Pergamon

Applied Geography 22 (2002) 49–76

APPLIED GEOGRAPHY

www.elsevier.com/locate/apgeog

Testing a place-based theory for environmental evaluation: an Alaska case study

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Received 23 August 2000; received in revised form 17 July 2001; accepted 16 August 2001

Abstract

Norton and Hannon (Environmental Ethics, 19(3), (1997), 227) proposed a theory of environmental evaluation based on a commitment to place or 'sense of place' wherein the intensity of environmental valuation is discounted from the home perspective across both time and space – a form of geographic discounting. This theory leads to a series of specific, testable scientific hypotheses relating the physical distance of an object from the point of residence to the intensity of value-judgements. Using community-based survey data collected as part of the planning process in the Chugach National Forest in Alaska (USA), this paper examines the statistical and spatial relationships between ecosystem values and respondent-selected locations on the regional landscape. The findings indicate that ecosystem values are not uniformly distributed across the landscape (not completely spatially random) and that some spatial relationships exist between selected ecosystem values and point of residence (community). The policy implications of these findings for natural resource planning and management are discussed, highlighting the importance of community-based environmental analysis. © 2002 Published by Elsevier Science Ltd.

Keywords: Community analysis; Environmental valuation; Place attachment; Spatial analysis

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0143-6228/02/$ - see front matter © 2002 Published by Elsevier Science Ltd.
PII: S0143-6228(01)00019-4

In this paper we examine the place-based theory of environmental evaluation and its major supposition, the concept of geographic discounting, using survey data collected from individuals living in communities near the Chugach National Forest in Alaska (USA). The place-based theory holds that environmental values are culturally constructed from a home perspective, with the intensity of environmental valuation being discounted from the home perspective across space. The primary supposition investigated is whether places of value are clustered or more spatially dense near the communities in the study area and decrease as a function of distance from a community. A mail survey methodology was developed that combined the process of ranking environmental values along with locating them on the landscape as part of the Chugach National Forest planning process conducted during 1998–2000.

The geographic setting for this case study, the Chugach National Forest, is a large tract of land in Alaska (approximately 2.2×10^6 ha) under federal ownership and administered by the US Department of Agriculture Forest Service. Located in south central Alaska (Fig. 1), the area contains the heavily glaciated Chugach Mountains

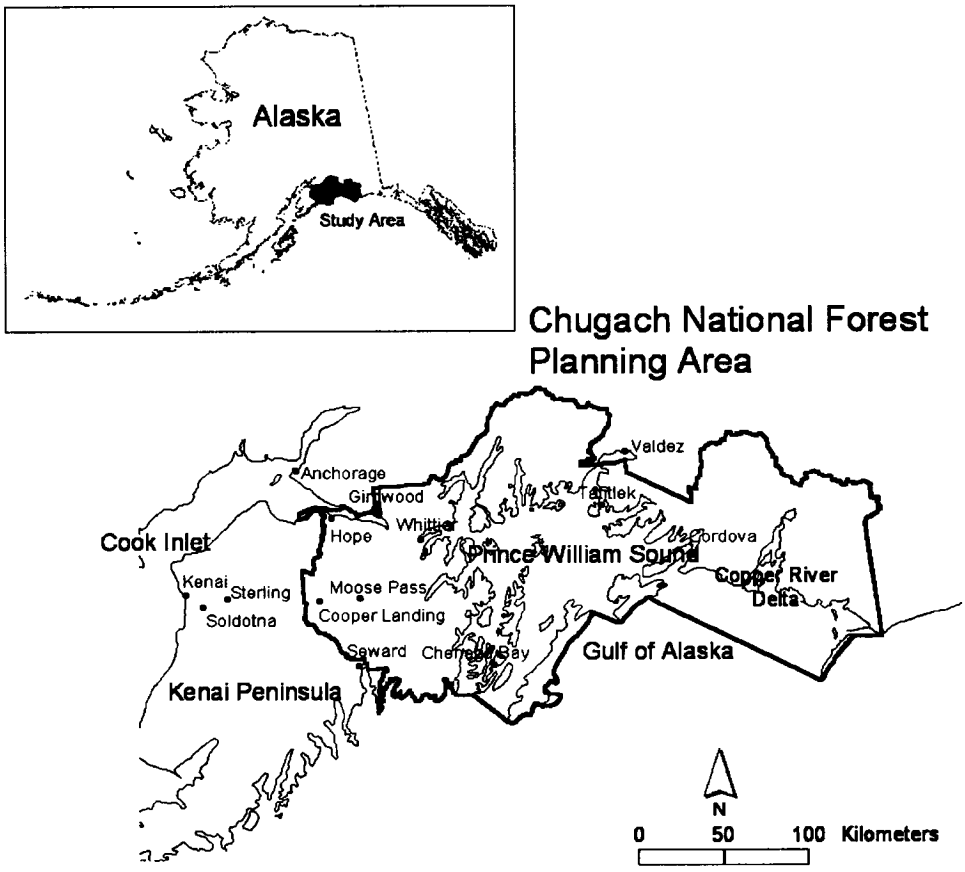

Fig. 1. Location of the study area in Alaska.

that surround Prince William Sound, a splintered array of islands and fjords with tidewater glaciers and abundant marine life. The national forest area spreads from the Kenai Peninsula in the west to the Copper River Delta in the east. The latter is the largest contiguous wetland area on the US west coast. Fourteen communities, ranging from the large urban area of Anchorage (population 260 000) to the small community of Hope (135 people) are located near or adjacent to the forest.

The place-based theory of environmental evaluation

Norton and Hannon (1997) proposed a theory of environmental evaluation based on a commitment to place. It rests on the assumption that some form of territoriality is universal to all human cultures, particularly with respect to those aspects of culture that relate people and communities to their ecological, social and cultural contexts. According to the theory, environmental values are manifestations of cultural values constructed from a given perspective in time and space, wherein the intensity of environmental valuation is highest in the here and now and is discounted from the home perspective across both time and space. This theory is an extension of the general concept of geographical discounting (Hannon, 1994), wherein people, animals and plants seem to consistently prefer to distance themselves from objects they fear and draw close to things they desire.

The place-based theory of environmental values leads to two general hypotheses:

- a scientific hypothesis relating the physical distance of an object from point of domicile to intensity of value-judgements, and
- a social-scientific hypothesis that allows us not only to predict how people will value things, but also to measure changes in local preferences as a result of experiences in democratic formulation of management goals (Norton & Hannon, 1997: 231).

These hypotheses assume that environmental values are formed within a phenomenological space that is organized from some place, and that development of a full sense of place involves a recognition of the various scales on which one interacts with nature from that place. Accordingly, 'local values are associated with a particular place, they are forged out of a very intimate relationship with the biotic communities in a region, and their perpetuation is associated by local inhabitants with success in maintaining their sense of spiritual and physical place' (Norton & Hannon, 1997: 238).

The concept of geographic discounting reflects deep psychological and aesthetic concerns and is manifest in human behavioural responses to objects in the environment. The familiar 'Not in My Backyard' (NIMBY) behaviour is a fear-based, territorial response from those who object to the siting of locally unwanted land uses. Hannon (1994) notes that NIMBY behaviour is a natural reflection of our insistence to be near objects we desire and far away from those we fear. Geographic or spatial discounting is roughly analogous to temporal discounting, whereby humans are seen

to favour current enjoyments of positive experiences while delaying unpleasant experiences. In temporal discounting, people favour the present over the future. In spatial discounting, people want to be near positive objects and distant from negative objects. The element of risk adds to the psychological effect of spatial discounting (Hannon, 1994).

Some studies have examined the relationship between distance and undesirable land uses. For example, Mitchell and Carson (1986) found that geographic discounting rates reflected declining levels of concern as distance from nuclear and electric power plants increased. In contrast, Maderthaner, Guttman, Swaton and Otway (1978) found that people living 1.4 km from a nuclear power plant expressed nearly the same level of concern as those living 10 km away, and Howe (1988) found that perceived rather than actual distance was inversely correlated with level of concern over toxic waste sites.

Other studies have attempted to examine the effects of geographical discounting with respect to real estate values. Colwell, Gujral and Coley (1985) examined the relationship between residential housing values and distance to a recently completed shopping centre. Their results indicated negative housing value effects (e.g. noise, lighting) within about 500 m of the shopping centre but positive effects (e.g. convenience) between about 500 and 1200 m away. Colwell and Sirmans (1978) found an exponential decline in residential property values as a function of distance from the central business district in a community, and although Colwell (1990) found lower residential property values near high-voltage power lines, he also found a sharply declining effect on value reduction with distance from the power lines. With respect to amenity or 'quality-of-life' factors, other studies indicate that property values may be higher near green belts (Correll, Lillydahl, & Singell, 1978; Nelson, 1986) and parks (Hammer, Horn, & Coughlin, 1974; More, Stevens, & Allen, 1982; Kimmel, 1985).

The concept of community

The concept of 'community' as a variant of place attachment is an important area of inquiry for this study. Numerous operational definitions exist in the research literature (Hillary, 1955; Wilkinson, 1986; Machlis & Force, 1988). Flora, Flora, Spears, Swanson, Lapping and Weinberg (1992: 27) defined community as 'a place or location where groups of people interact'. Wilkinson (1986) described a community as a geographic area with three elements – the presence of people meeting their daily needs in a particular geographic area with some kind of social and economic structure (e.g. schools, churches and stores) and some form of cooperatively engaged action (e.g. local government). As reflected in our 1999 Alaska community survey results, Alaskans consider their communities to be relatively distinct spatial areas that reflect local values, attitudes and lifestyles. The spatial extent of the concept of community is empirically examined in this study.

In valuing environmental attributes, spatial discounting focuses on distance whereas a place-based theory focuses on both distance and place context, including

social and cultural factors. Norton and Hannon (1997) argue that place orientation requires a 'home perspective' as well as a sense of space around the home place that results in valuation based on a commitment to place. 'We model environmental decisions as faced by individuals who are deeply influenced both by their individual perspective and by a local, community perspective' (Norton & Hannon, 1997: 229). In essence, place, community and scale matter in the process of environmental valuation.

Defining and measuring environmental values

The issue of what constitutes an 'environmental value' is not entirely clear from Norton and Hannon's place-based theory, in part due to the complexity of environmental valuation and alternative conceptions of 'value'. Human values have been the subject of considerable research across a variety of academic disciplines (e.g. see Rokeach, 1973; Andrews & Waits, 1980; Brown, 1984; Bengston 1994; Kempton, Boster, & Hartley, 1995) that derives from three different theoretical traditions:

1. the social utility perspective where value represents an object's usefulness for human purposes;
2. the cohesiveness perspective where values are meta-sociological constructs that facilitate coordinated action, and
3. the social discourse perspective where values represent evaluative judgements resulting from interpretation of social phenomena and emergent properties of communicative action (Keuntzel, 2000).

This study focuses on preference-based, held values that may be defined as 'an enduring conception of the preferable which influences choice and action' (Brown, 1984: 232). With this conception, the assignment of value is based on human preference as opposed to social obligation (norms) or physical/biological function.

Environmental valuation is the expression of preferences (evaluation) for certain objects or outcomes (attributes) that involve both a valuer and an object of value. People hold certain 'values' but also express 'value' for certain objects. Value preferences may be ordered to reduce internal value conflict and cognitive dissonance in decision-making processes. Confusion between held values and objects of value is common because the dividing line between these two concepts is subjective and dependent on how terms are defined (Bengson & Xu, 1995). Norton and Hannon (1997: 231) define environmental values as 'cultural values that are constructed from a given perspective in space and time', a definition that emphasizes the human component of valuation, but the place-based theory is stated in terms of the strength of opposition or approbation to potential land uses (*objects* of value) based on geographic proximity (p. 230). For these authors, an environmental value is clearly more than economic value and includes some expression of value based on a commitment to one's own home and community. But the range of potential environmental values

and their potential relationship to place theory are not fully articulated. According to the theory, physical distance can influence the 'intensity of value judgements' but what is a value judgement and how is it to be measured? Recent work in the area of identifying and measuring ecosystem values may be insightful.

Early work on the spatial aspects of environmental values focused on place attachment and the role of human–environment interactions in the development of special places in areas such as resort towns (Hester, 1985), national forests (Mitchell, Force, Carroll, & McLaughlin, 1993; Crystal & Harris 1997; Smaldone & Harris, 1997), and wilderness areas and national parks (Williams, Haggard, & Schreyer, 1989). Values for these places were addressed in terms of the interactions between people and settings, and were found to vary in their focus depending on the nature of those interactions. Some interactions were viewed as reflecting a personal level of activity, association, identification, meaning and, ultimately, value for understanding the development of personal identity in the context of a particular place, time and experience; others noted the role of cultural values on place identification and attachment at the broader level of cultural and societal attachment – as in the symbolic values of national parks and wilderness areas in American society (Crystal & Harris, 1997; Williams et al., 1989).

As noted by Williams (1988), these meanings are often tied in a natural resource context to the behaviours or activities of recreationists. Mitchell and her colleagues (1993) found the focus of place attachment to vary in terms of the extent to which recreational visitors are use-orientated rather than attachment-orientated. The attachment-orientated reported feeling a strong emotional bond with places, revealing a sense of ownership, pride and respect for the areas. They described places in terms of having a personality and visited them repeatedly, establishing traditions and rituals of use. User-orientated people viewed the places as important because of the activities or experiences these places provided, often revealing that they would not return if they could not continue their desired activities. Thus a user-orientated person would be more willing to find a substitute for a place than an attachment-orientated person. These researchers also noted that the needs of attachment-orientated people have been ignored by project managers, and stressed that these emotional values should be incorporated into land planning decisions. In part in response to concerns like these, Crystal and Harris (1997) developed the concept of a Spirituality Opportunity Spectrum, which sought to operationalize the different kinds and sources of place attachment and then to integrate these attachment-based values into the resource-management planning process. The work of Smaldone and Harris (1997) represents early efforts to map these values for a particular area, the Clearwater National Forest in Central Idaho (USA), as suggested in discussions by researchers like Williams (1995) and planners like Galliano and Loeffler (1995).

In a similar vein, Brown and Reed (2000) developed and tested a typology of values for natural landscapes that recognizes 13 potential environmental or ecosystem values (see Table 2).[1] The value typology, adapted from Rolston and Coufal (1991),

[1] The value typology was originally framed in term of 'forest' values but is not limited to forested landscapes. In fact, a large percentage of the Chugach National Forest where the typology was adapted

closely parallels the value typology developed by Manning, Valliere and Minteer (1999) to measure values in the Green Mountain National Forest in Vermont (USA). Both these studies found similar results: non-material values for the landscape clearly predominate (as the work of Crystal and Harris (1997) and Smaldone and Harris (1997) also found), while direct or individually related values, such as recreation (which are more utilitarian) and aesthetics (based on physiological and cultural predispositions to find certain settings or landscapes more attractive and others less so), are generally rated as most important. Less direct and more abstract values, such as life support or ecological protection, were also rated as important.

Hypotheses examined in the study

The intersection of Norton and Hannon's place-based theory of environmental values and Brown and Reed's spatially measured environmental values provides fertile ground for the exploration of a number of research questions related to the spatial distribution of environmental values and their relationship to place attachment:

1. Can the 13 environmental values from the value typology be measured spatially on a landscape? If so, do these environmental values emerge as spatial patterns on the landscape or are these values randomly distributed? H_0: *Environmental values are distributed completely spatially randomly (CSR) across a given landscape.*
2. Do environmental values by community emerge as spatial patterns on the landscape? The place-based theory for environmental valuation suggests that environmental values will cluster near a community as an expression of the 'intensity of value judgement'. H_0: *Environmental values for respondents in a given community do not spatially cluster around the community.*
3. Are environmental values more 'intense' or greater near a community? H_0 : *There is no relationship between the distance of an environmental value from a community and the 'intensity' or magnitude of valuation.*
4. Do residents of communities with strong place attachment locate environmental values nearer their community than communities with weak place attachment? H_0: *There is no relationship between community place attachment and the distance to environmental values surrounding a community.*
5. Are all environmental values subject to the same or differential spatial discount rates? Are some environmental values (e.g. recreation) more distance-sensitive

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is not forested. The value typology appears to be adaptable to any predominantly natural landscape. We believe the most descriptive label for the value typology would contain the term 'landscape' or 'ecosystem' in recognition of its intended phenomenological nature. Arguably, when one holds or expresses some of the values in the typology, one is engaged in environmental valuation. We refer to the values in the typology as environmental values while fully recognizing that some of the values (e.g. life support, biological diversity) may be commonly interpreted as more 'environment'-orientated than other values (e.g. cultural, historic).

than others (e.g. biological diversity)? H_0: *There is no difference in the spatial discount rate for different environmental values.*

6. Do relationships exist between the point value locations and potentially significant geographic features such as roads? H_0: *There is no relationship between environmental value point locations and the national forest road system.*

After answering these questions, we return to the question of the importance of communities in resource planning and a discussion of how knowledge of the spatial distribution of environmental values can be utilized in a rational land use planning process.

Study methodology

Sampling and survey instrument

In March 1998 a mail survey of Alaskan residents was conducted using Dillman's (1978) 'total design method'. The sample (see Table 1) consisted of randomly selected individuals from households in 12 communities (Anchorage, Cooper Landing, Cordova, Girdwood, Hope/Sunrise, Kenai, Moose Pass, Seward, Soldotna, Sterling, Valdez and Whittier) in close proximity to Chugach National Forest, under the assumption that households in these communities would have the greatest interest

Table 1
Communities sampled and the survey response rate

Community	Number of 1997 PFD applicants	1998 survey		1999 survey	
		Households sampled	Response rate (%)	Households sampled	Response rate (%)
Anchorage	194 140	281	30	235	22
Cooper Landing	329	148	44	152	34
Cordova	2 376	250	32	245	23
Girdwood	1 422	229	35	224	28
Hope	162	75	37	66	27
Kenai	10 118	265	27	219	22
Moose Pass	92	92	44	104	22
Seward	3 775	243	31	219	26
Soldotna	12 107	259	32	222	27
Sterling	2 488	239	36	224	16
Valdez	3 911	253	26	219	22
Whittier	237	113	23	110	16
Other Alaska	330 724	319	21	N/A[a]	N/A[a]

[a] No statewide sample was collected in 1999.

in forest planning issues. Additionally, a smaller, statewide random sample of households was included in the study for comparison with households in close proximity to the forest.

A second mail survey was sent to randomly selected households in the same 12 communities in 1999 to assess community characteristics, to measure residents' perceived quality of life, and to determine the contribution of public lands to community quality of life. As discussed below, several questions in the second questionnaire asked respondents to assess their level of place attachment. Both surveys followed the same sampling procedure.

The sampling frame was a database produced by the State of Alaska of all individuals in Alaska who had applied for a permanent fund dividend (PFD) from state oil revenues in 1997 and 1998 respectively. The strength of this sampling frame is that it is reasonably comprehensive, including most Alaskans who consider themselves to be permanent residents. For example, the 1996 US Census Bureau population estimate for Alaska was 604 966, while the 1997 PFD application database contained names and addresses of 571 241 individuals. The PFD sampling frame has two major weaknesses: it includes Alaskan residents regardless of age (all Alaskan residents, including infants, are eligible to receive a PFD) and it under-represents those who had lived in Alaska for less than a year (these individuals could not have applied for a PFD). From the US Census Bureau population estimates, approximately 30% of the questionnaire recipients were likely to be 17 years or younger and thus non-response would be expected from a high percentage of these households, even though the cover letter requested that someone else in the household complete the questionnaire if the named recipient was a child.

Sampling was limited to one individual per household. An introductory letter announcing the aims of the survey was sent to each selected household prior to the actual mailing of the questionnaire with a cover letter. A follow-up reminder postcard was sent approximately 10 days after the questionnaire. The 1998 questionnaire and cover letter were accompanied by a USDA Forest Service printed Chugach National Forest map that recipients were to use to complete part of the questionnaire.

The 1998 questionnaire contained five sections. The primary focus of the present paper is the section that requested survey participants to allocate a hypothetical $100 among 13 possible forest values. The specific instructions included in the questionnaire were as follows:

> The Chugach National Forest holds different values to different people. Some of these values are connected to direct use of the forest (such as for recreation). Some people value the Forest without setting foot on it (such as knowing that future generations will have the opportunity to enjoy it as it is now). Listed below are some of the best known values of national forests. We would like to know how important each of the following values of the Chugach National Forest is to you.
>
> Imagine that you could 'spend' $100 to insure that the Chugach National Forest keeps its existing values. You may allocate or spend the $100 in any way you

like, but your total spending may not exceed $100. You might spend all $100 on one value (and $0 on all others) or you might spend $50 on one value, $25 on another value, and $25 on yet another value. Remember, the total dollars you spend should equal $100.

The initial list of forest values to be included in the questionnaire was based on the typology suggested by Rolston and Coufal (1991). However, some changes were made to expand and clarify the typology. Two additional values – cultural and therapeutic value – as suggested by Rolston (1989) were added. Future value was also added to explicitly acknowledge bequest and option values for the forest that people may hold. The separate 'wildlife' value proposed by Rolston and Coufal was dropped because it represents a clear object-of-value that we wished to avoid in the typology. Several other changes were made to the Rolston and Coufal value terminology but the intent was to maintain the cognitive meaning – 'scientific value' became 'learning value', 'natural history value' became simply 'historic value', and 'life-support value' became 'life-sustaining value'. Finally, in deference to the importance of subsistence as a legal, social and political concern to Alaskans, we added a thirteenth and final value: subsistence.

Each of the 13 values was accompanied by a short phrase to communicate its intended meaning. Pre-testing of the questionnaire resulted in some changes to the list of value names and explanatory phrases. The actual list of values and phrases used in the final questionnaire appears in Table 2. Pre-test results indicated that all the forest values were selected by at least some of the respondents (and thus we were reluctant to drop any of the values), that few new values were suggested for inclusion (the one exception was 'wilderness', which was mentioned by more than one individual), and that few individuals had difficulty grasping the value meanings.[2]

After allocating their hypothetical $100 among the 13 values, respondents were instructed to unfold the official map of the Chugach National Forest accompanying the survey, to which was attached a key containing 13 sets of four coloured dots. Each set of coloured and coded dots represented one of the 13 values. A definition for each value accompanied the dots. The respondents were instructed as follows:

For each of the forest values that you spent any of the imaginary $100, place the colored dots for those values directly on the map over those locations on the Forest that you feel best represent those values. You only need to place dots for those values that you spent some of your imaginary $100 from the previous question. Each dot represents a separate location. If you think there is only one location for a particular value, you would only place one dot for that value. You may select up to 4 different locations for a given value . . . Remember – it is not necessary for you to have visited or used the Forest location where you place your dots. Some values may be related to forest use while others are not.

[2] The actual survey results followed the pre-test results. Every value was recognized by at least a quarter of respondents but no value was recognized by more than three-quarters.

Table 2
Forest value definitions used in the questionnaire

Aesthetic value: I value the forest because I enjoy the forest scenery, sights, sounds, smells, etc.
Economic value: I value the forest because it provides timber, fisheries, minerals, or tourism opportunities such as outfitting and guiding.
Recreation value: I value the forest because it provides a place for my favorite outdoor recreation activities.
Life Sustaining value: I value the forest because it helps produce, preserve, clean, and renew air, soil, and water.
Learning value: I value the forest because we can learn about the environment through scientific observation or experimentation.
Biological diversity value: I value the forest because it provides a variety of fish, wildlife, plant life, etc.
Spiritual value: I value the forest because it is a sacred, religious, or spiritually special place to me or because I feel reverence and respect for nature there.
Intrinsic value: I value the forest in and of itself for its existence, no matter what I or others think about the forest.
Historic value: I value the forest because it has places and things of natural and human history that matter to me, others, or the nation.
Future value: I value the forest because it allows future generations to know and experience the forest as it is now.
Subsistence value: I value the forest because it provides necessary food and supplies to sustain my life.
Therapeutic value: I value the forest because it makes me feel better, physically and/or mentally.
Cultural value: I value the forest because it is a place for me to continue and pass down the wisdom and knowledge, traditions, and way of life of my ancestors.

The respondent allocation of the $100 was not intended to represent actual dollars, as in contingent valuation methodologies. For example, the phrasing of the question could easily have called for the allocation of 100 'points' rather than 100 'dollars'. The intent was that respondents would select and weight those environmental values of greatest importance and then indicate where those values exist on the landscape. As such, the resulting points may as easily represent percentages as dollar amounts.

With respect to respondent placement of the coloured dots on the map, the points are best viewed as centroids or virtual polygonal areas with indeterminate shape, size and extent. Some point locations may represent small polygons on the landscape while others may represent larger virtual polygons. Alternative methods of collecting size, shape and extent information using either grids or freehand drawing of polygons were rejected because of the excessive cost of data entry, with little perceived improvement in resolution or interpretability.

From the 12 communities in the study, three were selected for more in-depth analysis because of their contrasting cultural and geographic settings. Anchorage is Alaska's largest city (population 260 000) and is located at the head of Cook Inlet, about 48 km northwest of the Chugach National Forest. Its diverse economy dominates the regional and statewide economy. It has the infrastructure of a metropolitan city, with water and sewage systems, a municipal landfill, natural gas, electricity, hospitals and health clinics, city bus service, universities, national retail chain stores,

and an airport that serves as a major hub for international freight service. Secondly, Cooper Landing is a small, unincorporated community located on the northwestern shore of Kenai Lake, about 48 km northwest of Seward on the Sterling Highway. It is figuratively an island of private land situated within a sea of surrounding public land on the Kenai Peninsula. Its population of 283 (in 1998) grows substantially during the summer with the influx of seasonal homeowners and summer visitors. The local economy is centred on tourism, including a large resort complex. Cooper Landing has a significant proportion of well-educated and financially secure retirees residing in the community. Finally, a working town, Cordova, is a historic, coastal fishing community located at the southeastern end of Prince William Sound. The community has a population of 2571 (1998 figures) and its economy is based on commercial fishing, seafood processing and government activity. Subsistence-related activities also play an important role. There are no roads linking Cordova to other communities and access is by commercial airline, boat and state ferry.

Analysis techniques

When the maps and questionnaires were returned, the data were entered into SPSS® while the map locations were digitized using ArcView® software. The table-based questionnaire data were 'joined' or 'related' to the spatial data using a combination of unique identifying keys, thus providing for both statistical and spatially based queries. Both descriptive and inferential statistics were utilized to explore and examine the spatial and tabular data.

Geographic or spatial discounting hypotheses were examined by calculating simple distance measures using straight-line distances from the centre of the respondent community to the actual point locations identified on the map. Hypotheses about the general distribution of point locations were examined using spatial statistics. Specifically, hypotheses were testing whether specific sets of point locations were completely spatially random (CSR) on the landscape (see Upton & Fingleton, 1985; Boots & Getis, 1988). The nearest-neighbour statistic (R) is a simple measure of the spatial distribution of points. It is calculated by dividing the average Euclidean distance of all points within a specified polygon by the expected distance of points under an assumption of random distribution. The more closely geographic point locations are clustered, the closer to 0 the value of R will be. The closer R gets to 1, the more randomly spaced the points are. The value of R approaches 2.149 for uniformly spaced points. With a derived R-value for a set of point locations, a simple test of significance for deviation from CSR can be calculated using the standard error of the expected difference. For the purpose of this analysis, the polygon used for calculating R was a generalized Chugach National Forest boundary polygon.

Results

Response rate

The overall survey response rate for the 1998 survey was 31%, with variation in the response rate positively correlated with the study community's proximity to Chu-

gach National Forest.[3] The overall response rate for the 1999 survey was 25%. A non-response analysis of the 1998 survey results indicated that no demographic variables were highly correlated with a predisposition to complete the questionnaire.

While participants were requested to return the forest map with their completed questionnaire, not all individuals did so. Approximately 880 surveys and 700 maps were returned. There were 15 542 value locations digitized for spatial analysis.

Distance of environmental values from community

The mean distance (calculated as the straight-line distance from the centre of the community to the point location) of environmental values from the communities in the study differ according to the environmental value (Table 3). Mean distance measures were also ranked to account for variations in the distance of some communities from the national forest boundary.

Table 3
Mean distance (km) of environmental values from three communities (rankings in parentheses)

Environmental value	Anchorage	Cooper Landing	Cordova	12 Alaskan communities[a]
Aesthetic	105.4(3)	55.7(2)	64.2(6)	82.7(2)
Economic	127.4(8)	63.4(3)	76.6(11)	96.7(6)
Recreation	104.7(2)	41.0(1)	54.4(3)	77.1(1)
Life-sustaining	133.5(9)	83.3(8)	69.2(9)	105.9(11)
Learning	140.1(12)	96.2(12)	66.5(7)	104.3(10)
Biological diversity	137.1(10)	66.6(4)	70.8(10)	99.0(7)
Spiritual	118.6(4)	66.8(5)	66.8(8)	89.5(5)
Intrinsic	150.6(13)	109.9(13)	78.2(13)	113.3(13)
Historic	125.5(6)	84.5(9)	63.1(5)	103.5(9)
Future	124.7(5)	92.4(11)	77.9(12)	113.0(12)
Subsistence	138.9(11)	77.2(7)	44.1(1)	86.9(3)
Therapeutic	97.5(1)	71.3(6)	51.0(2)	87.5(4)
Cultural	126.0(7)	86.2(10)	59.2(4)	103.3(8)
All points (values)	123.1	72.6	64.2	95.6

[a] Differences in mean distance are significant (Tukey HSD, $p < .05$) between aesthetic and life-sustaining, learning, biological diversity, and intrinsic; between recreation and life-sustaining, learning, biological diversity, intrinsic, and subsistence; and between therapeutic and life-sustaining, learning, biological diversity, intrinsic, and subsistence.

[3] The survey response rate appears lower than others have reported using the total design method in part because the second-'wave' mailing containing the questionnaire and Chugach National Forest map was not implemented for budgetary reasons. Previous experience indicates that this could have increased response rate by up to 10%. Two other reasons may also account for the response rate: Alaskans seem to distrust surveys (e.g. they have returned census forms at the lowest rate of any state); and the forest map used in the study has a retail value of $4.00, so some individuals may have chosen to simply keep the map and not complete the survey.

Several general conclusions are apparent from Table 3:

- environmental values involving direct or active human use of the landscape (recreation, aesthetic and therapeutic values) are located nearest the communities in the study;
- environmental values involving indirect or passive human use (intrinsic, future, and life-sustaining values) are located furthest from the communities, and
- proximity of the environmental values to the community varies by community (i.e. communities exhibit different spatial profiles). For example, the distance of economic values ranked third for Cooper Landing but eleventh for Cordova.

Thus, there is both inter-community variation in distance to held environmental values as well as inter-value variation as measured by distance from community.

To illustrate the inter-value variation, Fig. 2 shows the cumulative frequency distribution of point locations for the community of Cordova at 500-m intervals. The distances of values from Cordova are consistent with distance results for all communities, with recreation and aesthetic values being located closer to the community and intrinsic and future values being located further away. For example, over 50% of recreation value locations are situated within 3700 m of Cordova, compared to less than 30% of the future and intrinsic value locations.

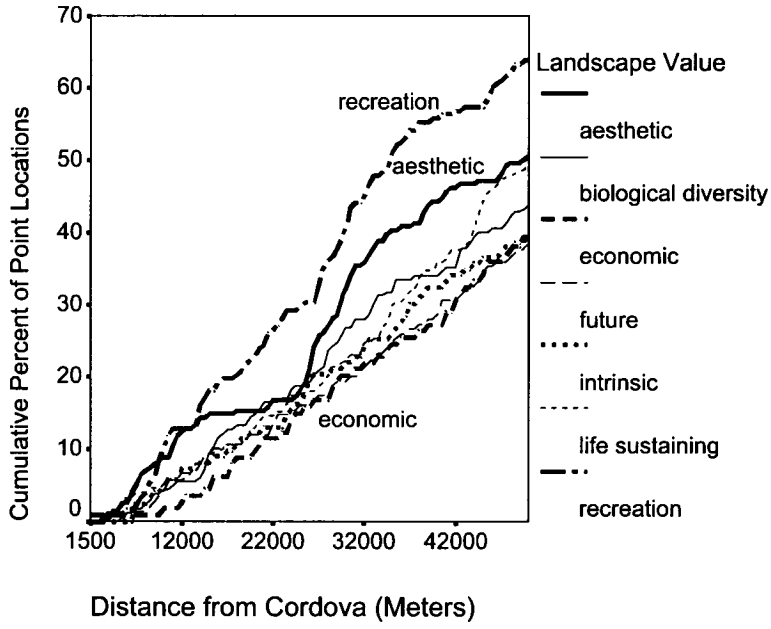

Fig. 2. Cumulative frequency of all value locations as a function of distance from community (Cordova).

Spatial pattern of values by community

The value locations are not randomly distributed across the landscape but tend toward spatial clustering. Further, the spatial clustering of value locations is not necessarily concentric around a community and may be influenced by access. Visually, this can be seen in Fig. 3, which shows plots of values for two communities, Cooper Landing and Cordova. Value locations for Cordova are distributed and orientated along the coast of Prince William Sound (Cordova is not connected to the Alaska highway system), while Cooper Landing value locations are distributed in a more concentric pattern around the community on public lands.

Table 4 shows the results of nearest neighbour analysis of the location of environmental values by community with a simple test of the hypothesis that the values are distributed completely spatially randomly (CSR). For every environmental value measured, the null hypothesis is rejected, indicating a tendency toward clustering. Despite the universal tendency toward clustering, differences in the spatial arrangement of values do exist between communities. For example, the most clustered environmental values were those from residents of Hope and Cooper Landing (R = .61), while the communities of Valdez and Anchorage had the most randomly distributed values (R = .77 and .74 respectively). The most randomly distributed set of values was from the statewide sample of residents (R = .82).

Thus, one must reject the hypothesis that environmental values do not spatially

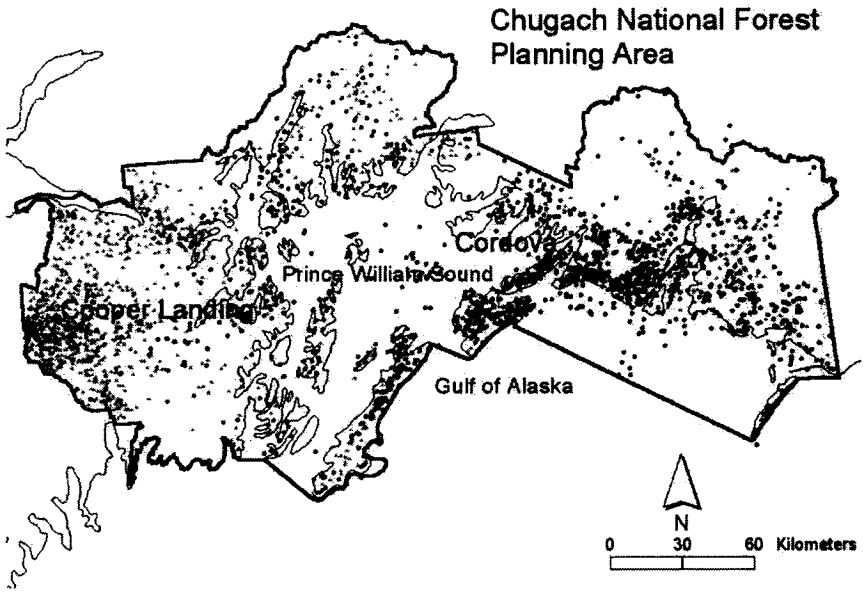

Fig. 3. Spatial distribution of point locations for the communities of Cooper Landing (grey) and Cordova (black).

Table 4
Completely spatially random (CSR) hypothesis testing of environmental value locations by community using nearest neighbour analysis

Community (number of observations)	Total distance (m)	*R*-value (rank)	*z*-value	H_0: values are CSR	Mean distance point locations from community (km)	Community attachment (measure 1)[a]	Community attachment (measure 2)[b]
Anchorage (n = 1581)	2.90927E+06	.742554 (11)	–19.5831	Reject	123.1 (9)	12	11
Cooper Landing (n = 1419)	2.2826E+06	.614964 (2)	–27.7475	Reject	72.6 (5)	2	2
Cordova (n = 1807)	2.88449E+06	.688654 (8)	–25.3194	Reject	64.2 (3)	5	7
Girdwood (n = 1942)	3.10677E+06	.715476 (9)	–23.987	Reject	77.7 (7)	3	1
Hope (n = 551)	1.4176E+06	.612899 (1)	–17.3833	Reject	70.0 (4)	4	4
Kenai (n = 1310)	2.45191E+06	.68751 (7)	–21.6373	Reject	147.7 (11)	9	6
Moose Pass (n = 884)	1.986E+06	.677898 (5)	–18.321	Reject	61.9 (2)	1	5
Seward (n = 1277)	2.3491E+06	.66715 (4)	–22.7549	Reject	73.5 (6)	6	8
Soldotna (n = 1525)	5.54798E+06	.662172 (3)	–25.2384	Reject	152.2 (12)	10	9
Sterling (n = 1470)	2.77408E+06	.734294 (10)	–19.4891	Reject	138.4 (10)	8	3
Valdez (n = 1451)	2.89676E+06	.771772 (12)	–16.6316	Reject	88.8 (8)	11	12
Whittier (n = 325)	1.18724E+06	.668358 (6)	–11.4378	Reject	60.0 (1)	7	10
Non-Chugach National Forest communities (n = 1038)	2.60725+06	.821287	–11.015	Reject	–	–	–

[a] Attachment measured by responses to the question 'How attached are you to your community?' on a 7-point Likert scale ranging from 'Extemely unattached: some other community could easily substitute for this one' to 'Extremely attached: this community is like a part of me'.

[b] Attachment measured by responses to the nominal-level question 'Given your overall satisfaction with the quality of life in your community, what would you do if you had the ability to live anywhere with the same standard of living?' Three choices were provided: 'I would still live in this community'; 'I would move to another community in Alaska', and 'I would move outside of Alaska'. Rankings were based on the highest percentage choosing to live in their same community.

cluster around communities, while recognizing the degree of clustering is variable by community.

Spatial pattern of environmental values in general

Like the spatial pattern of environmental values by community, the location of aggregate environmental values by value also tend towards spatial clustering. Table 5 shows the results of nearest neighbour analysis of environmental values for all respondents and a test of the hypothesis that the point locations are completely spatially random. For every environmental value, the null hypothesis of complete spatial randomness is rejected, indicating a tendency toward clustering.

Despite the tendency toward clustering, there are differences in the relative clustering of environmental values. For example, aesthetic and recreation values are considerably more clustered than the others ($R = .66$ and .68 respectively), while the most randomly distributed values are intrinsic and cultural ($R = .83$ and .81 respectively). Aesthetic and recreation values tend to cluster within a larger landscape around the community being surveyed, while intrinsic and cultural values tend more toward randomness. Thus, the hypothesis that component environmental values are distributed completely spatially randomly on the landscape is rejected.

Relationship between value 'intensity' and distance from place of domicile

The concept of geographic or spatial discounting suggests a relationship between place of domicile (residence) and the intensity of environmental valuation. There are at least two ways of conceptualizing and measuring value intensity: as a function of the density of values located near a community (i.e. the total number of points), or

Table 5
Completely spartially random (CSR) hypothesis testing of environmental values by value using nearest neighbour analysis

Environmental value(number of observations)	Total distance (m)	*R*-value	*z*-value	H_0: values are CSR
Aesthetic ($n = 1710$)	2.70734E+06	.664439	−26.5461	Reject
Economic($n = 1089$)	2.40959E+06	.741037	−16.3487	Reject
Recreation ($n = 2095$)	3.04504E+06	.675167	−28.4435	Reject
Life-sustaining ($n = 1759$)	3.20108E+06	.774593	−18.0855	Reject
Learning ($n = 982$)	2.29491E+06	.743226	−15.3935	Reject
Biological diversity ($n = 1751$)	3.14656E+06	.763138	−18.9613	Reject
Spiritual ($n = 834$)	2.17631E+06	.764801	−12.9942	Reject
Intrinsic ($n = 1030$)	2.61947E+06	.828334	−10.5398	Reject
Historic ($n = 860$)	2.02143E+06	.699553	−16.8557	Reject
Future ($n = 1577$)	2.91625E+06	.74528	−19.3513	Reject
Subsistence ($n = 1189$)	2.53155E+06	.745084	−16.8158	Reject
Therapeutic ($n = 1191$)	2.44706E+06	.719612	−18.5117	Reject
Cultural ($n = 502$)	1.79539E+06	.813237	−8.00523	Reject

Table 6
Pearson product moment correlations between environmental value responses (interval) and the mean distance (interval) for three communities

Environmental value	All communities	Anchorage	Cooper Landing	Cordova
Aesthetic	–0.020 ($n = 514$)	–0.019 ($n = 57$)	0.277 ($n = 45$) ($p = 0.065$)	–0.036 ($n = 54$)
Economic	0.059 ($n = 324$)	0.078 ($n = 34$)	–0.166 ($n = 36$)	–0.050 ($n = 37$)
Recreation	0.073 ($n = 560$)	0.225 ($n = 59$)	–0.213 ($n = 50$)	–0.170 ($n = 55$)
Life-sustaining	0.001 ($n = 508$)	–0.281 ($n = 53$) ($p = 0.041$)*	–0.408 ($n = 48$) ($p = 0.004$)*	–0.022 ($n = 51$)
Learning	–0.075 ($n = 310$)	–0.269 ($n = 31$)	–0.175 ($n = 28$)	–0.133 ($n = 34$)
Biological diversity	–0.016 ($n = 514$)	0.183 ($n = 52$)	–0.056 ($n = 51$)	0.301 ($n = 53$) ($p = 0.029$)*
Spiritual	–0.105 ($n = 252$)	–0.043 ($n = 24$)	0.047 ($n = 26$)	0.132 ($n = 32$)
Intrinsic	–0.035 ($n = 307$)	0.040 ($n = 36$)	–0.193 ($n = 25$)	0.034 ($n = 37$)
Historic	–0.089 ($n = 270$)	0.004 ($n = 30$)	–0.358 ($n = 25$) ($p = 0.079$)	–0.187 ($n = 29$)
Future	–0.011 ($n = 453$)	0.081 ($n = 50$)	–0.031 ($n = 43$)	0.236 ($n = 43$)
Subsistence	–0.099 ($n = 337$)	–0.001 ($n = 19$)	–0.214 ($n = 28$)	–0.023($n = 57$)
Therapeutic	–0.099 ($n = 341$)	0.137 ($n = 34$)	–0.261 ($n = 28$)	–0.035 ($n = 35$)
Cultural	0.023 ($n = 159$)	0.026 ($n = 15$)	0.096 ($n = 12$)	–0.142 ($n = 21$)

* $p < 0.05$.

as a function of decreasing importance associated with point locations as one moves away from a community. The first measure of value intensity was graphically depicted in Fig. 3, showing intensity as a point density function – point locations being denser near the communities. The second concept of value intensity – a function of the importance attached to the points – is reported here.

In theory, greater importance should be attached to point locations near to the communities, with importance decreasing as a function of distance from the communities. To examine this relationship, the correlation coefficients between point importance measures assigned by respondents (ranging from 0 to 100) and the distance from community centres were calculated (Table 6). The majority of correlation coefficients are small and not statistically significant. However, several significant relationships do emerge from the analysis. There is a significant relationship between the intensity of life-sustaining values and distance from the communities of Anchorage ($r = -.28$, $p < .05$) and Cooper Landing ($r = -.40$, $p < .05$). Greater or more intense life-sustaining values are located closer to the communities, as suggested by the theory. There is also a significant relationship ($r = .30$, $p < .05$) between the intensity of biological diversity value and distance from the community of Cordova, indicating that greater biological diversity values are located further from the community, the opposite to what is suggested by the theory. This is likely to be because the Copper River Delta, one of the acknowledged biologically rich areas in North America, is located some distance from the actual community of Cordova, thus reversing the hypothesized relationship.

In contrast with point density distributions, the measure of intensity as an attribute of importance of the point location is not as evident with the survey responses. Nine of the 13 correlation coefficients for all 12 communities are in the expected negative direction (higher valuations being less distant) but the correlation coefficients are neither large nor significant. As is discussed below, the research methodology may need to be modified to better capture the 'intensity' attributes of point locations that seek to define a complex, spatial discounting function.

Relationship between place attachment, distance to environmental values and other community attributes

Perhaps the closest we can come to directly testing the place-based theory of environmental valuation is to examine the relationship between the place attachment of residents in a community and the extent to which values are found near a given community. Two questions from the 1999 survey provide a measure of the extent to which community residents are attached to their community. These are imprecise but reasonable proxies for residents' 'sense of place'.

The first place-attachment measure asked residents how attached they were to their community, while a second question asked whether they would continue to live in their community if they were given an opportunity to leave (an attempt to ground the feeling of place attachment behaviourally; see Table 4 for exact question wording). Each community was ranked from 1 to 12 on place attachment, based on the aggregate responses of individuals in the community.

The two measures of place attachment were significantly correlated (Spearman's rho = .74, $p = .003$) and place attachment measure one was also significantly correlated with several other community attributes – perceived quality of life (Spearman's rho = .69, $p < .05$), abundance of special places near the community (Spearman's rho = .64, $p < .05$), and community cohesiveness (Spearman's rho = .72, $p < .05$).

The 12 communities were also ranked from 1 to 12 based on the mean distance of all value centroids from the community centre (1 = smallest mean distance, 12 = largest). The Spearman rank correlation coefficients were $r = .66$ ($p = .009$) for the self-defined place attachment measure and $r = .10$ ($p = .381$) for the second attachment measure (choosing to live in the community). While the self-defined place attachment measure is thus significantly related to distance of environmental value centroids from the community, this finding may be an artefact of the distance measures from four communities (Anchorage, Kenai, Soldotna, Sterling) not physically situated in or adjacent to the Chugach National Forest. Using this methodology, respondents were asked to place their environmental value locations within the national forest boundary. For these four communities, mean distance may reflect proximity to the forest, and not necessarily spatial discounting alone. Eliminating these four communities from the analysis, the distance/attachment relationship becomes insignificant for the eight remaining communities 'inside the forest'. Thus, the evidence is inconclusive about the relationship between community place attachment and mean distance to environmental value centroids.

The ranked mean distance of aggregate environmental values was also positively related to the ranked abundance of special places near the community ($r = .77$, $p < .05$) and scenery outside the community ($r = .64$, $p < .05$).

Relationship between distance from roads and environmental values

A visual examination of the point patterns of the respondents suggested that some value locations are more than a function of distance from the community – they also appear to be a function of proximity of road access to the landscape. The relationship between distance from roads and the value centroids was empirically examined by plotting the cumulative frequency distribution of point locations within successive 500-m buffers drawn around major roads in the Chugach National Forest (selected values are shown in Fig. 4).

The distribution of points indicates that recreation, aesthetic and economic values are located closer to the road system than intrinsic, life-sustaining and future values. For example, about 50% of the recreation, aesthetic and economic value point locations are situated within 7500 m of the Chugach National Forest road system; in contrast, less than 30% of intrinsic, life-sustaining, and future values are located this close to roads.

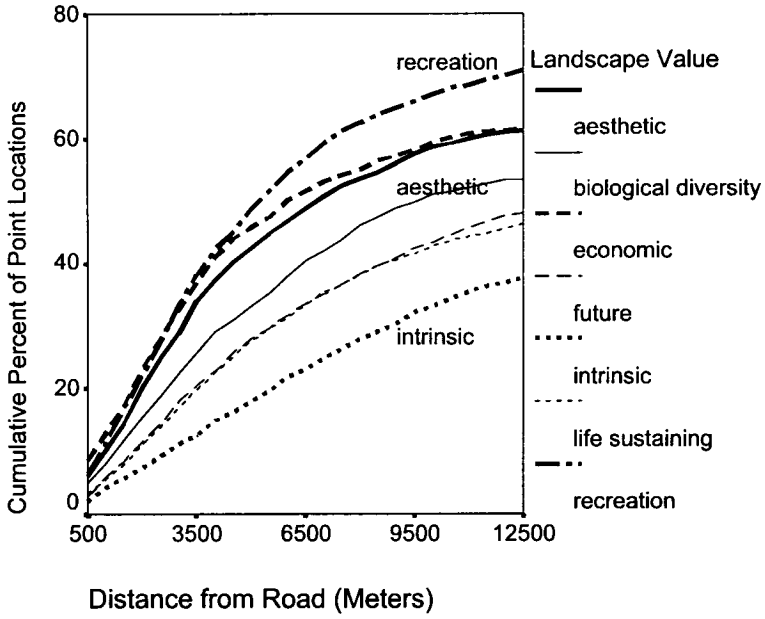

Fig. 4. Cumulative frequency of all value locations as a function of distance from roads.

Discussion

Theory and validation

The place-based theory for environmental evaluation and its major supposition, the concept of geographic discounting, are both intuitive and seductive. For the theory to hold, one would expect to find point-value locations more clustered or dense nearer the communities, with point locations decreasing as a function of distance from the community. Further, one would expect those residents with strong place attachment to associate greater importance with values located near a community, in recognition of their sense of space around the place.

While there was strong support for the concept of spatial discounting as a function of point location density, there was no consistent or significant pattern showing the rated importance of point locations as a decreasing function of Euclidean distance. This latter result is not surprising for a number of reasons:

- The measure for the importance of a point location (a value ranging from 0 to 100) is imprecise and subject to considerable variation between respondents.
- The respondent processes of weighting the importance of values and then mapping the point locations were sequential rather than concurrent. While providing valid importance ratings and spatial location information, this approach may have precluded the opportunity for obvious cognitive association between value importance and distance.

- Distance measurements were recorded using straight-line or Euclidean distance, a problematic measure of effective proximity, given Alaska's rugged topography and limited road access to the landscape. Relatively short, straight-line distances may actually represent much longer, circuitous access to the places of value.
- The sample sizes, while statistically sufficient, may be inadequate for detecting the distance/importance relationships confounded by other variables.

Additionally, two other factors may tend to muddle the precision of the analysis. First, respondents may actually live some distance from the geographic centre of their indicated community of residence (which is universally used in the calculations) and, secondly, the 1999 survey suggests that there is not perfect agreement among residents as to how best to define what a community is (e.g. whether it is a bounded geographic area, distinct political boundary, or area of similar values, lifestyles, economy, or attitudes).

While empirical relationships between distance and intensity of environmental valuation were examined, we did not expect, nor does the theory suggest, that this hypothesized relationship will be easy to measure and extricate from the complex set of cultural and physical variables inherent in a place-based theory of environmental valuation. In fact, simple measures of distance can distort important place relationships with environmental values. Norton and Hannon (1997: 230) state:

> . . . we do not mean to claim that simple measurements of distance will track, on a unit-for-unit basis, changes in environmental valuation. This empirical hypothesis simply establishes that the theory is place-based. The content of true place-based value must be a cultural artefact of local interactions, a dialectic between a culture and its natural context.

The empirical evidence presented in this study provides moderate support for the theory that community place attachment is related to distance and intensity of environmental valuation. It indicates that those Alaskan communities with strong place attachment tend to be more cohesive, to enjoy a perceived higher quality of life, and to have more special places near their communities. These results are consistent with the findings of the community self-assessment conducted for the Interior Columbia Basin Ecosystem Management Project (ICBEMP), which included a landscape-level, regional assessment of the Inland Northwest completed by the US Forest Service and Bureau of Land Management. In that assessment, similar measures were used by over 1300 active land-involved citizens to assess the current situations in 198 communities across the Interior West of the USA (Harris, McLaughlin, Brown, & Becker, forthcoming). The results of that assessment included moderate, statistically significant ($p < .05$) correlations between measures of place attachment and quality of life (.26) and social cohesion (.31), and a weak but significant correlation of place attachment with abundance of special places near their communities (.17).

However, the simple relationship between place attachment and distance can mask important local meanings. As indicated by the theory, anomalous findings require

social and cultural place context for explication. For example, the community of Whittier (population 306) has point locations concentrated near the community (small mean distance, highly clustered values) and yet residents exhibit weak place attachment. Whittier's relatively low quality of life (e.g. social isolation, frequent bad weather, few public services, ineffective local government) is likely to contribute to the weak place attachment and its apparent lack of resolve when confronted with a major environmental threat, the recent completion of a road link to the major population centre of Anchorage.

In contrast, the residents of Hope (population 135) successively thwarted a potentially large environmental threat near the community – a proposed industrial-scale gold-dredging operation. Although Hope residents are similar to Whittier's in the intensity of values surrounding the community, they also exhibit strong place attachment and organized collectively to strongly oppose the perceived threat. These findings are consistent with results from the ICBEMP community assessment that revealed fairly strong, statistically significant ($p < .05$) correlations between measures of quality of life and place attachment (.42), and between place attachment and measures of residents' 'working together to get things done' in their communities (.47) (Harris et al., forthcoming).

The apparent contradiction between the weak place attachment of Whittier residents (from the 1999 survey) and the relatively high abundance of environmental values near Whittier (from the 1998 survey) confirms that in a place-based theory of valuation, spatial proximity to positive sense-of-place values is a necessary but insufficient condition for strong place attachment. The lack of community social capital may undermine otherwise highly positive and proximate environmental values. The results of the ICBEMP community assessment (Harris et al., forthcoming) provide mixed support for this proposition, including a fairly strong, statistically significant ($p < .05$) correlation between measures of social capital and quality of life (.42), but a statistically insignificant correlation of social capital with abundance of special places near their communities.

While the analysis reported here has examined environmental valuation as a function of distance, understanding the complex interaction between human values and the landscape requires more than spatial context alone; the place-based theory also requires temporal context. Drawing upon systems hierarchy theory (see Allen & Starr, 1982; O'Neill et al., 1986; Allen & Hoekstra, 1992), Norton and Hannon (1997) proposed a triscalar system of environmental policy horizons – individual, community and global – each corresponding to a temporal level of concern. The individual scale of concern is focused on relatively immediate needs (0–5 years), the community/ecological scale of concern extends up to 200 years, and the global level of concern extends indefinitely into the future (Norton, 1996).

The values typology empirically examined in this study has the potential to be both spatially and temporally coherent in scale for land use planning. What does this mean? In the process of weighting the importance of values and locating them on the landscape, respondents are describing both the spatial and temporal distribution of values (see Table 7). The human values spatially nearest the communities examined in this study (aesthetic, recreational, therapeutic and subsistence) are the values with

Table 7
Spatial and temporal dimensions of value typology

Environmental value	Spatial discount rate	Temporal environmental policy horizon (see Norton, 1996)	Time scale
Aesthetic	High	Individual/local	0–5 years
Recreation	High	Individual/local	0–5 years
Therapeutic	High	Individual/local	0–5 years
Subsistence	High	Individual/local	0–5 years
Economic	Medium	Community/ecological	up to 200 years
Learning	Medium	Community/ecological	up to 200 years
Biological diversity	Medium	Community/ecological	up to 200 years
Spiritual	Medium	Community/ecological	up to 200 years
Historic	Medium	Community/ecological	up to 200 years
Cultural	Medium	Community/ecological	up to 200 years
Future	Low	Global	indefinite
Intrinsic	Low	Global	indefinite
Life-sustaining	Low	Global	indefinite

the shortest temporal scale of concern and satisfy the most immediate human needs, while the most geographically distant values (life support, future and intrinsic) are the most temporally distant or time indefinite. The remaining human values (cultural, spiritual, economic, biological diversity, historic and learning) are intermediate in scale, both spatially and temporally – indicating concern for culture and culture's interaction with ecological communities (Norton & Hannon, 1997).

Implications for public land management planning

What do these research findings mean for environmental planning and management? There are a few simple implications. In general, it is clear that resource managers must be concerned about managing the landscape for a variety of values, at different intensities, over different scales of space and time. This cannot be accomplished successfully without the aid of social science research, although there is no guarantee that every aspect of environmental values will be uncovered simply through research alone. The key no doubt lies in the recognition, adoption and integration of social information with biophysical information.

Just as all animals cannot be lumped together and managed as a composite that is 'wildlife', nor all trees simply regarded as 'vegetation', so too must diversity in environmental values be clearly recognized. Similarly, in the same way that many species do not live independent existences without interacting with others, so too may environmental values necessarily interact with each other – sometimes in harmony, sometimes in competition.

Communities are more than geographic place names and points on a map; they are composed of different people, with different beliefs and interests. This diversity results in a mosaic of values draped on the landscape and subject to the competing forces of cultural tradition and real or perceived disturbances. Thus, no two com-

munities should ever be assumed to be identical, or be treated identically, by planners.

Like the forest fire that leaves a patchwork of burn intensity over varying distances from its origin, human values extend outward from a given community in a patchwork of spatial intensity and saturation. For the reasons already mentioned, it is inappropriate to automatically assume a simple linear rate of decline in the importance of values with distance. Areas remote from a community may be just as important as those nearby, although this may be for different reasons due to different values. This suggests that areas remote from communities should not necessarily be considered 'unvalued' lands and therefore subject to free-for-all management that only special interest groups might be concerned with.

The challenge of implementation

As a society, we aspire to a landscape-scale planning and allocation scheme that promotes environmental values that achieve both intergenerational and spatial equity, defined as a balance of local and regional/global interests. How might this be achieved in practice? Prescriptively, Norton and Hannon (1997: 244) would 'shift responsibility for resource use to local levels, and accompany this change with an active and ongoing effort – such as many locally based ecosystem management plans – to build positive sense of place'. While we would be reluctant to advocate a complete shift of responsibility to local communities in the case of the management of national forests, parks and refuges, there is ample scope for improving the way local values are integrated into centralized resource decision processes. On the basis of the research reported here, we would argue for the *explicit* and rationally defensible integration of environmental values in land use decisions and policies. Our approach would be to modify the decision criteria within the resource planning and policy framework to require that land management activities, prescriptions and allocations *strive for consistency with local environmental values on the landscape.* Anticipating the argument that existing resource allocation decision systems already account for public value consistency, we would respond that qualitative value consistency analysis, if present, is often obscured or embedded with the larger institutional or political decision framework, which only serves to fuel public mistrust of 'expert' or 'centralized' resource decisions.

The traditional approach to resource planning and allocation has been to match increasing human demand with resource system capacity (with capacity serving as a constraint on human activity). When resource system capacities were deemed inadequate, processes or techniques were devised to increase resource capacity or productivity. Managing a landscape for a full range of environmental values transforms and elevates the role of values by allowing them to act as constraints on human activities.

By selecting meaningful management units of analysis, identifying the consistency of potential human activities with ecosystem values, bundling sets of activities into management prescriptions, and allocating prescriptions to the identified management units, it is possible to iterate through a range of land use alternatives to arrive at a

plan that appears most consistent with the measured values on the landscape. This is the concept behind values suitability analysis (VSA), a rational planning technique that determines how consistent proposed land uses are with identified local values on the landscape. Such an approach appears to be among the most rationally defensible because its seeks to allocate land uses among the broad range of potential values for the landscape. And because such an approach is rooted in community and sense of place, it has the potential to perpetuate the cultural structure of local interactions, thus preserving 'places' on the landscape.

Concerns are often raised that national or international interests may be compromised by local interests, and that allocation decisions consistent with local values simply invite resource exploitation. McCloskey (2000) argues, for example, that arbitration of values at the local level will tend to erode the strength of long and hard-won battles to establish national laws and standards for the protection of the environment, including clean air and water. Although national interests could be sampled using the same spatial methodology described herein, this would still leave unanswered the vexing question of how to weight the responses between local and national samples. Such decision-making concerns, while valid, are more likely to be settled in the political arena and here only serve to distract from the focus on place-based environmental values in public land management planning.

As an experimental methodology for community-based public involvement, questions remain about its transportability to other places and regions and the willingness of agencies to integrate and institutionalize place-based spatial information into resource planning and policy processes. While replication of the spatial methodology in other areas can help resolve methodological issues, the second question will require institutional analysis of public involvement in decision processes. Are resource agencies willing to have their technically derived 'expert' opinions regarding resource alternatives possibly constrained by local, popular or intuitively derived values? Are resource managers up to the challenge suggested by Norton and Hannon (1997: 245) – that their responsibility is to 'communicate to the public and to simultaneously learn from the public, in the development of locally based models for the articulation of local values'? Our experience leaves us optimistic that the spatial methodology can be implemented successfully elsewhere to help understand and resolve issues in public land management planning.

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