orientations Related to Biodiversity Between Positive and Negative Attitude Groups

Symbolic belief dimensions/items	Mean attitude scores ^a			<i>t</i>
	Positive Group	Negative Group		
Species Primacy:				
If it was known that an economic development project would result in a plant or animal species becoming extinct, the development should be stopped.	5.51	4.17		6.24 ^b
An endangered plant or animal species should be preserved whether or not that species directly benefits humans.	5.56	4.00		6.66 ^b
Even if a plant or animal species is in danger of going extinct by natural causes, humans should try to save the species.	4.94	3.74		5.11 ^b
It is unacceptable when humans cause the extinction of plant and wildlife species.	5.52	4.39		5.45 ^b
The best way to protect individual plant and animal species is to ensure their natural habitat is undisturbed by humans.	5.40	4.67		3.73 ^b
We should try to save all wild plant and animal species since many have benefits to humans that we still don't know about.	5.79	4.53		5.99 ^b
Species Loss:				
One of the most serious problems for wild plants and animals is loss of natural habitat.	6.26	5.80		3.23 ^b
The extinction of wildlife and plant species could have harmful effects on the well-being of humans.	6.08	5.32		4.85 ^b
The loss of any wildlife or plant species in nature could have harmful effects on the ability of other species to survive.	6.04	5.34		4.72 ^b
The loss of natural habitats for wild animals is not serious as long as there are zoos available for these animals to live in.	1.74	2.47		4.00 ^b
The loss of wildlife and plant species has no effect on the ability of humans to survive.	2.11	2.60		2.78
Species Value:				
I can think of some species of mammals, reptiles, fish, insects, or plants that I would like to see go extinct.	2.85	3.37		2.16

TABLE 6 Continued

Symbolic belief dimensions/items	Mean attitude scores ^a		<i>t</i>
	Positive Group	Negative Group	
Some species of plants and animals are undesirable and it would be good if they did go extinct.	3.04	3.71	3.09 ^b
There is no such thing as a good or bad plant or animal species since they all perform a function in the natural environment.	5.53	4.91	3.31 ^b
Human Primacy:			
Humans are part of the natural environment and therefore some human-caused extinction should be expected.	4.09	4.78	3.68 ^b
A wildlife or plant species should be protected or saved from extinction only if it can be shown to directly benefit humans.	2.48	3.72	5.52 ^b
When human needs conflict with protecting the habitat of a plant/animal species, the human needs take precedence over habitat.	3.70	4.81	6.04 ^b

^a1 = "strongly disagree," 2 = "moderately disagree," 3 = "slightly disagree," 4 = "neither agree nor disagree," 5 = "slightly agree," 6 = "moderately agree," 7 = "strongly agree."

^bSignificant differences at $p \leq .003$ computed using Bonferroni's adjustment in order to guard against Type I error.

Objective Knowledge

The positive-attitude group correctly answered 2.8 out of 7 questions, while the negative-attitude group members were correct on 2.0 of 7 questions, though both groups showed low knowledge overall (Table 7). The positive-attitude group was more likely to know that (a) controlled burns are sometimes used to manage forested areas in and around metropolitan Chicago, and that (b) restoration of tall-grass prairies, savannas, woodlands, and wetlands has already begun in the Chicago area.

Behavior

There was only one significant difference in reported behaviors between respondents with positive and negative attitudes. A higher percentage of individuals with positive attitudes toward ecological restoration recycled than did those with negative attitudes.

Discussion

This study holds two broad theoretical implications. First, structural equation analysis found that the theoretical model was an acceptable fit of the data, lending credibility to the notion that attitudes toward an issue such as ecological restoration may be appropriately addressed using a tripartite analysis. Second, this study supported the notion that the relationship between cognitive, affective, and behavioral factors and attitudes toward ecological restoration is influenced by both the importance of the issue and the direction of attitudes. This understanding of the underlying nature of attitudes toward ecological restoration would likely enhance managers' ability to predict behavior related to restoration, operationalized as active support for restoration activities.

That perceptions of outcomes of ecological restoration were strong predictors of one's attitudes is not surprising. In fact, these specific beliefs about ecological restoration were important for all four groups. What is particularly significant is that the role of other cognitive, affective, and behavior factors differed across attitude group. While perceived outcomes, values, and emotions all showed relatively strong effects on attitudes toward ecological restoration when the issue was important, values and emotions played relatively smaller roles in influencing attitudes when the issue was unimportant. This supported the notion that the underlying structure of "important" attitudes is likely different than "unimportant" attitudes. In addition, the systematic differences in the effects of emotional responses on attitudes across importance and attitude-direction groups supports the conclusions of Vining et al. (2000) that emotions play a part in perceptions of ecological restoration, and suggests that the emotional responses may be connected to characteristics of one's attitude.

The relative affects of cognitive, affective, and behavioral factors also differed between persons with positive and negative attitudes. Although both groups were influenced by perceptions of outcomes of ecological restoration, those with positive attitudes focused on benefits and resource availability while those with negative attitudes focused on resource availability and negative conditions. Those with positive attitudes were somewhat more influenced by values related to the value of wildlife species as related to humans than were those with negative attitudes. However, emotions influenced negative attitudes more than positive attitudes.

Although the study confirmed that the underlying structure of positive attitudes is different than negative attitudes, more can be learned about the nature of positive

TABLE 7 Comparison of Percent of Respondents Who Were Correct on Each Knowledge Question Between Positive and Negative Attitude Groups^a

	Percent Correct		Phi ^b
	Positive group	Negative group	
Controlled burns (fires intentionally set by natural resource managers) are sometimes used to manage forested areas in and around metropolitan Chicago. (True)	61.3	44.7	.096 ^c
There are fewer than 25 species of threatened or endangered plants and animals in the Chicago metropolitan area. (False)	30.5	31.6	.007
The Forest Preserve District of Cook County has plans to restore a significant portion of its 67,000 acres to conditions common to the area prior to European settlement. (True)	19.5	13.2	.046
The diversity of species in the Forest Preserves in Cook County has decreased since the establishment of the Forest Preserve System in the early 1900s. (True)	37.0	28.9	.056
The Karner blue butterfly is commonly found in the Chicago area. (False)	6.4	5.3	.013
Restoration of tall-grass prairie, savannas, woodlands, and wetlands has already begun in the Chicago area. (True)	61.2	42.1	.111 ^c
Increased vegetation in urban areas causes the air to become warmer. (False)	50.8	43.4	.042

Note. ^aIndependent samples *t*-test found that the positive attitude group were correct on a greater number of knowledge items than was the negative attitude group ($m = 2.8$ versus 2.0 ; $t = 3.36$, $p = .001$).

^bPhi is a chi-square distributed statistics used to analyze the relationship between dichotomous factors (positive vs. negative attitude).

^cSignificant differences at $p \leq .007$, adjusted using Bonferroni's adjustment in order to guard against Type I error.

and negative attitudes toward ecological restoration by comparing the two groups on specific items. The groups differed a great deal on what they perceived as outcomes to ecological restoration, and, as would be expected, nearly all of the differences in perceived outcomes were directional. However, also of interest are the items that did not differentiate between these two groups. Both agreed virtually equally that restoration should not occur if it meant cutting down mature trees, losing wildlife habitat, and using herbicides. Also, both agreed that returning nature to presettlement conditions was not realistic, which may explain why many ecological restorationists have pulled back from that objective. Another interesting agreement between the two attitude groups is that both agreed that setting aside additional land as natural is more important than restoring existing natural areas.

Differences in values between the attitude groups were in strength rather than direction. While people with positive and negative attitudes toward restoration may hold certain values with different intensity, they are otherwise similar. This supports previous work that suggests that basic values are often relatively similar, with differences existing primarily in the strength of such values (Fulton et al. 1996).

Also of interest in this study was the apparent lack of influence of objective knowledge on attitudes toward ecological restoration. This is consistent with other studies using a tripartite analysis (Bright and Manfredi 1996; Burtz and Bright 1998) that have suggested that values, perceived outcomes, and emotions mediate the effects of knowledge on attitudes.

This study provides a snapshot of the nature of attitudes toward ecological restoration in the Chicago Metropolitan Area. Given the attention it has received in the media, familiarity with the issue may have increased over time, and there may be potential changes in perceptions of ecological restoration. In addition, situational factors such as proximity of residence to restoration efforts, perceptions about individuals and agencies carrying out restoration activities, cultural differences among a study population, and other factors should be explored to more fully understand differences in perceptions of this issue. Research should continue to enhance understanding of attitudes based on the location of one's residence to restoration efforts and allow for generalization of findings related to the theoretical effects of residential proximity and other situational factors not easily addressed in a general population survey.

While understanding public attitudes toward ecological restoration does not tell land managers specifically what to do regarding ecological restoration projects, this information does provide more general benefits. Providing information on public beliefs, values, and attitudes the public holds about ecological restoration can aid in the integration of social, economic, physical, and biological information and thus provide a broader picture of the social environment that exists around urban ecological restoration. It can provide guidance in identifying and in reducing confrontations between opposing groups and/or reducing the severity of such conflicts. The fact that people with positive and negative attitudes toward ecological restoration agree on many aspects of this issue provides a starting point for resolving conflicts that may occur.

References

- Anderson, N. H. 1971. Integration theory and attitude change. *Psychol. Rev.* 78:171–206.
- Anderson, N. H. 1991. *Contributions to information integration theory* (vols. 1, 2, and 3). Hillsdale, NJ: Lawrence Erlbaum Associates.

- Arbuckle, J. R. 1997. *Amos users' guide version 3.6*. Chicago: SmallWaters Corp.
- Bath, A. J. 1989. The public and wolf reintroduction in Yellowstone National Park. *Society Nat. Resources* 2:297–306.
- Barnes, T. G. 1993. *Biodiversity* (Report FOR-63). Lexington, KY: Cooperative Extension Service, College of Agriculture, University of Kentucky.
- Belden and Russonello 1995. *Communicating biodiversity: Focus group research findings*. Report for the Consultative Group on Biological Diversity. June. Washington, DC.
- Bem, D. J. 1972. Self-perception theory. In *Advances in experimental social psychology*, ed. L. Berkowitz, vol. 6, 1–62. New York: Academic Press.
- Bonnicksen, T. M., and E. C. Stone. 1985. Restoring naturalness to national parks. *Environ. Manage* 9:479–486.
- Bright, A. D., and M. J. Manfredo. 1996. A conceptual model of attitudes toward natural resource issues. *Hum. Dimensions Wildl.* 1(1):1–21.
- Bright, A. D., M. J. Manfredo, and D. C. Fulton. 2000. Segmenting the public: An application of value orientations to wildlife planning in Colorado. *Wildl. Soc. Bull.* 28(1):218–226.
- Burtz, R., and A. D. Bright. 1998. The moderating effects of residential proximity on the formation of attitudes toward reintroducing predator species. *Proc. Seventh Int. Symp. Society and Resource Management*, Columbia, MO, May.
- Byrne, B. M. 1989. *A primer of LISREL: Basic applications and programming for confirmatory factor analytic models*. New York: Springer-Verlag.
- Carmines, E. G., and J. P. McIver. 1981. Analyzing models with unobserved variables. In *Social Measurement: Current issues*, ed. E. W. Bohrnstedt and E. F. Borgatta, 80. Beverly Hills, CA: Sage.
- Carr, S., and J. Tait. 1991. Differences in the attitudes of farmers and conservationists and their implications. *J. Environ. Manage.* 32:281–291.
- Eagly, A. H., and S. Chaiken. 1993. *The psychology of attitudes*. Fort Worth, TX: Harcourt Brace.
- Eagly, A. H., and S. Chaiken. 1998. *Attitude structure and function*. In *The handbook of social Psychology*, eds. D. T. Gilbert, S. T. Fiske, and G. Lindzey, Vol. 1, 4th ed., 269–322. Boston: McGraw-Hill.
- Fishbein, M., and I. Ajzen. 1975. *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fulton, D. C., M. J. Manfredo, and J. Lipscomb. 1996. Wildlife value orientations: A conceptual and measurement approach. *Human Dimens. Wildl.* 1(2):24–47.
- Fulton, D. C., J. Pate, and M. J. Manfredo. 1995. *Colorado residents' attitudes toward trapping in Colorado* (Project Report No. 23). Project Report for the Colorado Division of Wildlife. Fort Collins, CO: Colorado State University, Human Dimensions in Natural Resources Unit.
- Gobster, P. H. 1997. The Chicago Wilderness and its critics, III. The other side: A survey of arguments. *Restoration Manage. Notes* 15(1):32–37.
- Gobster, P. H. 2000. Restoring nature: Human actions, interactions, and reactions. In *Restoring nature: Perspectives from the social sciences*, ed. P. H. Gobster and R. B. Hull, 1–19. Washington, DC: Island Press.
- Grumbine, R. E. 1994. *Environmental policy and biodiversity*. Washington, DC: Island Press.
- Hook, R. A., and W. L. Robinson. 1982. Attitudes of Michigan citizens toward predators. In *Wolves of the world*, ed. F. H. Harrington and P. C. Paquet, 382–394. Park Ridge, NJ: Noyes.
- Kang, M. H., and S. I. Kim. 1996. Effects of the persuasive message on user's attitude toward the policy of limiting park use. *J. Korean For. Soc.* 80:20–31.
- Kellert, S. R. 1985. Public perceptions of predators, particularly the wolf and coyote. *Biol. Conserv.* 31:167–189.
- Kline, V. M. 1997. Orchards of oak and a sea of grass. In *The tallgrass restoration handbook*, ed. S. Packard and C. F. Mutel, 3–20. Washington, DC: Island Press.

- Manfredo, M. J., M. Fishbein, G. E. Haas, and A. E. Watson 1990. Attitudes toward prescribed fire policies. *J. For.* 88(7):19–23.
- Nunnally, J. C., and I. H. Bernstein. 1994. *Psychometric theory*, 3rd ed. New York: McGraw-Hill.
- Plutchik, R. 1980. *Emotion: A psychoevolutionary synthesis*. New York: Harper and Row.
- Shore, D. 1997. The Chicago Wilderness and its critics, II. Controversy erupts over restoration in Chicago. *Restoration Manage. Notes* 15(1):25–31.
- Stevens, W. K. 1995. *Miracle under the oaks: The revival of nature in America*. New York: Pocket Books.
- Vaske, J. J., and M. P. Donnelly. 1999. A value-attitude-behavior model predicting wildland preservation voting intentions. *Society Nat. Resources* 12:523–537.
- Vining, J., E. Tyler, and B. Kweon. 2000. Public values, opinions, and emotions in restoration controversies. In *Restoring nature: Perspectives from the social sciences*, ed. P. H. Gobster and R. B. Hull, 143–161. Washington, DC: Island Press.
- Wheaton, B. A., B. Muthen, D. F. Alwin, and G. F. Summers. 1977. Assessing reliability and stability in panel models. In *Sociological methodology 1977*, ed. D. R. Heise, 84–136. San Francisco: Jossey-Bass.

SOCIETY & NATURAL RESOURCES

AN INTERNATIONAL JOURNAL

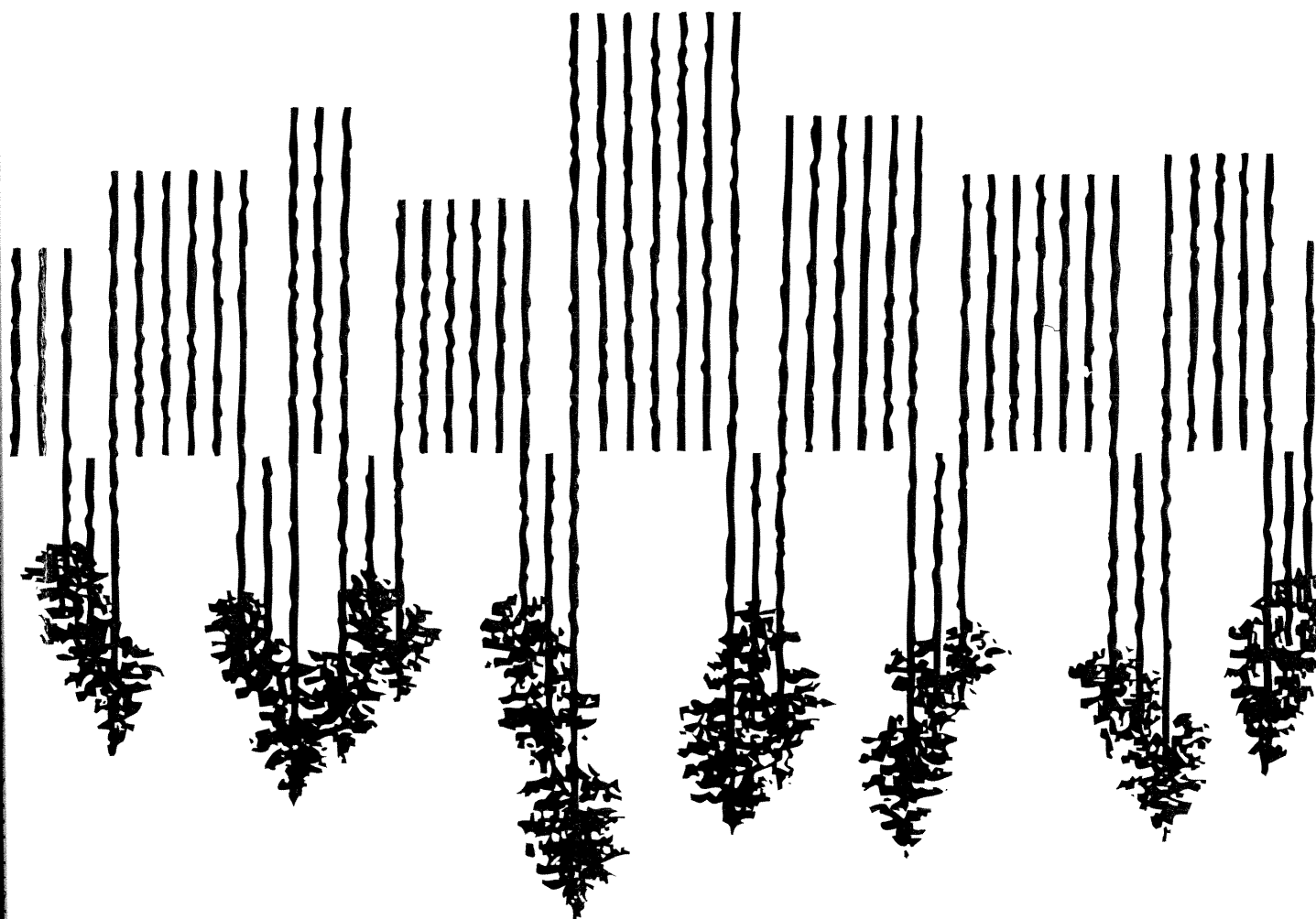
DONALD R. FIELD

CO-EDITORS-IN-CHIEF

FREDERICK H. BUTTEL

VOL. 15 · NO. 9

October · 2002



SOCIETY & NATURAL RESOURCES

Volume 15, Number 9, 2002

Contents

Articles

- Public Attitudes Toward Ecological Restoration in the Chicago
Metropolitan Region
Alan D. Bright, Susan C. Barro, and Randall T. Burtz 763
- Political Strategies of American Environmentalism: Inclusion
and Beyond
David Schlosberg and John S. Dryzek 787
- Knowledge Partnerships: Rapid Rural Appraisal's Role in Catalyzing
Community-Based Management in Venezuela
Brooke Ann Zanetell and Barbara A. Knuth 805

Essay

- Buying Back and Caring for Country: Institutional Arrangements and
Possibilities for Indigenous Lands Management in Australia
Marcus B. Lane 827

Forum

- Commentary on the Challenge to Change: Participatory Research
and Professional Realities
Gigi Berardi 847

Book Reviews

- Sarewitz, Daniel, Roger A. Pielke, Jr. and Radford Byerly, Jr., eds.
Prediction: Science, Decision Making, and the Future of Nature
Katrina Smith Korfmacher 853
- Kemmis, Daniel. *This Sovereign Land: A New Vision for Governing
the West*
Marcia Hill Gossard 856

(continued on inside back cover)

