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Landscape and Urban Planning 69 (2004) 165–182
LANDSCAPE AND URBAN PLANNING
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Private forestland parcelization and development in Wisconsin's Northwoods: perceptions of resource-oriented stakeholders

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Accepted 4 September 2003

Abstract

Increases in the parcelization and development of private forestlands in the US and other countries have become a major concern of natural resource agencies and groups. This concern is particularly heightened in heavily forested areas such as Wisconsin's "Northwoods," where private lands make up a majority of the forest area and play a critical role in supplying economic, ecological, and quality of life values. As a part of the Forest Fragmentation Education Initiative, we assisted the non-governmental group 1000 Friends of Wisconsin in identifying the range of perceptions and concerns about parcelization and development held by public land managers, conservation and environmental organizations, forest industry groups, non-industrial woodland owners, and other resource-oriented stakeholders ($N = 182$). Employing a qualitative methodology involving facilitated workshop discussion and thematic analysis, we identified critical themes in four main areas: (1) *Patterns*—parcelization and development are exhibiting a range of patterns on the forest landscape in terms of movement, distribution, size, and rate of change. (2) *Drivers*—the attractiveness of the Northwoods and people's concept of the good life, combined with changes in the economic, demographic, and technological aspects of society, are seen as causal agents behind increased parcelization and development. (3) *Effects*—while some aspects of parcelization and development might benefit residents and nature in the Northwoods, most effects are seen as negatively impacting recreation opportunities, forest health, local communities, the timber-based economies. (4) *Solutions*—an integrated strategy is needed to guide future growth and ameliorate the negative impacts of parcelization and development, including planning and regulation, taxes and incentives, acquisition and funding, and education and ethics. Implications for planning, research, and program development are noted.

Keywords: Parcelization; Development; Private forest landowners; Land protection

1. Introduction

There is a tension in the air across the forestlands of the US and many other countries, an uncertainty among resource-oriented individuals and organizations about the future role private lands will play in supplying wood fiber and products, providing recreation opportunities, and maintaining ecosystem values such as biodiversity. Parcelization, the subdivision of larger landholdings into smaller ones (e.g., Fig. 1), is a major factor feeding this tension. Although the process of parcelization has occurred on private forestlands in the US since at least the 1900s, its rate and extent have increased in recent decades (Sampson and DeCoster, 2000). National woodland owner surveys conducted by the USDA Forest Service in 1978 and 1994 show

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doi:10.1016/j.landurbplan.2003.09.005

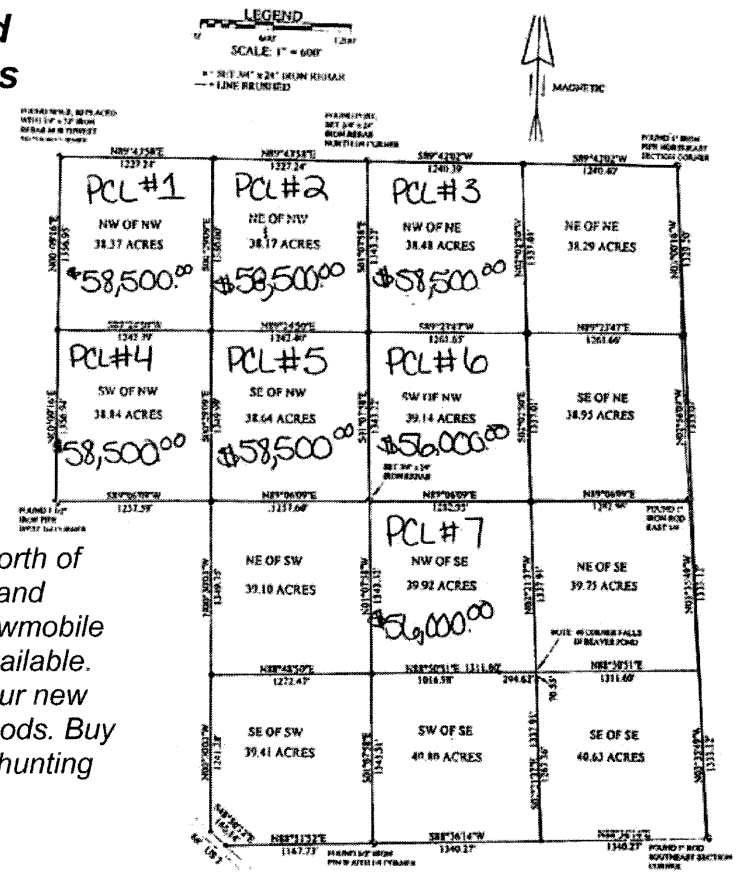

Fig. 1. Parcelization and development of private forestlands in northern Wisconsin is exemplified by this description and illustration seen in a recent advertisement from Wild Rivers Realty in Florence, WI (http://www.wildriversrealty.com).

that between these years the number of private owners of small parcels 10–49 acres (4–20 ha) in size has more than doubled, from 1.2 to 2.8 million owners (Birch, 1996). The bulk of this change was among individual (non-industrial) private owners, whose average parcel size from 1978 to 1994 shrunk from 27 acres (10.9 ha) to 25 acres (10.1 ha). If these trends continue, Sampson and DeCoster (1997) estimate that by 2010 average parcel sizes will be reduced to 17 acres (7 ha).

While a key aspect of people's concern about parcelization is that smaller parcels may no longer be economically viable for timber production (Luloff et al., 2000; Mehmood and Zhang, 2001), perhaps an overriding concern is that parcelization will lead to development, the conversion of forested and other open land to built-up uses. While this successional relationship is not a foregone conclusion, development raises an even broader range of concerns about impacts on forest values (Wear et al., 1998; Odell et al., 2003). Here, US National Resources Inventory data mirror parcelization trends, showing that more than 10 million acres (4 million ha) of non-federal forestland was converted to developed uses between 1982 and 1997. These data also indicate that the average yearly conversion for 1992–1997 of nearly 1 million acres per year (0.4 million ha/yr.) was more than 1.5 times that of the previous 5-year period (USDA Natural Resources Conservation Service, 2000; see also Alig et al., 2004). Development trends at the national level are being offset somewhat by the increases in

Fig. 2. The Wisconsin "Northwoods" study area lies north of an ambiguously defined biophysical–psychological tension zone shown as the dark band in the figure. Stars denote workshop locations and circles denote major metropolitan areas mentioned in the paper.

forestland due to abandoned pasture and cropland reverting to forest. Nevertheless, for some parts of the US these changes have been dramatic and the concerns of local citizens, forest industry and preservation groups, and other stakeholders are warranted.

One such place where both parcelization and development are a concern is in the "Northwoods" of Wisconsin (Fig. 2), where forests cover more than two-thirds of the 14 million acre (5.7 million ha) land area and are a critical timber, ecological, and tourism resource (Marcouiller and Mace, 1999). Private timberland ownership (60%) dominates over public (40%), with non-industrial private forestland (NIPF) owners making up more than 90% of all private owners and holding 44% of all timberlands (Schmidt, 1998). While different measurement methods prevent an accurate assessment of changes, available statistics point to increases in parcelization in recent years. Woodland owner surveys conducted in 1984 and 1997 estimated that the number of owners increased from 95,600 to more than 102,000, while the average size of parcels owned decreased from 44 to 41 acres (17.8–16.6 ha) (Roberts et al., 1986; Leatherberry, 2001). Supporting these trends, other studies show sharp increases in forestland values in popular Wisconsin Northwoods counties (Klase and Guries, 1999), a Northwoods population growth significantly larger than the state average (US Census Bureau, 2002), and major increases in housing density in recent decades (Radeloff et al., 2000, 2001; see also Hammer et al., this issue), especially around resource amenities such as lakes (Laas, 1996).

These data raise important questions about how parcelization and development are perceived by the public and key stakeholder groups. A survey of state residents conducted by the Wisconsin Department of Natural Resources (DNR) (2001a) pursuant to their statewide Forestry Assessment (Finan, 2000) showed that three of the top 10 concerns about the forests in the state focused directly on parcelization and development issues: that the forest was becoming more fragmented by temporary and permanent land cover and land use changes, that development was encroaching on rural forestlands, and that the number of non-industrial private owners of forested land has increased due to the division of forested lands into smaller parcels. While the DNR study provides a good indication of the perceived importance of these issues relative to other forestry concerns in the state, further information is needed about *how* parcelization and development is perceived, especially for critical forest areas.

In this paper, we attempt to provide this detail for the Wisconsin Northwoods. We sought information on a broad spectrum of parcelization and development issues ranging from where such changes are happening and why to what their impacts might be and how they might be ameliorated or prevented. As an initial foray into this area, our aim was to uncover and describe the perceptions that exist among a critical group of well-informed stakeholders in Wisconsin. As a first step our main goal was to understand the phenomenology of parcelization and development in order to identify questions and hypotheses for future research, locations for the implementation of planning and extension efforts, and priorities for education and policy development.

In contrast to the DNR study, our research examines how parcelization and development issues in Wisconsin's Northwoods are perceived by forest resource-oriented stakeholders—those who play an active role in managing or protecting forestlands for

utilitarian and non-utilitarian resource values. As a composite group, these individuals and the organizations they represent hold diverse and often conflicting views on forest resource issues. Their expertise and shared concern about parcelization and development issues, however, provided a good reason to bring these key informants together to discuss their collective knowledge and experience (Elmendorf, 2000).

2. Background and methods

The Northwoods generally refers to a region of northern Minnesota, Wisconsin, and Michigan that is predominantly forested as opposed to the southern portions of these states that are of mixed woodlots and agriculture or more urban in nature. In Wisconsin, forest statistics used to describe the Northwoods usually include the northernmost 22 counties, but for other purposes the region is more ambiguously defined (Fig. 2). The forests of the Northwoods generally fall above a vegetative and climatic tension zone that separates northern forest stands of maple–beech–birch, aspen–birch, white–red–jack pine, and spruce–fir from central hardwood stands of oak–hickory (Curtis, 1959; Powell et al., 1994). This tension zone also tends to be a psychological one, and many residents of the state look to the Northwoods for high quality outdoor recreation experiences in the numerous public and private forests and lakes.[1]

Concerns about parcelization and development issues among Northwoods' stakeholders compelled the non-profit group 1000 Friends of Wisconsin (Friends) to establish a Forest Fragmentation Education Initiative in late 2000. While the group has taken an advocacy position to minimize forest parcelization and development, the Friends and its research and education arm, the Land Use Institute, were also interested in obtaining a comprehensive understanding of the issues. To this end, they formed an advisory council composed of diverse members from resource-oriented organizations with the charge of implementing three objectives of the initiative: (1) develop awareness of the impacts of parcelization and unplanned growth on local forests, (2) provide data on the location and extent of parcelization and forecast growth trends by county and sub-region, and (3) provide a forum for discussion of concerns and recommendations.

Working as a part of a consultant team, we assisted the Friends in carrying out this initiative by providing data for objective two and helping design and facilitate stakeholder discussion forums under objective three. During the spring and summer of 2001, the Friends convened a series of four regional workshops in Spooner, Ashland, Eagle River, and Wisconsin Rapids followed by a statewide summit meeting in Wausau (see Fig. 2) to bring stakeholders together for presentations and discussion. While participation in these forums was open to the public and widely advertised, most attendees came as a result of invitations sent out to groups and individuals suggested by the project's advisory council. Participants ($N = 182$) included resource managers from public agencies at the county, state, and federal levels; legislators and policy makers; representatives from forest industry and non-industrial private forest owner associations; staff from non-profit resource use, conservation, and protection groups; and some individual woodland owners and other non-professionals who had an interest in the topic. While the sample thus encompasses a diversity of resource-oriented individuals, it should be recognized that it does not include stakeholders such as real estate agents, developers, or second-home owners who may have different views on parcelization and development issues.

In keeping with the title of the Friends' initiative, the focus of the workshop discussions was to center on "forest fragmentation." During early planning sessions for the workshops, however, advisory council members quickly recognized this term was problematic. Some individuals, particularly those representing timber interests, did not want the workshops to deal with forest fragmentation resulting from harvesting methods such as clearcutting, which is a major issue of concern among some environmental groups (e.g., DeGraaf and Healy, 1990). To divorce that issue from the initiative's main concern on the division of forestland ownership, the council defined forest

[1] The geography of the Northwoods, or simply "up North," is a frequent topic of discussion and humor among Wisconsinites. For a sample of this discussion, see the Wisconsin Public Television "Weekend" Website archives at: http://www.wpt.org/npa/transcripts/weekend/062201tran.cfm, which includes a transcript of a special on the Northwoods that in part describes the Forest Fragmentation Education Initiative from which this paper is an outgrowth.

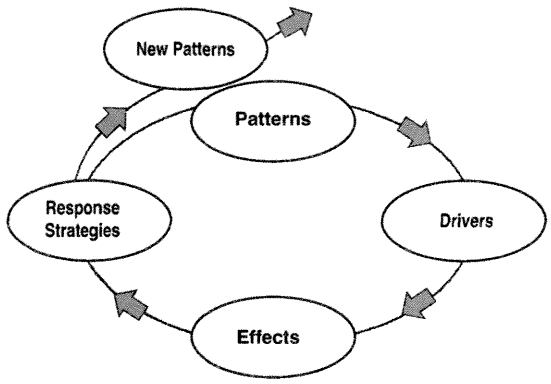

Fig. 3. A process model of landscape change (adapted from Gobster et al., 2000).

fragmentation as parcelization and used the terms interchangeably in the workshop discussions. In this paper, we favor the term parcelization because of its less ambiguous meaning (Mehmood and Zhang, 2001).

With this understanding, we identified a set of discussion questions for tapping stakeholder perceptions of parcelization based on a process model for understanding landscape change (Gobster et al., 2000). This model (Fig. 3) conceptualizes landscape change as a process where patterns of change result from one or more driving forces of social, economic, or technological origin. These changes may have effects on people and ecosystems, sometimes for the better, but the changes that concern most resource-oriented stakeholders are often expressed as negative impacts. As depicted by the looped model, strategies undertaken to address the consequences of change feed back into model, resulting in new patterns and altering the trajectory of the landscape change process.

Applying the model to the issues of parcelization resulted in the following set of questions:

- *Patterns*: What patterns and sizes of parcelization (fragmentation) have you seen? Where are they occurring? To what extent is parcelization resulting in fragmentation or land development?
- *Drivers*: How or in relation to what is parcelization (fragmentation) occurring? What are the causes?
- *Effects*: Do you see any problems resulting from parcelization (fragmentation)? Any benefits? Impacts on communities? Ecosystems? Impacts to you personally?

Table 1
Parcelization and development categories and themes derived from forum discussions

Patterns	Movement; distribution; size; rate of change
Drivers	Socio-economic; demographic; values and motivations; globalization and technology; natural capital; policies
Impacts	None or benefit; recreational; forest health and fire; community/infrastructure; timber productivity
Solutions	Planning and regulation; taxes and incentives; acquisition and funding; education and ethics

- *Response Strategies*: What do you see as the most effective solutions to parcelization (fragmentation) issues? What more can or should be done? By whom?

In each of the workshops, participants broke out into a number of subgroups for these discussions, which lasted approximately 1 h. Using the notes and tape transcripts from these sessions, we identified the prominent themes relating to each of the four elements of the landscape change model. For presentation purposes, these themes were grouped into a smaller number of more general categories listed in Table 1. In the following sections, we highlight the major themes we uncovered, and include representative quotes from workshop participants to illustrate how participants viewed particular issues.[2]

Although the primary focus of the Friends' initiative was on parcelization issues, in planning and carrying out the workshops development issues became an integral and in many cases dominant part of the discussions. Thus, while parcelization does not necessarily lead to development, because of the importance and close association between the two in the eyes of our participants, we discuss the two together in the results below. However, as parcelization is an important issue in its own right and a topic of growing interest among resource professionals (DeCoster, 2000), we also attempt to deal solely with it as a topic in a companion paper (Rickenbach and Gobster, 2003).

[2] In a few cases, the quotes from participants were slightly edited to improve readability. Ellipses were used to shorten a comment, and unless names of a participant are given, the quote shown is a single statement given by a single person. If multiple names are given, the participants are each responding to the same question or adding to the original response.

3. Patterns

In asking participants about recent patterns of parcelization and development they had witnessed by living and working in various places throughout northern Wisconsin, we received a vivid picture not only of the extent and rate of change across the landscape, but also a feeling of where some of the "hotspots" of change were occurring and why. While the focus of the forums was on northern Wisconsin, this part of the discussion often ranged outside this region in comparing patterns with other parts of the state and the US. This information provides a basis for determining which locations in the state could be the focus of outreach efforts. Our analysis yielded four major themes and a number of sub-themes relating to patterns of spatial and temporal change.

3.1. Movement

Participants described three different patterns of how parcelization and development move across the landscape. The most common pattern, often called urban sprawl, is the development of permanent residential and commercial properties in forested and other open areas at the fringe of urban centers: "... It's really sad when I go home now because some of those beautiful places like Holy Hill and some of these places that were very scenic kettles and moraines, now, there seems to be one large home on top of each hill." Several participants pointed to the northern Wisconsin population centers of Wausau and Green Bay as well as Milwaukee and Madison to the south as major places experiencing urban sprawl. They also emphasized that similar patterns were occurring in many smaller northern centers with populations well under 10,000.

A second pattern of movement participants discussed was parcelization and second-home development in rural areas. Such patterns have been occurring for many decades around the lake areas of northern Wisconsin, but what concerned some participants was that new development and parcelization were now occurring in places far away from these obvious tourist attractions: "I'm from Bayfield County, and ... of course we're getting a lot more growth around Bayfield and Washburn and Ashland. But I live in a very rural township, and in the last five years we've noticed a lot more people moving in and things are breaking up." In the solidly forested northernmost parts of the state, these locations tend be to around rivers and smaller, more marginally recreational lakes that have not yet been developed. This contrasts with the more mixed landscape of north central Wisconsin, where parcelization and development tended to be happening within and adjacent to forested tracts.

While these two patterns of movement are well documented (e.g., Heimlich and Anderson, 2001), a third, less often noted pattern of movement observed by participants was permanent home development in attractive rural enclaves once thought to be far removed from urban centers: "We're 75 miles (120 km) from Madison and 75 miles from LaCrosse, but in the last few years there have been many new homes going in within a few miles where I live. All of a sudden they just blossomed, some on wooded, some on open land. The prices they charge, they boggle your mind ... They're not building houses as big as they're building around Madison, but they're building very nice houses. Where they come from, where they go, I have no idea." Participants tended to mention enclaves beyond the traditional commuting radius of large urban centers such as Milwaukee, Madison, Chicago, Minneapolis, and some felt these once isolated areas were now being used as people's principal homes because improvements in technology or roadways made such living arrangements feasible.

3.2. Distribution

One pattern that became very apparent from the discussions was the perception of a distinct north–south gradient in the intensity of parcelization and development. Most felt that while a significant amount of private forest acreage in northern Wisconsin has been parcelized and in some cases developed in recent years, the extent of activity was nothing like what was happening in the southern half of the state. This gradient also extended beyond the state, with some looking south to northern Illinois as a worst case scenario and north to the Upper Peninsula (UP) of Michigan as a place that has not yet been significantly affected by such changes: "I'm from the Upper Peninsula of Michigan, and Wisconsin to me is already highly fragmented and I'm horrified of that trend moving farther north to the UP ... And the northern Wisconsin

people are scared of what's coming toward them. So it's just interesting from that aspect to see what's coming and, you know, have time to be scared about it until it gets there." In some ways these differences are as much temporally distributed as they are spatially; with parcelization and development spreading out incrementally over time from southerly population centers, participants often compared the Northwoods to what southern Wisconsin was like 20–30 years ago.

3.3. Size

Along with distributional patterns, participants also observed a north–south gradient with respect to the size of forest parcels. In many counties in the southern and central part of the state today a wooded parcel of 40 acres (16 ha) is considered large, while 40–80 acres (16–32 ha) parcels are still rather common in the north half of the state. These standards, however, are in flux in the north as new owners move in who may have different ideas about what parcel size is acceptable for their intended uses of the land: "It seems that most people were, are, and will be happy at the point they move into ... Whether that's 30 years ago and they bought 100 acres (40 ha) with a house, or it's ten years from now and they're buying two acres [0.8 ha] with their house, they're going to be happy coming to northern Wisconsin at that point in time. The real dilemma to those of us that are here now is, how much change do we want to accept?"

In some cases, participants observed parcel sizes in the north increasing rather than decreasing. These initially surprising observations, however, often make more sense when looked at over time as part of the parcelization and development process. For example, one participant noted several large adjacent forested parcels had been purchased by a single person, and suspected this was a real estate developer who likely will then subdivide the holdings into small parcels for housing development. Another person observed consolidation by owners of small lots who were purchasing parcels adjacent to theirs on tracts of lands that had been previously subdivided, a phenomenon that some might view in a positive light while others have referred to in a derogatory sense as outsiders' attempts at "kingdom building" (Holyoke, 2003). Together, these examples demonstrate that the processes of forest parcelization and development can be complex.

3.4. Rate of change

A final theme under patterns concerns the rate of change in forest parcelization and development. As mentioned at the start of this paper, these are longstanding processes across most of the US. What concerned many participants in our forums, however, was the rapid increase of such changes in the forests of northern Wisconsin: "I think we need to realize that we are in exponential change in many ways. And just as exponential curves start out at a very prolonged and slow rate at first, then suddenly accelerate, we need to be cognizant of the fact that we are in an upward spiral or just about there. Change is about to happen, and our landscape is in jeopardy of being changed by our lifestyle." With the current economic uncertainty some may question whether the concerns expressed by participants in these pre-September 11, 2001 forums are still warranted. Here, however, participants with a memory of historical patterns of development and parcelization may provide a clue. A few participants mentioned that similar patterns and concerns surfaced during the 1970s when rural areas in Wisconsin experienced a population increase for the first time in decades, due mainly to in-migration. During that brief period, second-home development surged in many lakeshore areas, only to be squelched by a major economic recession in the early 1980s. These observations agree with cyclical fluctuations in forestland values in two northern Wisconsin counties documented by Klase and Guries (1999). Thus, while growth patterns may not be exponential over the long term, there may be a cyclic pattern from which we can learn (see also Hammer et al., this issue).

4. Drivers

Why is parcelization and development occurring to such an extent now? For Wisconsin's Northwoods, participants cited a number of forces they felt were driving change, many that are common to those being experienced elsewhere in the US and beyond (see, for example, Alig et al., 2004), and some that may be unique to the combination of social, political, and resource conditions in the region. We grouped these drivers of change into six broad thematic categories.

4.1. Economic

The two economic forces driving parcelization and development most often cited by forum participants were the booming economy and rising property values. The newly created wealth predating 2002's stock market slide gave many people the disposable income to purchase forestland for vacation or investment purposes. This demand for property has increased the value of forestland, creating an incentive for owners to sell—whether by choice or necessity—to realize profits not available in less prosperous times. While participants recognized the co-dependence of these drivers, many also tended to view those who lived and worked outside northern Wisconsin as the main beneficiaries and longstanding residents as victims, particularly with respect to increased property taxes: "Our property tax system in the State of Wisconsin is made strictly on the basis of property value, and that's it. Not on income level. And what's happening in the north, there are a lot of probably not quite as wealthy older people ... who can't afford the land because they don't have the income, but they have the value."

Not everyone was quick to lay blame on rich outsiders, however. In some areas, particularly near cities where parcelization and development of nearby forested areas were evident, some participants said it was local residents themselves who were most to blame: "As a lifelong forester I'm tremendously concerned about forest fragmentation. I live in Wausau and ... the urban sprawl/forest fragmentation I see around here is mostly coming from people who live here. I have friends who get sick of living in the city and they want this place out in the country and off they go."

4.2. Demographic

Participants cited a number of demographic-related trends as partly responsible for parcelization and development. One of these was the sheer growth in population; with the 2000 Census recording more than 5.63 million residents, the state grew by nearly 10% in the last decade and gained almost 500,000 new residents in its biggest increase since 1960–1970 (Forstall, 1995). While some of this growth at the state level was from natural increase in births over deaths, for northern Wisconsin much of the growth is likely due to in-migration (Johnson and Beale, 2001). This may especially be the case with popular, vacation-oriented counties such as Vilas and Burnett, both of which grew by nearly 20% in the last decade. Of the various demographic factors, however, participants most often cited the aging population as driving forestland parcelization and development in the north. A multiplicity of age-related patterns were identified: urbanites from the south moving up north as a retirement destination, native northerners coming back home to retire or buy vacation property, parents dividing property among their sons and daughters as inheritance, and farmers cashing out their holdings as part of their retirement income. Participants saw many of these as legitimate reasons for buying and selling forestlands; it was the cumulative effect of the individual decisions that often ended up being undesirable: "How do you recognize the property rights of individuals who really are not trying to make a profit from it? It's just a retirement nest egg type of thing. And they certainly have the right to anticipate doing that well into the future. They would have to be reimbursed somehow if the opportunity were denied them."

4.3. Values and motivations

A third set of driver-related themes dealt with values and motivations, and here many participants cited an ingrained desire among Wisconsinites to own a second home on a lake or in the forest; it is seen as an accepted part of "the good life" and a status symbol of making it in society. The outdoor lifestyle was also cited as a strongly revered trait among many Wisconsin residents—hunting, fishing, and camping are very popular outdoor recreation pastimes in the state (Wisconsin Department of Natural Resources, 2001b) and the Northwoods is the premier playground for such activities. Some noted a contradiction, almost to the point of resentment, that while many people claim to be environmentalist in nature, their awareness does not restrain their desire to buy and develop woodland property: "And a classic example is we've got—this is a true-life example ... They were collecting money from these second graders to save the rain forests in Brazil. And the teacher collects this money, gets in her big SUV [Sport Utility Vehicle] and drives 50 miles (80 km) out in the country and lives in a big,

humongous house with one other person in the middle of a pine plantation. You know?"

4.4. Globalization and technology

Globalization and improvements in technology were additional factors participants saw as driving parcelization and development. Forestry professionals in nearly every workshop mentioned the surprising number of transfers of industrial forestlands in the state in recent years; by some participants' accounts, 90% of all corporate lands had changed hands in the last 5 years. These accounts agree with forestry statistics (e.g., Dresang, 2002), but while these transfers have not yet resulted in radical changes in land use, participants were very concerned that land ownership was going from longstanding, locally owned companies with strong community ties to large, multinational corporations with little local history and few qualms about selling off prime real estate to the highest bidder: "I'm with the electric and gas utility, and we are involved in fragmentation in a couple of different ways. One, we have some land along the Menominee and Peshtigo Rivers that we're looking at divesting ... because, if you look at what's happening in different corporations now, the different buyouts and consolidations and stuff like that, you don't know what's going to happen. And this makes us more of a target, but being a good steward of the land, we still have an opportunity now to ... sell it to the state or something, and that block will stay somewhat intact. If somebody else buys us out, there's no way that we can—you know, we don't know what's going to happen with it. It may be developed or whatever."

Globalization was also seen as having an effect on recreational land purchases in the Northwoods. A few participants remarked that while second-home ownership in northern Wisconsin is largely confined to those in the upper Midwest, particularly those within a 6 h maximum drive, with bargain airfares and better road travel the Northwoods could become a national destination like Florida or Aspen, CO. On a more regional level, many participants saw recent highway improvement projects in various parts of the state as responsible for increases in forest parcelization and development both on the urban edges and in the Northwoods. Significantly reduced commuting time has allowed many people who formerly would not have considered driving that far, to now do so.

Lastly, one other significant change in technology has been the use of mound septic systems and holding tanks, innovations in private sewage treatment that allow people to build in areas of shallow soil characteristic of many areas in northern Wisconsin. Two participants ("Jim" and "Ralph") conversed on this point. Jim started: "there's been a change in some of the state building code requirements for new septic systems ... that allows you to build on previously unbuildable lots ... And that in itself is going to have a huge increase in parcelization, maybe not the forestry lands but maybe those areas that are adjacent to wetlands. You know what I'm talking about? There's a change in ..." Ralph continued: "Yes, it's opened up about 40 percent more land in the State of Wisconsin as a result."

4.5. Natural capital

A key set of drivers relate to the natural resource assets of the Northwoods, particularly the high density of lakes in areas such as those near the Eagle River and Spooner workshops. But as lake property gets harder and harder to find, the region's other natural assets are being looked upon with an eye toward parcelization and development: "And one of the trends I see is limited water resources. You know, they can't all have lakeshore, so we're getting the second ring effect around lakes and then further from that, looking for wooded acreage in instances where the lakeshore is either priced too high or not available."

With respect to wooded acreage, some participants were particularly concerned that the mature condition of some Northwoods forest parcels would attract buyers, who would then no longer be interested in using that land for timber production. This perception appears to run contrary to the findings of Gobster and Schmidt (2000), who in their analysis of Northwoods forest inventory data between the 1980s and 1990s found no evidence of increases in parcelization for stand areas that had larger trees, and found that smaller parcels exhibited increased clearcutting activity compared to larger parcels. The meaning of these findings are difficult to assess, however, as inventory data shows that trees on all private lands in the Northwoods increased in size, regardless of the stand area class they were in. Furthermore, human disturbance

of forestlands through clearcutting or other activities could likely be signs that parcels are undergoing development, such as the significant proportion of forestlands in New Hampshire that Thorne (2000) found were "terminal harvests," that is, a liquidation of timber assets on a parcel prior to its conversion for housing development.

4.6. Policies

Innovations in on-site sewage treatment as described above did not have any effect on development until this new technology was accepted as policy in the Wisconsin Plumbing Code (LaGro, 1996). In this way, participants saw this and other policies such as large lot zoning and the granting of zoning variances as unintentional drivers of parcelization and development. For the Northwoods, the Managed Forest Law was mentioned by several participants in a positive light for helping to stem the tides of change. Some, however, faulted this statewide law—which provides a tax break to woodland owners who manage their lands for timber and other purposes—for not dealing more effectively with smaller woodland parcels: "If you look at our current state laws, once it gets below ten acres, you're not even eligible under the Managed Forest Law. The tax incentive doesn't apply to these parcels, so for new parcels of five acres [2 ha], there's a disincentive to manage it rather than an incentive."

5. Effects

Of the time spent in the breakout discussions, participants seemed to dwell longest on issues relating to the effects of parcelization and development. They talked about a diverse range of effects on the people and ecosystems of the Northwoods; we grouped their comments into the five general categories discussed below.

5.1. Benefits or no negative effects

Of the various effects, few of the participants saw anything benign or positive about such changes. Remember first, however, that most of the discussion group participants were predisposed toward forest protection; there were no developers in the groups, for instance, and most of the woodland owners were interested in some level of management of their forestlands. A few people felt that parcelization without development would not be a problem if owners were still motivated to manage their lands for timber and other forestry values and if there were the right conditions to make management and harvesting economical. European, particularly Scandinavian, countries were cited as models of small parcel management, and one person who had recently visited Finland related how undeveloped five acre (2 ha) parcels there were being economically harvested. One such model with a European heritage, the forestry cooperative (Kittredge, 2003), was seen as having high potential for small parcel management in the Northwoods: "More and more cooperatives have been forming; some of them haven't been what we would picture as the best way to go, but there are some that have been successful at bringing people together to do whatever type of management is needed. Not only do we need to teach people about ecosystem management and parcelization, but we need to teach them about sharing as well."

As for other benefits, some participants said land fragmentation through parcelization and development might increase some desired types of wildlife, particularly edge species—a justification often cited by those in the timber industry (e.g., Brenneman and Eubanks, 1990). The primary perceived benefits mentioned, however, tended to be social and economic ones. Life in the Northwoods can be pretty simple without the range of options in services and opportunities available to those in more urban areas, and some participants who were residents of northern communities said increased choices and business activity would be welcome: "We are a forest area and a lot of people, retirees, come up and they add a lot of income to our economy. We center a lot of what we do around our retirees, our medical facilities in our area in Minocqua and Woodruff ... They bring in professional people. They bring in people in service, professional people, and there's a considerable amount of building going on. So you have a definite economic impact."

5.2. Recreational and aesthetic

Participants mentioned many different effects on recreation and aesthetics, including that development intrudes on the beauty and the wildness of the forest,

and that more development and use reduce solitude and increase light and noise pollution. Several participants mentioned that as lands change hands and are parcelized, access to woodlands for hunting, fishing, and gathering has noticeably decreased. One person mentioned how private property that local residents had used for generations was now posted "no trespassing," motivating this person to buy and post his own land to ensure continued hunting. Reduced private land access has increased recreational pressure on public lands, and more recreationists seeking varied opportunities on a decreased land base has in some cases resulted in recreational conflicts. This exchange between "Ken" and "Jim" illustrates. Ken noted: "This forces people to go to public lands, county or state. And I think the other thing, too, is we're seeing as a result of that, increased motorized pressures, ATVs (All Terrain Vehicles) in particular, and that's partly due to this parcelization ..." Jim finished: "Yes, increased user conflicts related to quiet sports versus motorized sports."

Recreational and aesthetic impacts such as these were also among the top concerns of Wisconsin residents in the DNR forest assessment survey described earlier (Wisconsin Department of Natural Resources, 2001a), and while they may have not been directly associated with parcelization and development issues, there are certainly indirect links.

5.3. Forest health and fire

A number of issues related to forest health and fire were associated with parcelization and development, including decreased plant and animal diversity, increases in exotic invasive plants, and negative impacts on endangered wildlife, particularly those needing large, uninterrupted blocks of land. Similar to Thorne's (2000) finding of "terminal harvests" in New Hampshire as cited above, one participant mentioned how a local developer would severely cut the timber on the land prior to sale for development, in the participant's words "blasting it back to the Stone Age." Another forest manager mentioned how many of the mature pine plantations in north central Wisconsin were being parceled off and sold to exurbanites who built homes there and commuted to Wausau for work. These residents may see their plantation as secluded wilderness, but for forest managers it is more like a fire hazard: "I just want to reemphasize the increasing risks or difficulty in trying to provide both structural and wildland fire suppression on all these homes that are getting more and more remote. So not only wildland (fire) suppression but structural suppression is getting more difficult, bringing stress on the local communities."

5.4. Community/infrastructure

The fire suppression activities just mentioned were part of a host of perceived impacts that parcelization and development placed on local communities and their infrastructure. With ever-increasing property taxes, participants wondered how long many long-time residents—especially those who were retired and on fixed incomes or those with modest incomes from farming and timber harvesting—would be able to hold onto their lands. More development was also seen as increasing the demand and strain on community infrastructure: more roads, more services, and more maintenance. These "costs of sprawl" often end up being passed onto the community as a whole. As one representative from an electrical utility company stated: "Thirty-five years ago, we ... might have had ten customers on an existing transformer. Today, it's one transformer on a long line that goes to each of these customers because of all this fragmentation ... (These residents may be) paying the full cost of the line themselves ... But what really they don't pay equal cost on is the maintenance of those lines. You know, you have the winds blow through Northern Wisconsin and we've got one customer and it takes, you know, they might put five line crews on to get one customer back on line. When that happened in (the city of) Oshkosh, I had five line crews that were working on probably 100 customers. So that is quite a bit of a difference, and (fragmented development) does cost all of us more for that maintenance probably."

In a somewhat different vein, newer residents were seen as bringing different ideas and values to the community that sometimes clash with those of long-time residents. Such changes were not always perceived negatively by some discussion participants, who saw newcomers as often being more politically active in protecting the environment and more accepting of regulations to reduce the negative effects of development and parcelization.

5.5. Timber productivity

With timber a central focus of many participants' livelihoods, the effect of parcelization and development on timber productivity was a prominent topic. There was a general belief and experience among participants that as land is parceled and developed it is often taken out of timber production, and available studies in other places tend to confirm this perception (e.g., Barlow et al., 1998; Wear et al., 1999). Parcels that do remain in production for timber are often more difficult and costly to manage, resulting in lower profits and fewer incentives for continued management. Parcelization was also seen as resulting in maturation and succession of the forest base in northern Wisconsin from commercially valued aspen, pine, and oak to somewhat less valued species such as red maple. One person called this the "mapleization" of the Northwoods. These combined trends of smaller parcels and low valued species were seen as harming local mills that must increasingly rely on fiber sources outside their region or face closing down: "Where is the resource that wood fiber is going to come from when we build houses on the many tracts of land? I mean we're seeing that problem today and it's going to get worse."

6. Response strategies

Participants discussed various strategies for mitigating the negative effects of parcelization and development. Comments relating to this element seemed to be the most speculative; participants seemed to know what was broken but did not always know the best way to fix it. We grouped the solutions into four broad categories as described below.

6.1. Planning and regulations

In terms of planning and regulations, several people viewed the recently state-mandated "Smart Growth" planning positively, as each county will be forced to have a comprehensive land use plan in place by 2012 (see also Last, 2000). But within the Smart Growth context, some felt there was a need to develop more innovative planning strategies. Two such strategies include cluster development and conservancy zoning. Two participants mentioned places where these strategies have allowed higher housing densities within a planned development in order to protect remaining natural areas. One participant mentioned how Oneida County in the heart of Wisconsin's Northwoods established one of the first forestry zoning ordinances in the country in the 1920s, but as currently applied the law has no real teeth in preventing parcelization and development. Other participants concluded that to make any of these plans and regulations work, more effective participation was needed among the various forest stakeholders: "We need to look at conservation and land use planning in a very robust way. And perhaps that's what this Smart Growth legislation will do. Any good land use planning should involve effective public participation, and I think that if it's done correctly—it's timely and expensive—but it helps people identify the problems themselves. And if they're able to do that, which from my experience they generally are, they're likelier to buy into protection efforts."

6.2. Taxes and incentives

In terms of solutions, there was also a lot of talk about taxes and other incentive and disincentive mechanisms for protecting lands from parcelization and development (see also Bengston et al., 2004; Williams et al., 2004). The Managed Forest Law drew considerable attention in discussions, with many participants seeing it as a law with good intentions but with various loopholes that needed to be fixed. Other solutions looked at developing such things as a parcelization tax, fines for blatantly poor land use practices, and rewards for good land stewardship: "Now, if you manage your land in a way that's bad ... there's absolutely no penalty in our society for doing that ... And it makes me wonder if there aren't—I always like to think of incentives instead of regulations—ways that statewide or local comprehensive plans can look at private lands without threatening what people perceive as the rights you're talking about. If there are ways for them to be rewarded perhaps for management of lands that benefit certain aspects or certain values that we take kindly to, you know, right now, what we say is that if you have managed forestland, you get a tax break."

Finally, participants were often quick to place blame on urbanites from the southern part of the state and

elsewhere and offered suggestions like differentially higher property taxes for non-residents and seasonal residents and improving the quality of lakes and cities in the south so that people wouldn't move up north.

6.3. Acquisition and funding

Participants for the most part were cognizant that the prospects for increased funding for land acquisition were limited, and several felt that future land acquisitions should aim at moving large, private tracts into public ownership: "From my standpoint, we need to work at blocking in the public ownership. You have holes in the national forest system, the county forest system. There are some logical things that we're trying to acquire just to block in. Not trying to go outside and get more—you know, get bigger arms and pull it in—but instead to look at our boundaries and where it makes sense to try to buy some of these inside parcels. These are the ones that are getting bought up and subdivided and are causing us problems with management because people don't want to see the clearcuts or they don't want to see another road popped in here or whatever it might be, or the access problems."

Others said more effective use of easements and transfers of development rights was needed, and felt that the recent burgeoning of the land trust movement in the state could, in the long term, accomplish many land protection objectives. A few participants who worked for the Wisconsin Department of Natural Resources saw the recent flood of applicants for the Managed Forest Law program as an indication of the potential of the program for serving small parcel owners. They were also quick to note, however, that more funding for staffing was needed to keep the program on track and responsive to landowner needs.

6.4. Education and ethics

Last but certainly not least, participants strongly felt that a major key to resolving problems due to parcelization and development was through education and other means that could instill a more proactive land use ethic among woodland owners. On the bright side, a few saw how recent increases in ownership presented a marvelous opportunity for land stewardship education: "We may be able socially, however, to get to a point where people choose to live differently on land than they have ... and I think there is still a chance for a land ethic to come into being where people would say, 'a part of my owning this land means I can't do just what I want to. I need to be a member of society. I need, for example, to provide at least some of the fiber that's grown on forested land,' or it could be other land types ... I see a chance to help people in that sense to become better citizens, land citizens, so that all of the pressure for things like having clean water, saving endangered species, and producing wood fiber doesn't fall just on the large industrial landowners and the public landowners. There's the opportunity."

As a potential model to follow, some participants cited programs such as lake property owner associations that have been successful and could be used in a similar vein to teach woodland owners the knowledge and responsibilities of land stewardship. This work, however, could be accomplished in many different ways with different programs aimed at different stakeholder groups. Such programs should address problems in the short term, but must also work toward long-term ethical changes to protect forestlands, as one participant said, like Native Americans do for the seventh generation.

7. Conclusions and implications

The aim of this study was to identify the salient issues relating to landscape change in the Wisconsin Northwoods due to parcelization and development. Working with 1000 Friends of Wisconsin through their Forest Fragmentation Education Initiative, we were able to tap into the thoughts of a key segment of stakeholders and in doing so identified a broad range of their concerns. While it is important to note that our findings are based on participants' perceptions of parcelization and development patterns, drivers, effects, and response strategies, their comments often mapped closely with independently documented sources when we were able to make such comparisons. This was especially true with respect to patterns or trends of change and its effects at various locations. In some cases, their knowledge extended beyond such comparisons: with their fingers on the pulse of parcelization and development in the state, participants sometimes conveyed information that was not commonly known. This points to one of the

advantages of this method in that it can give planners and researchers an early and rapid assessment of the concerns and the locations where they exist for following up with more detailed study.

People's perceptions can also be colored by their values and attitudes. With many participants both long-term residents of the northern part of the state and professionally involved in natural resource issues, their comments at times seemed to reflect an anti-urban, anti-development bias. This is an important concern in terms of understanding and being able to generalize the findings of our research. Future work on this topic should seek to include a broader range of perspectives, including those of seasonal residents and visitors, those not tied professionally to natural resource issues, and those who may have an opposing interest in parcelization and development such as real estate developers and recent woodland owners or home builders. In this respect, some important questions include: Do stakeholders who are not directly tied to the forest resource base see a greater set of benefits to development than the discussion group participants we focused on in this study? Are long-time residents and newcomers at odds with one another in how they think and feel about parcelization and development, or are there shared concerns that could provide common ground for developing strategies for growth management? How are the effects of parcelization and development perceived differentially by residents in communities that have experienced high rates of recent change versus those who have not?

Along with population sampling issues, the results of this study also have implications and raise questions for understanding the critical topical issues related to parcelization and development. We found that the landscape change model, with its four elements of patterns, drivers, effects, and response strategies for dealing with landscape change, seemed to do a good job in both organizing topics for discussion and producing a wide range of responses from participants. While many of the perceptions of participants were expected and supported by local data or more generally in the literature, some findings stand out in terms of what they imply for future work.

In terms of the patterns of parcelization and development, one little talked about pattern of movement that deserves further attention is the growth of permanent home development in rural enclaves. In our study, we heard about a number of these around the state, attractive towns like Mineral Point or regions like the unglaciated "Driftless Area" that lie significantly outside traditional daily urban commuting distances yet are still reasonably accessible so that residents can maintain regular work or social ties to a large city, or maintain a household the lies in between two workplaces. Besides their relative proximity, one thing these enclaves seem to share is a set of cultural amenities that complements their natural assets. This unique combination of nature and culture may provide a desirable "middle landscape" (Pollan, 1998) for some people that cannot be found in either the city or the forest. Further examination of these growing enclaves may help planners identify future hotspots of development as well as expand our understanding of how nature and culture can contribute to "sense of place" (Williams and Stewart, 1998; Jorgensen and Stedman, 2001).

A second implication from our findings on patterns deals with the idea of gradients of development and parcelization. While the north–south comparisons made in the paper may not be strictly commensurable due to major differences in vegetation, topography, and other physical and social conditions, our study participants found the spatial and sometimes temporal gradients in parcelization and development useful as heuristics in visualizing and communicating the effects of change in the Northwoods. North–south comparisons are often made between lake lot development in the state (e.g., Bernthal and Jones, 1997), and it is possible that transferring this mental imagery to parcelization and development of forestlands could also be a very useful educational tool for planners. It may also be useful for future work in this area to compare perceptions and trends in parcelization and development from other places in the United States and beyond. Problems and issues such as those documented by Thorne (2000) in the Northeastern US are in some cases more acute than what is now being experienced in the forests of the Midwestern Northwoods, and thus contrasts and comparisons between such regions could be very instructive.

In terms of the drivers and effects of parcelization and development, one thing that our analysis may have failed to communicate was the stakeholders' acknowledgement of the interdependence of causes

and effects. The coding of comments into discrete categories can sometimes obscure the multidimensionality of people's responses; in a given statement a participant may have mentioned a number of different drivers or effects of parcelization and development, as well as the interaction between drivers and/or effects. For example: "A robust economy begets accumulated wealth, which begets the desire to own a piece of heaven, which begets fragmentation of the landscape. Human population growth also fuels the fragmentation fire. More people need more places to live, and the perception is that the good life is found outside of cities and towns. But of course curbing human population growth is more controversial than private property rights issues, so call me a dreamer."

As this comment also illustrates, while some drivers are constant, others are value driven and change slowly over time, and still others come into play only when conditions are ripe or when they interact with other drivers. In future research, more attention should be paid to how drivers and effects operate as singular entities as well as how they interact with one another.

While our research documented perceptions of a host of negative effects due to parcelization, we uncovered few perceived benefits. As mentioned in Sections 2 and 3, our sample of participants as well as the focus of our questions for this theme may have minimized opportunities to understand a fuller range of benefits the parcelization and development might bring to rural areas. However, a review of the Wisconsin Department of Natural Resources (2001a) open-ended survey responses for parcelization and development-related issues reveals a similar widespread negative perception of effects among the statewide sample of residents. Still, for the purposes of guiding future growth it would be useful to understand how and when parcelization and development can yield benefits, particularly in the economic and social realms. For this type of information, future research should target local chambers of commerce, new seasonal residents, long-time residents that are not particularly tied to natural resource issues, real estate developers, and other similar segments of the population.

As for the last element in the landscape change model that we addressed, the response strategies mentioned by participants also closely paralleled the range of regulatory, acquisition, and incentive-based approached described by the literature (see Bengston et al., 2004). But unlike many policy-oriented analyses of solutions to parcelization and development, participants frequently mentioned that a range of educational approaches was also needed to change people's fundamental values toward the forest landscape. This, some felt, would lead to a realization of the "land ethic" called for by Aldo Leopold, an ethic that places the intrinsic values of nature on par with the instrumental values of people (Leopold, 1981). But while such an idea may resonate strongly with the natural resource professionals who dominated our sample (particularly as Leopold's home state was Wisconsin), attitude-behavior theory would argue that translating a land ethic into specific behaviors that prevent inappropriate parcelization and development can be a difficult thing to accomplish (Ajzen and Fishbein, 1980). As Jordan (2000) points out, fostering a love for the land has also led to the desire to live out on it in the way that Leopold did in his Sand County "shack" and Thoreau before him did in his cabin on Walden Pond. While such expressions in the days of Leopold or Thoreau had few negative consequences, Jordan argues that we are now faced with "10,000 Thoreaus" who are having a much greater cumulative impact. The challenge, then, for educators is to direct environmental behaviors in specific ways that work to improve cities as dwelling places (Cieslewicz, 2000) and encourage land stewardship restore lands damaged by past parcelization and development (Jordan, 2003).

Finally, while the Friends' Forest Fragmentation Education Initiative sought to understand how parcelization issues were perceived by Northwoods stakeholders, what we found was that as a topic of discussion it was not easily separable from development issues. Parcelization may be a conceptually distinct process in an intellectual sense, but on a perceptual level it cannot be readily observed in the landscape. And given that the resource-oriented professionals in our sample often tended to lump parcelization and development together, it is likely that less familiar stakeholders would do the same. Yet parcelization remains a vexing issue, and with further study of it resource professionals, policy makers, and other stakeholders can gain the wherewithal to reduce it, to stave off development as an inevitable consequence, and to guide future development on subdivided forest parcels in more appropriate ways. In these ways, our

increasingly parcelized landscape can more effectively balance ecological, economic, and social goals (Rickenbach and Gobster, 2003).

Acknowledgements

We are grateful to John Grosman and Don Last of 1000 Friends of Wisconsin for their assistance and the opportunity to work on this project with them, to Jan Hacker of the Northwest Regional Planning Commission for collaborating on the workshops, and to Shorna Broussard, Kristen Nelson, Susan Stewart, and two anonymous reviewers for their helpful comments on earlier versions of this manuscript. This project was supported in part by 1000 Friends of Wisconsin, The University of Wisconsin–Madison's Department of Forest Ecology and Management, the Renewable Resources Extension Act, and the USDA Forest Service's North Central Research Station.

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