Appropriate Combinations of Technology for Solving Landscape Management Problems— Session H: Rural and Agricultural Development

Managing for Naturalness in Wildland and Agricultural Landscapes[1]

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Abstract: Visual management systems operate from the premise that people have expectations for landscape views, and that people's positive expectations should be fulfilled. Both the Forest Service and Bureau of Land Management visual management systems assume that people expect wildlands to look natural.

People also like to see natural landscapes in rural Iowa. Research I conducted in 1977-78 showed that naturalness, land use compatibility, water presence, and relief predict 75 percent of the variance in visual value of Iowa landscape views. Naturalness alone predicts 50 percent of the variance in visual value.

People may have different expectations for naturalness in the context of an agricultural landscape than in a wild landscape. Although the agricultural landscape is of natural materials, it is also a landscape of designed patterns. The wild landscape displays natural materials in natural patterns. Differences in expectation should lead to different visual management approaches.

NATURALNESS IN THE VISUAL LANDSCAPE

People prefer the visual quality of natural landscapes. Zube, Pitt, and Anderson's study of the Connecticut landscape (1974) and my own study of the Iowa landscape (1978) support this assertion. The Forest Service and Bureau of Land Management visual management systems are based on this idea. Thinking about how people see naturalness in landscape may help us develop sound visual management goals.

People may enjoy seeing a natural landscape because the landscape communicates the concept of naturalness. Naturalness is a concept which has no specific appearance in form; line, texture, and color of naturalness change from place to place. These formal visual qualities seem not to account for the power of naturalness as a predictor of visual preference. Because perception and cognition of a landscape are not discrete events, landscape meaning may be more important than specific appearance in understanding people's visual preferences for natural landscapes.

What naturalness is may be impossible to determine. Yi-Fu Tuan reports that Basil Wiley noted 60 different meanings of the term (Tuan 1971). In both Zube, Pitt, and Anderson's study and my own, naturalness was operationally identified as being a function of land use type, and ranked land use types predicted visual preference. In Zube, Pitt, and Anderson's study, land uses were ranked by agreement of nine planners and, in my own study, land uses were ranked by reference to typical proportion of impermeable surface. Explaining the ranking for both studies as a description of the typical degree of control by people for any given land use seems to make intuitive sense. Research described below demonstrates that this common sense notion of naturalness is empirically related to people's preferences for landscape views. Adopting this operational definition of naturalness as a function of land use and

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and as reflecting the degree of control by people may be useful in thinking about regional visual management.

NATURALNESS IN THE IOWA LANDSCAPE: A STUDY

Hypothesis and Definitions

In a 1978 study of people's visual preferences for the Iowa landscape, I hypothesized four landscape characteristics to be positively associated with visual value and found naturalness to be by far the most powerful predictor. Visual value was operationally defined as the mean score of 150 people's evaluations of a given landscape view. Naturalness was operationally defined as the typical proportion of impervious surface of a given land use. In addition to naturalness, water presence, topographic relief, and land use compatibility were tested as predictors of visual value. Water presence was operationally defined as the visible presence of surface water; topographic relief was defined as the characteristic slope of the most prevalent visible landform; and land use compatibility was defined as similarity in naturalness of spatially adjacent land uses. Amount of presence of each of the four landscape characteristics was categorized by an ordinal scale (table 1).

Research Technique

An original sample of 152 slides depicting Iowa landscapes was selected to represent the range of categories for the four landscape characteristics and all possible combinations of the categories. That range was achieved with the exception of some combinations of landscape characteristic categories unlikely to be found in Iowa. Slides were selected to control several factors that might influence evaluations of visual quality: slide quality, slide orientation, viewer eye level, season, weather, diurnal changes, presence of animals or people, number of land uses, and distance of view.

To verify the presence of the categories of landscape characteristics in the slides, they were shown to three agronomists, three geologists, and three landscape architects. Each of the viewers was asked to categorize the landscape characteristics seen in the slides according to the operational definitions given above. The Chi-Square Test for goodness-of-fit was used to compare the number of viewers who agreed on the category of a characteristic shown in a slide with the number of viewers who might agree by chance. The number of viewers who agreed was significantly greater than chance on all four characteristics for 82 of the slide views. These 82 slides composed the sample of views for the remainder of the study. The number of slides in each of the landscape categories is described by Table 1.

147 students and 3 instructors at Iowa State University evaluated the visual quality of landscapes shown in the 82 slides. The participants were chosen to represent a range of possible occupational biases in landscape evaluation; 47 were landscape architecture majors or instructors, 20 were farm operations majors or instructors, and the remaining 82 came from a wide variety of other majors.

Five groups of participants viewed the slides in three different random orders. T-tests of the difference of mean scores for each view showed slide order to have no effect on visual evaluations. The participants were asked to “Evaluate each view according to its visual quality relative to all other Iowa landscapes you know. Don't think about its quality for a particular activity (say, traveling, or a place to live). Think only about its quality as a view...record your first impression. Do not stop to consider your answer.” Participants were asked to rate the visual quality of each view on a scale from 1, very high, to 7, very low. Each slide was shown for 10 seconds.

Data Analysis

Scores for visual value were determined by finding the mean visual quality score for each view. [lean scores for the views ranged from 1.76 to 6.00. All but ten of the views had a range of evaluations from I to 7, but standard deviations for the mean scores fell consistently between 1.2 and 1.6.

Each landscape category for all four landscape characteristics was treated as a nominal variable. For example, the presence or absence of the agricultural naturalness category was coded instead of the second highest level of naturalness, agricultural land use, being coded. In this way, the order of categories within landscape characteristics, as they empirically related to visual value, could be observed. Each of the four landscape characteristics was regressed alone on visual value, without controlling for the effects of the other landscape characteristics; and all of the landscape characteristics were regressed together on visual value, controlling for interactions among landscape characteristics.

Nonstandardized regression coefficients for the categories of each of the four landscape characteristics described the order of the categories (table 1). The naturalness categories

Table 1--Landscape Characteristic Categories: nonstandardized regression coefficients

Landscape Characteristic Category	n	Controlled	Uncontrolled	Mean
Naturalness				
Nonagricultural	30	-1.51	-2.00	2.96
Agricultural	27	-1.20	-1.41	3.56
Residential	8	-1.15	-1.12	3.88
Industrial	6	0.09	-0.01	4.95
Commercial	11	0	4.96	4.96
Compatibility				
Same	51	-0.41	-0.39	3.60
Compatible	15	-0.56	-0.49	3.50
Incompatible	16	0	3.99	3.99
Water Presence				
Water visible	29	-0.57	-0.97	3.03
Water not visible	53	0	4.00	4.00
Topography				
Strongly sloping	10	-0.62	-1.39	2.87
Varying	38	-0.28	-0.95	3.31
Nearly level	34	0	4.26	4.26

were ordered as expected, but regression coefficients of the commercial and industrial categories were very similar, suggesting that the visual value of the two land uses is similar. Contrary to expectation, regression coefficients of the land use compatibility categories showed that views of two compatible land uses were valued over views of a single land use. However, in general, nonstandardized regression coefficients for all the landscape characteristic categories confirmed the expected order for visual value. The main hypothesis, that the four landscape characteristics were positively associated with visual value, was tested by regressing all of the landscape characteristic categories and all of their two-way interactions on visual value. An initial step-wise regression included 28 of 37 possible terms and explained 75% of the variance in visual value. This initial regression showed that the four land use characteristics and their interactions were highly significant in predicting visual value.

A classical analysis of variance, described below, isolated the effects of each of the landscape characteristics from those of the interaction terms and allowed each characteristic to be evaluated separately. All of the terms in the analysis of variance were significant at the .01 level of probability except land use compatibility, which indicates that compatibility is not an important predictor of visual value.

Source of variation	Mean square			F
Saturated model	.7463/28	=	.0266	5.5417
Additive model	.6285/9	=	.0698	14.5417
Naturalness	.5054/4	=	.1264	26.3230
Compatibility	.0266/2	=	.0133	2.7708
Water presence	.2007/1	=	.2007	41.8125
Landform	.2640/2	=	.1330	27.5000
Interaction	.7175/23	=	.0312	6.5000
Residual	.2537/53	=	.0048	

The final regression equation did not include the compatibility characteristic and treated the commercial and industrial land use categories of naturalness as a single category. This equation, a partial stepwise regression entering the naturalness, water presence, and topo-

graphic relief characteristics first, and their two-way and three-way interactions second, showed naturalness to be the most significant characteristic, explaining 50 per cent of visual value. This final equation is described below.

Independent variable	R^2
Nonagricultural land use	0.26
Agricultural land use	0.42
Residential land use	0.50
Water presence	0.56
Steep topography	0.58
Varying topography	0.59
Interaction of nonagricultural land use and water presence	0.63
Interaction of residential land use and varying topography	0.64
Interaction of residential land use and water presence	0.65
Interaction of nonagricultural land use, water presence, and varying topography	0.65
Interaction of water presence and steep topography	0.66

Implications

The most important finding of this study is that naturalness of land use type is a powerful predictor of visual preference. Specifically, the study found that people have visual preference for land uses in the following order of their naturalness:

1. Non-agricultural open space
2. Agricultural land
3. Residential land
4. Commercial or industrial land

Results of Zube, Pitt, and Anderson's landmark study of the Connecticut River Valley (1974) are consistent with this finding. Both studies examined visual preference for primarily rural landscape regions; the Forest Service and Bureau of Land Management describe naturalness as a determinant of visual quality in wildlands as well. The first premise of the Forest Service Visual Management system is that, "People expect to see a naturally appearing character" within forest areas (Forest Service 1974). The Federal Land Policy and 1".anagement Act of 1976 directs the Bureau of Land Management to manage the landscape with concern for "natural scenic values." Although naturalness has positive visual connotations in both wildlands and agricultural lands, it may have distinct meanings and implications for visual management in each of the two landscape types.

EXPECTATIONS FOR NATURALNESS

The Land Use Context of Naturalness

Defining naturalness as the typical degree of control by people for a given land use helps us make sense of the order of the land uses in the Iowa study, but it does not tell us what qualities of the land use communicate the concept of naturalness to the viewer. Each land use implies a different level of naturalness and visual preference, but it may also imply a different image of naturalness. To manage nonagricultural

Figure 1--Nonagricultural open space

Figure 2--Agricultural space

open space or agricultural lands we need to know what naturalness means to the viewer in each land use context. We need to know what people expect naturalness to look like in wildlands and agricultural lands.

Our criteria for judging the visual quality of any given landscape may be qualified by our original expectation for the naturalness of the land use; the less natural the land use, the less our visual criteria are derived from the expected appearance of naturalness. So a forest may be more beautiful than agricultural land simply because it is a forest; but at the same time, we expect the forest to be beautiful in a different way than agricultural land simply because it is a forest. Between perception (this place is a forest) and expectation (this place should be beautiful in the way forests are beautiful) lies an interpretation of naturalness for a specific land use. Naturalness may mean the appearance of unimpeded ecological succession in one setting, but may mean only the presence of growing corn in another setting. The wildland context indicates a different interpretation of naturalness than does the rural context. Recognizing the deepfelt meaning of naturalness in any landscape context, we can also recognize that the specific meaning of naturalness may change with landscape context.

Wildlands as Archetypes of Naturalness

John Dewey says in Art as Experience that, "While the roots of every experience are found in the interaction of a live creature with its environment, that experience becomes conscious, a matter of perception, only when meanings enter it that are derived from prior experience" (Dewey 1958).

Several theorists see wild or natural environments as archetypes of meaning which are carried not only into the interpretation of other environments but also into other forms of experience. Jay Appleton (1975) argues that people's ancestral experience in natural environments taught or caused the evolution of a preference for environments that provide visual control of the environment or that provide shelter from environmental threat. Appleton suggests that natural environments are likely to be most visually appealing because they are likely to have the greatest potential for prospect and refuge. Paul Shepard (1967) sees wilderness as the landscape archetype of acceptance of natural systems. He notes that "The spiritual effect of the wilderness runs deeper than any other encounter in nature," and that people's response to wilderness has varied from the revulsion of 16th century Protestants to the reverence of the Transcendentalists. Yi-Fu Tuan links current interpretations of nature with two ideologies, environmentalism and ecology. Both ideologies interpret nature as the ultimate external authority, a kind of parallel to anthropomorphic notions of God. Thus, the effects of nature and natural systems are inherently good. It follows that landscapes that reveal the unimpeded actions of natural systems are also inherently good, and that the landscape of greatest appeal in our time and culture is the wilderness.

Viewed from the theoretical standpoints of any of these writers, wildlands are archetypes of powerful forces outside the control of people. Like the 18th century English notion of the

Figure 3--Residential space

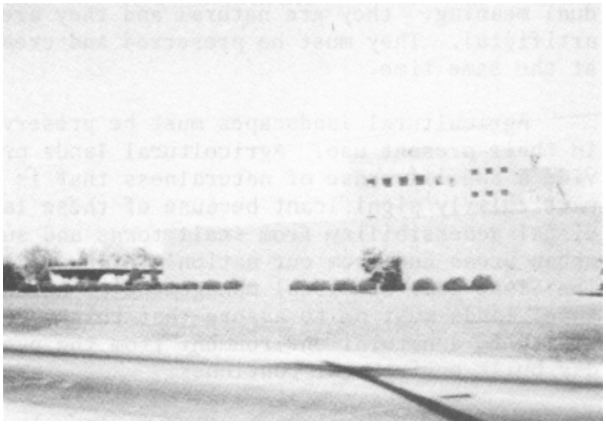

Figure 4--Industrial or commercial space

sublime, wild landscapes disallow the appearance of human intervention. The sublime was the wonderful and tremendous in nature. It was too large to be experienced by the senses; perceiving the sublime was an attempt to embrace infinity. Archetypes of naturalness exclude the appearance of design.

The visual management of wildlands must reject aesthetic artifice. Although we may not fully understand the complex ecological communities of wildlands, we hope the communities are there: our dependence on natural forces outside our control has deep meaning for us. Though we might be able to establish the conditions which will allow a natural ecological community to evolve over time, such a landscape cannot be had by design fiat. Nor does imitation of visual qualities of natural objects satisfy our expectation for wild landscapes. The only way we can have such landscapes is to select them from the existing landscape to he protected from human design. We select these landscapes for ourselves, but we also select them as authentic archetypes for future people's ideals. And it seems that the appropriate criteria for such selection are not visual, but biological, because in wildlands the visual image communicates the meaning of the biological ideal.

Agricultural Landscapes as Designed Landscapes

What meanings enter into the perception of agricultural landscapes? The agricultural landscape suggests naturalness limited and portrayed by human intention; viewers expect the imprint of human activity on this landscape. It is by definition a landscape of natural materials, but a landscape designed by people. It uses natural systems, but it does not control them. Agricultural landscapes have a dual meaning: they are natural and they are artificial. They must be preserved and created at the same time.

Agricultural landscapes must be preserved in their present use. Agricultural lands provide a special sense of naturalness that is particularly significant because of these lands' visual accessibility from small towns and suburban areas and from our nation's highways. The first goal of visual management of agricultural lands must be to assure that this accessibility to a natural environment from the everyday built environment continues.

The visual management of agricultural lands should also encourage the creative exercise of aesthetic artifice. Artistic interpretation of the relationship between natural and human forces is appropriate here. Some of the agricultural landscapes that exist today can simply be recognized as found art. Other agricultural landscapes can be preserved in their present use, but changed in appearance to improve their visual quality. These lands can be patterned and judged according to criteria of line, texture, and color because the agricultural landscape is essentially designed. Visual management of the agricultural landscape can enlarge the purpose of the agricultural design to include aesthetic pleasure.

Visual management Techniques: Creation and Selection

While we need to recognize naturalness as a primary overriding determinant of visual value in both wildlands and agricultural lands, people may have different expectations for naturalness in each case. It follows that agricultural lands and wildlands should be managed differently. Agricultural landscapes display natural materials in artificial patterns; the lands must he preserved in this present use, but the patterns can be created. Wildlands display natural materials in natural patterns; these lands must be selected for preservation from the appearance of design. Criteria for judging the visual quality of each landscape type should incorporate this crucial distinction between creation and selection.

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