

Understanding Social Complexity Within the Wildland–Urban Interface: A New Species of Human Habitation?

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Abstract The lack of knowledge regarding social diversity in the Wildland Urban Interface (WUI) or an in-depth understanding of the ways people living there interact to address common problems is concerning, perhaps even dangerous, given that community action is necessary for successful wildland fire preparedness and natural resource management activities. In this article, we lay out the knowledge and preliminary case study evidence needed to begin systematically documenting the differing levels and types of adaptive capacity WUI communities have for addressing collective problems such as wildland fire hazard. In order to achieve this end, we draw from two theoretical perspectives encompassing humans' interactions with their environment, including (1) Kenneth Wilkinson's interactional approach to community, (2) and certain elements of place literature. We also present case study research on wildfire protection planning in two drastically different California communities to illustrate how social diversity influences adaptive capacity to deal with hazards such as wildland fire. These perspectives promote an image of the WUI not as a monolithic entity but a complex mosaic of communities with different needs and existing capacities for wildland fire and natural resource management.

Keywords Wildland urban interface · Community · Wildland fire · Adaptive capacity · Social diversity · Hazards

Introduction

The wildland–urban interface (WUI) is the area where residential development is juxtaposed proximate to wildland areas (USDA 2001; USDA and USDI 1995). Estimates indicate that the WUI covers more than 9% of land mass across the contiguous United States (Radeloff and others 2005) and it is widely regarded as a focal point for human–environmental conflicts and policy conundrums ranging from habitat fragmentation to wildland fire protection. In this paper we focus on the issue of fire hazard in the WUI to more meaningfully characterize the social complexity in this evolving area of human habitation. By analyzing the literature and data from case study research on community wildfire protection planning, we hope to advance the discussion of what that complexity means for natural resource management, policy, and successful adaptation by residents faced with increasing risks inherent to living in the WUI.

According to the National Interagency Fire Center (2008), more than 85,800 fires burned more than 9 million acres in 2007, part of a growing prevalence since 2000. An estimated 5,326 structures were destroyed by fire in 2007, excluding seasonal homes, for which data were not collected (NIFC 2008). The U.S. Government Accountability Office (2007) reported that the cost for federal agencies to prepare and respond to wildfires rose from \$1.1 billion per year between 1996 and 2000 to more than \$2.9 billion per year between 2001 and 2005, while the majority of fire suppression costs by the U.S. Forest Service are attributed

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to the protection of homes in the WUI (Office of Inspector General 2006). These numbers indicate an increasing impact of wildfires on WUI communities and highlight the need for additional consideration of community capacity to deal with such disturbances.

The continuing progression of spatial studies concerning evacuation capacity, fuel modeling, and development trends of communities in the WUI have been key in preventive management of wildland fire (Stewart and others 2007; Radeloff and others 2005; Zhang and Wimberly 2007). Yet researchers and policymakers have paid less attention to the mapping of another important variable in WUI management: the diversity and variability of people and communities occupying the area in question. Missing is an explicit recognition that the WUI may well constitute a “new species” of human habitation that begs better understanding on a conceptual level.

Scholars have tended to treat the WUI as the simple extension of urban settlement or the further development of traditional rural areas, yet these characterizations have not captured all that the WUI is; nor do the past distinctions of rural versus urban or extraction-, amenity-, or tourism-based settlements tell the whole story. The WUI is *all* of these and other social, political, and economic characteristics interacting in close proximity, often resulting in a complex mosaic of social adaptation and local culture spread across the country. Resulting interactions are both the source and the result of changing patterns of social functioning across the landscape. Understanding the differences in the social context of WUI communities, including place-based experience, demographic/structural characteristics, access to scientific/technical information, and the informal interactions/relationships residents have with one another is critical to knowing (1) how new policies and regulations may affect local action to achieve national goals and (2) how communities can successfully adapt to virtually any resource issue, including fire management.

A number of studies have shown that some communities have greater capacities for the mobilization of collective resources before, during, and after disturbance events (Luloff and Swanson 1995; Flint and Luloff 2007). These studies focused at the community level link to the very large and robust literatures on risk, risk perception, and response to human disasters (Slovic 1993; Quarantelli and Dynes 1976; Drabek 1986). Likewise, there are a number of social science concepts linked to the ability of a community to adapt to various economic, social and demographic changes, including community capacity, community resiliency, and community viability (Donahue and Haynes 2002; Haynes 2003). While there is much debate concerning the overlap of these terms, most scholars and managers would agree that a community’s capacity to adapt is a multifaceted concept which can change given the specific disturbance events (i.e.,

fire). Wall and Marzall (2006, p. 378) define adaptive capacity as a “set of characteristics that allows a given system to perceive change or threatening circumstances, evaluate them, decide on a solution path and both develop and adopt processes and tools to manage the risk, thereby maintaining itself throughout.”

This research helps extend work on these various aspects of community capacity to adapt (Donaghue and Sturtevant 2007) by beginning to explore what specific attributes of communities are needed for adaptation to the risk of wildland fire. Such a synthesis is needed to help reconcile and refine the growing body of literature on social/community capacity to deal with different aspects of wildfire preparedness, mitigation, and recovery (Cohn and others 2008; Walker and others 2006).

One element of social context related to adaptive capacity that is often overlooked is the knowledge component. This knowledge component includes (1) access to scientific/technical information concerning disturbance and (2) resident knowledge of the local ecosystem and/or culture (hereafter referred to as local knowledge). Along with the demographic/structural characteristics of a community and the interactions/relationships between its residents, these components of social adaptability are an often overlooked component of hazard resiliency (Wilkinson 1991). Resilience is defined as the capacity of a system to absorb disturbance and reorganize during change to retain essentially the same function, structure, and identity (Berkes 2007). While resilience often focuses on returning a community to some original state following a disturbance, adaptation focuses on moving a community on to something new. Both adaptive capacity and resilience point to the importance of social and structural components in addressing change, including the evolution of social systems in relation to a biophysical environment and the way historical and current social systems are linked to hazards threatening the community.

In response to the above issues, we wish to advance a conceptual understanding of the differing levels and elements of social context in the WUI. This includes the various elements of adaptation needed to solve problems in WUI areas and increase the resiliency of communities within its borders. The idea here is (1) to better understand the diversity of people and communities that encompass the WUI and (2) to suggest a conceptual framework that will help explain the relationships among elements composing community social context. We believe this understanding will assist managers, policymakers, and local residents in adapting to a variety of circumstances surrounding natural resource management.

To accomplish these goals we have organized the remainder of this paper as follows. First, we review and propose the selective use of various theoretical perspectives relating to humans’ interactions with their environment to

help sort through both the social complexity of the WUI and the myriad issues revolving around the so called “human dimensions” of land/resource management that manifest within its boundaries. Next we illustrate the diverse elements of social context that have influenced the community wildfire protection process in two California communities. The paper concludes with a discussion of how these case studies support our use of the above theories and what this new theoretical understanding of WUI communities’ adaptive capacity means for preparation and mitigation of hazards such as wildland fire.

Literature Review

Existing WUI Literature

Case study research focused on WUI populations has been growing (Walker and others 2006; Bright and Burtz 2006), however, the primary thrust of this research seldom explicitly recognizes that very different types of communities and residents exist within its borders. Likewise, the aforementioned mapping studies often submit various physical definitions of the WUI without providing societal context of their attempts. Certain managers, scholars, and policymakers have long recognized the importance of differing levels of social adaptability within the WUI. Lee (1991) warned against a common myth that all interface communities are a cohesive unit with residents who know each other, work together, or communicate. He warned managers to be prepared for a variety of community approaches and to understand that “every interface conflict stems from competing human attachments to the land.” Likewise, Cortner (1991) suggested that “the commonly used term ‘interface’ may not define the changing relationships between people and wildlands.” Jakes and others (1998a, b) extended this line of argument by calling for different management approaches based on “functional communities,” defined as geographical areas where residents share perceptions and relationships with the surrounding natural resources. These studies demonstrate the existing links among space, community, and culture we hope to build on in our development of a conceptual understanding for the WUI.

More recently, a number of studies about fire in the WUI demonstrate variability in knowledge levels, demographics, and the nature of social networks among residents of disparate communities. For instance Brunson and Shindler (2004) and Nelson and others (2005) have demonstrated variability in resident knowledge or acceptance of fire mitigation strategies based on local environmental and social characteristics, while Carroll and others (2004) found differences in forest landholders’ perception of fire

(both wildland and prescribed) as a threat or a tool and willingness to take measures in response based on past experience with fire, land tenure, financial, and physical restraints. Others have shown that WUI residents vary in their willingness to pay for fuel treatments or maintain defensible space based on their status as full-time residents or seasonal users (Walker and others 2006; Bright and Burtz 2006) or how differing socioeconomic variables such as poverty may affect the average size or destructiveness of locally experienced fires (Mecer and Prestemon 2005).

Case study research has also shown how the social context of WUI communities affects wildfire preparedness. Jakes and others (2007b) have shown that landscape, government involvement, human capacity, and social capacity were important to the success of wildland fire preparedness initiatives in 15 U.S. communities. Different levels of these elements help explain why some WUI communities are more successful than others in taking responsibility for reducing wildfire risk. In Australia, agency involvement, human capacity, and social capacity were also found to be important to successful community wildfire preparedness (McGee and Russell 2003).

Steelman and Kunkel (2004) describe the importance of structural and social responses to wildfire threats. Social responses refer to actions that improve decision making, organization, management, and planning that help communities assess, support, and choose among different approaches to wildfire management. The social context of a community determines its ability to initiate social responses to wildfire, and the variability of social contexts will result in differences in the effectiveness of different social responses.

Even spatial studies of the WUI hint at varying levels of vulnerability to hazards and community adaptability within its parameters. The definition of WUI communities in the Federal Register (USDA 2001) and the basis for recent GIS efforts mapping the extent of the WUI (Stewart and others 2007; Haight and others 2004) differentiate between the wildland urban intermix and the WUI based on levels of development and density of nearby wildland vegetation. Meanwhile Zhang and Wimberly (2007) point out the importance of using spatial data at different levels of aggregation (county, census tract, etc.) to demonstrate how it can affect the distinction of the WUI. The USDA Southern Wildland–Urban Interface Assessment (2002) separates the WUI into four geographical categories: a “classic” WUI of urban sprawl; a wildland urban intermix characterized by a shift to agriculture and urban fringe; the isolated WUI, composed of remote residences; and WUI islands within urban areas. All of these designations include inherent social, economic, or democratic influence by communities on the area in question, yet there is little attempt to integrate this into management or policy.

Mapping studies such as Stewart and others (2007) and Radeloff and others (2005) are a very important first step in dealing with human presence by incorporating housing density. Yet they leave it for others to address the complexities of how different types of social arrangements and their interaction with the natural environment may have on the mapped areas in question.

What is needed to compliment recent advances in the biophysical understanding of the WUI is the component social theory that extends thinking by Lee, Cortner, and Jakes described above. While recent studies highlight the interaction between demographic variables and fire-related issues of protection (Walker and others 2006; Bright and Burtz 2006), they are not informed by a larger and more abstract understanding of their interaction with other social or biophysical characteristics. Such linkages can explain why and how collective adaptive behavior relative to fire conditions does or does not happen in particular locales in the WUI.

For this purpose we draw mainly from two areas of sociological inquiry to create a framework for better understanding WUI diversity: (1) Kenneth Wilkinson's interactional approach to community (2) and certain aspects of the rapidly developing place literature in natural resource social science.

Sociological Inquiry and the WUI

Interactional Approach to Community

Wilkinson's (1991) interactional approach to community is central to our argument because it recognizes the importance of social interaction in the creation and functioning of locally based social arrangements to solve common problems. This notion extends Toennies' (1957) classic views of community volition—natural (*Geminschaft*) and rational (*Gesellschaft*)—by portraying the community not as unchanging structure but, rather, as a constantly evolving *process* that members from diverse segments of the community are engaged in to meet their needs. Wilkinson (1991) conceives of community as an interactional field because this construction demonstrates how the interactions people have locally create a sense of belonging; it acknowledges the interrelated structure that undergirds a need for social contact and action at local levels to solve problems. As Wilkinson states, “So long as people interact, the community in this sense will persist and give rise to collective identity *and action* in the locality” (p. 38; emphasis added).

Wilkinson (1991) also emphasizes the importance of the local surroundings in the development of community: “The interactional conception of the community supports the view that contacts among people define the local territory; and it argues ... that characteristics of local settlements are

important indicators of social interaction” (p. 24). These notions imply an important variable of the local surroundings and lead us to engage aspects of place literature.

Recent work by Flint and others (2008) extends Wilkinson's (1991) notions of interactional field to a regional scale. They contend that geographical development patterns such as urban sprawl have not negated the importance of community in its process sense, but merely created a greater number and complexity of interactions occurring across larger geographical scales. We suggest that this reconceptualization of interactional field theory fits the WUI phenomenon very well, as many of the problems needing solutions in the WUI (such as mutual fire aid for example) occur at larger scales than the traditional community or even county but are certainly smaller than that of the state.

Place

Places encompass the physical locality of an area and all that occurs there, including the cultural contexts, meanings, values, and experiences of the people who define it (Williams and Stewart 1998; Patterson and Williams 2005; Brandenburg and Carroll 1995). Here our focus is on local, place-based action, as it is informed by both scientific/technical knowledge and (very importantly) by intimate knowledge of local environments.

Particularly important to our exploration of the WUI is Kemmis' (1990) linkage between the social relationships of place and the political or organizational capacities of a given local area. He argues that productive local adaptation takes place primarily when people have emotional as well as practical ties to the physical space they occupy. Taking Wilkinson and Kemmis together, it can be argued that the capacity for dealing successfully with emerging problems is moderated by the relationships people have with their locality and to each other. Specifically, Kemmis argues that “one size does not fit all” and that the solutions to local problems with the most probability of success are those modified to fit local conditions by those people whose lives will be directly affected by them. He argues that cookie-cutter solutions imposed by more distant entities tend to engender resistance or (even worse) passivity by local stakeholders. This is not to minimize the need for scientific/technical knowledge or community interaction with experts in such areas as fuels management and fire behavior. Rather we argue that such knowledge needs to be accessible to local actors and adapted to meet local circumstances. This can often be accomplished through the building of relationships among local and nonlocal actors across geographic and jurisdictional scales (Daniels and Walker 2001).

We feel that place-based thinking is important in our expansion of the WUI concept because it suggests that

even in areas with seemingly uniform physical characteristics and apparent management needs, workable solutions may well be very different based on the values and knowledge that local residents hold individually and collectively for particular settings. We also recognize that place-based knowledge is not uniform or even present in all localities and among all residents (Jakes and others 2007b). Recent work on differences between seasonal residents and full-time ‘locals’ is just one example of the many influences that create differences in the ways homeowners and communities value various aspects of the landscape (thinned forests for example) or attribute different levels of its importance to community functioning (Walker and others 2006; Bright and Burtz 2006). Among others factors influencing place-based knowledge are generational ties to the area (Brandenburg and Carroll 1995) and the specific experiences local people have had with disturbance events such as fire (Cohn and others 2008), yet one commonality remains clear—these characteristics vary across landscapes and communities.

The WUI as a Mosaic

We are certainly not the first to indicate that there is a diversity of community types across the United States. However, we count ourselves as part of a growing group of scholars and managers recognizing that this differentiation is not uniform across the landscape, nor is it determined only by quantifiable, demographic characteristics.

For instance, Bell’s (1992) description of urban/rural differences attempts to identify and characterize the culture or functioning of communities based on economic, social, and demographic characteristics. Bell’s work is important to our characterization because it acknowledges the importance of local knowledge and culture in the everyday adaptability of communities studied and the fact that rural and urban people can in some cases bring different kinds of knowledge and perspectives to local problem solving.

Perhaps the most useful blending of these two perspectives for the WUI is the designation of “New West” and “Old West” communities (Shumway and Otterstrom 2001), partially resulting from the migration of urban populations to undeveloped areas in the American West. This migration of residents causes shifts of economy from traditional extractive industries (ranching and farming) to recreation and tourism. Subsequent changes in population have a drastic effect on the culture and social functioning of the community, including its views of natural resource issues and willingness/ability to collaborate on resource issues (Krannich and Luloff 1991). Particularly important to our discussion of the social characteristics in the WUI is a recent article by Winkler and others (2007) in which they use factor and spatial data analysis to analyze demographic

characteristics of “New West” communities in the Intermountain West. The result was a highly correlated group of characteristics, including socioeconomic class, industry employment or level of education, and the arrangement of “New West” community clusters. Included in their analysis is a continuum of “New West” and “Old West” communities based on demographic characteristics and the resulting local cultures existing in those localities.

The image emerging from the juxtaposition of these conceptual pieces is neither the WUI as an undifferentiated and monolithic entity nor simply a collection of neatly bounded communities but, rather, a mosaic of complex settlement patterns with overlapping resource problems and capacities for adaptation distributed across the landscape. Natural resource-related problems occurring in these settlement patterns must be dealt with at different scales, including the neighborhood, the geographically bounded community and the region (Flint and others 2008).

WUI populations draw their differences from both quantitative demographic elements and less tangible qualities related to social context (informal knowledge networks, place-based experience/knowledge, scientific/technical knowledge networks) that are much harder to grasp. The varying presence and pervasiveness of these characteristics in different communities dictates the collective ability of its people to adapt and prepare for hazard situations such as fire. We map this relationship in Fig. 1. Differences in these adaptive capacities do not stem uniformly from outdated notions of rural and urban, but exist in patchworks of local arrangement dictated at smaller scales that often assumed (Lobao 2004).

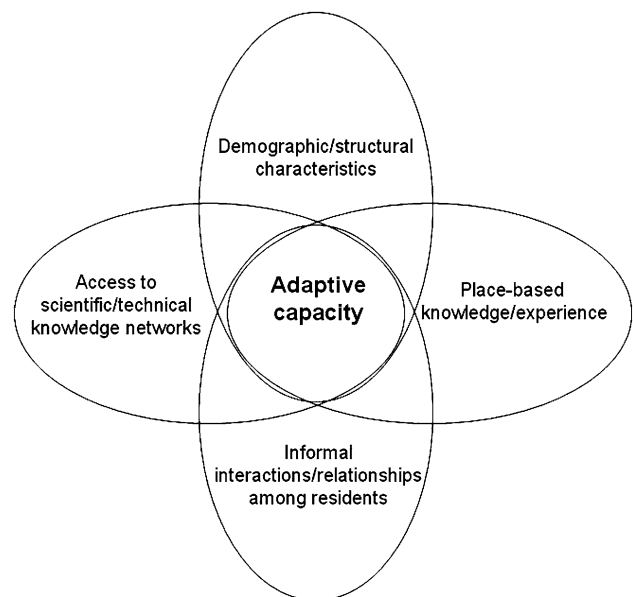


Fig. 1 Conceptual elements of WUI community adaptive capacity

We cannot be certain of all the specific characteristics that differentiate the social context of different communities and regions; rather, we are beginning the empirical investigation of these characteristics guided by the concepts noted above. The goal is to identify the domains of problem solving needed in the WUI and ways to understand/characterize local/regional abilities to solve them. To that end we discuss the characteristics of social context which led to the successful development of Community Wildfire Protection Plans in two drastically different WUI communities in California. Comparison of the existing abilities in these communities and the measures needed to improve wildfire protections provide evidence for our claims of differing adaptive capacities of WUI communities across the country.

A Study of Community Wildfire Protection Planning—Diverse Social Contexts in Two California WUI Communities

In 2003 Congress passed and the President signed the Healthy Forest Restoration Act. The act advocated the development of community wildfire protection plans (CWPP) as a way in which communities could “clarify and refine [their] priorities for the protection of life, property, and critical infrastructure in the wildland–urban interface” (Society of American Foresters 2004, p. 2). Over the past 4 years, CWPPs have become “one of the most successful tools” for communities to develop collaborative strategies to reduce wildfire risk in the WUI (CWPP Task Force 2008, p. 2).

The Joint Fire Science Program funded a project to investigate how CWPPs enhance collaboration between communities and fire management agencies, and how the development of CWPPs builds community capacity (Jakes and others 2007a). Case studies were conducted in 13 communities in eight states. Using data from the two California case study communities, we can illustrate how the social contexts of WUI communities vary across the landscape and how these contexts influenced the development of CWPPs.

Auburn Lake Trails (ALT) and Grizzly Flat are regulated by the same state (California) and county (El Dorado County) governments. Both were identified as high-fire-risk communities by the El Dorado County Fire Safe Council and the California Department of Forestry and Fire Protection (CDF at the time, now called CAL FIRE) and received funding to hire consultants to develop CWPPs in both communities. Although sharing these similarities, the two communities vary in terms of social interaction, a sense of belonging, and other elements of social context.

Auburn Lake Trails

ALT is an unincorporated gated community of more than 950 homes located on the southern rim of a deep canyon formed by the Middle Fork of the American River near the city of Auburn. As the name implies, Auburn Lake Trails was envisioned as a lakeshore community, but the dam on the American River has never been built and current residents focus their leisure activities on horseback riding and golf. Annual grasses, chaparral, oak, and mixed conifers present a mosaic of highly flammable vegetation.

The Auburn Lake Trails Property Owners Association’s Board of Directors is responsible for adopting, establishing and seeing to the enforcement of rules and regulations governing the community, and for levying and collecting assessments to cover management costs. One local resident observed:

[The ALT Board has] an organization that is equal, I think, to almost any large or small city.

ALT is a community rich in community capital. This is a community that has significant human capacity. The local population, particularly the retirees, has the experience and education to move the community forward in various areas of interest. They also know how to work the different governmental systems to overcome barriers to action. An ALT employee who does not live in the community said,

[The local residents] are pretty much prone to be well educated in college. They are socially aware, they’re aware of their responsibilities.

Activities to reduce hazards in the home ignition zone are centered in the Volunteers in Prevention (VIP) program. VIP is a California Department of Forestry (CDF) fire prevention and loss reduction education program. The CDF and local fire department initiated the ALT VIPs in 1989. ALT residents were frustrated by the CDF’s limited budget for program implementation and, feeling that more could be done, took over the program in 2003. The core of the ALT VIP program is the annual inspection of each ALT property by local volunteers. Property owners are informed of work that needs to be done to reduce fuels on their property and to reduce structural ignitability, and the property is reinspected to make sure work is done. Owners can be fined if recommended actions have not been carried out. As the community manager observed:

I think the fact that you have the VIPs, we had fifty people who every year would dedicate a day or so out of their hot summers to go out and do inspections. And we really try to use them as a backbone for a lot of this vegetation stuff.

ALT has been recognized by the Firewise Communities USA program. This program provides local residents knowledge to improve and maintain wildfire preparedness, while ensuring the safety and efficiency of activities necessary during a wildland fire emergency. As stated on the program's Web site: "The program draws on a community's spirit, its resolve, and its willingness to take responsibility for its ignition potential." The focus of the VIP and Firewise Communities USA programs has led residents to frame the wildfire issue primarily as a fuels reduction problem.

The CDF and Bureau of Reclamation, which manages the public lands along the American River Canyon, have been creating a shaded fuel break along the northern boundary of ALT. Although the fuel break will not stop a fire from moving into the community, it provides defensible space that will make it easier for fire fighters to protect homes. This project is seen as part of a multistakeholder cooperative effort to reduce the fire risk in ALT:

We have the CDF, and they're responsible for treatment along the perimeter shaded fuel break, especially on federal lands. We have the Association, which is joint[ly] responsible with the CDF on some of that shaded fuel break and some of the common parcels we have. And we have the homeowners who own the lots and are responsible as well.

Although the El Dorado County Fire Safe Council had developed a county CWPP that served, according to one emergency manager, as a "kind of an umbrella CWPP that all the more specific individual communities would be nested underneath," ALT residents did not see their CWPP as falling under the county plan:

We don't agree with the way in which [the County CWPP] focus[es] on certain things, we don't agree with the way which the CWPP was formed, we feel like it's a waste of time and money; but we're here with what we have here.

The ALT CWPP was developed by contractors who were trusted as professionals that could get the job done. Although the contractors kept the Board and interested homeowners informed of their progress, it was not a particularly collaborative effort. The Board and local residents were comfortable with this process. When researchers asked local property owners if they ever questioned the contractors on the projects and priorities contained in the CWPP, they replied, "How did we know how to question them?" and "It's a Bible we accept."

The ALT bylaws, outlining the local government structure and processes, provide ALT the means to codify requirements related to fuels management and to assess property owners for work necessary to reduce risk of

wildfire. This financial capital provides the funding for staff to conduct home assessment follow-ups and do fuels reduction work on common property and along transportation corridors. Association funds are also used as matching funds for grants. The Board created the Resources Management Department, and the Department has adopted the projects identified in the CWPP as part of their 5-year work plan. A Board member described the CWPP as the Department's "blueprint" for action. Property owner assessments have been raised to help cover the costs of the fuels reduction projects. This increase in dues was presented at an annual property owners' meeting, along with some additional increases for other projects. One local resident described what happened at that meeting when property owners began to complain about the increases:

[The Board president asked] "Do you want to eliminate the fuel reduction project?" Not a single soul [did]. They attacked all the other projects, but not the fuels reduction.

The ALT culture has developed with some sense that the wildfire problem is a community problem. One member of the ALT Board commented,

They believe they [can do something about the wildfire problem], and they know that it's not going to stop [the fire], but it's going to be a big help.

Local residents feel that this local knowledge, community organization, and property owner commitment to fuels reduction reflects well on their funding proposals:

I think that's one of the things that people who are granting us funds are looking at too. They're saying, "[ALT is] an organization" ... that they're going to sustain themselves, and they're going to set aside funds to do this every year, and they're going to try to raise funds ... and it goes on and on and on.

ALT staff claim that the community has bought into the goal of fuels reduction and the mechanism to be used to accomplish various projects. They stress the importance of peer pressure and the concept of being a member of the community in achieving these goals:

You drive through [ALT and] you'll see more and more being done, the community is building with enthusiasm. You see neighbors doing it, you see the Association doing it, you see things that have been done.... And people are, "Oh, I'm gonna do it too."

Grizzly Flat

Located less than 50 miles south of Auburn Lake Trails in El Dorado County, Grizzly Flat is a collection of 580 homes with no formal government or organizational

structure located in a dense mixed-conifer forest. Grizzly Flat had a reputation as an “outlaw community” with an antaauthority counter culture. As one resident described it:

The thing ... when we moved here fourteen years ago, it was ... There were five hundred houses and there were five hundred bunches of people living independent of each other ... there was nothing, community-wise.

This type of community is a challenge for efforts to build capacity for collective action. As one resident saw the challenge:

Well, first off, you’ve got to go after people according to the way they function. Like I said, you live in a community like this, basically [there are] a lot of mountain men. You know? It’s a wild area. “Don’t bother me, if I want that bush growing into my window, it’s going to grow into my window.” That kind of a thing. So I think the group has to understand who they’re dealing with. Also the biggest thing here is because we’re a bunch of independents, we aren’t going to go out and tell somebody what they’re going to do. But we’re not shy about telling them what needs to be done. And then say to them, “Hey, you’ve got to do this, so go find a way to get it done.” But we’re not going to tell them how to do it, it’s just not going to work for this particular community.

Although covenants, conditions, and restrictions were written when the area was developed, there is no enforcement mechanism and no property owners association or other organization like that in ALT.

The culture of the community started to change in the 1990s when more retirees and part-time residents started moving to Grizzly Flat to live next to neighbors who had originally come to the area to avoid nosy neighbors and escape government interference. These new residents brought with them their expectations of what a community should be, not only in terms of services provided but also in terms of residents’ ability to work together. One of the big concerns of residents was fire protection. One Grizzly Flat resident commented:

...the fire district was pretty ineffective ... things were starting to fall apart, [the CDF] was having troubles.... So it’s... we were talking about trying to improve the fire prevention, the fire fighting.

Much of this talk occurred at Friday “burger nights” organized by one particular resident during the summer months. The organizer described these functions as follows:

We started this thing going with a hundred people at these burger night things, and we’d just go and say,

“Hey, on Tuesday night we’re going to sit down and talk about the following....”

The El Dorado County Fire Safe Council director encouraged residents of Grizzly Flat to get involved and hired consultants to work with the community. Those involved in developing the Grizzly Flat CWPP see their document as the community’s tactical plan in support of the strategic county plan. Being surrounded by national forest lands with high fuels loads, residents felt that they were “literally right in the muck...” Local residents formed a Grizzly Flat Fire Safe Council and worked with the consultants to address local concerns in the CWPP.

Grizzly Flat residents framed the wildfire issue first as an evacuation problem, and the consultants worked with the Fire Safe Council to develop a CWPP that addressed this issue:

I and several others said you need to just set this evacuation route to the shortest route, no sense running it around the block if you can go straight across. So that was the kind of thing they did. They knew what needed to be done, they just needed to know where it was going to happen, and we needed to understand why they would chose to do what they were doing.

Although development of alternative evacuation routes has been slow, the CWPP has produced a team of local residents who work with their neighbors to reduce hazards in the home ignition zone, following recent statewide regulations:

We have here a defensible space team that goes around and helps people understand what the law, what the California law says.

The community is encouraged by the progress they are seeing and the Grizzly Flat Fire Safe Council is taking on other issues, unrelated to fire, that community members want to address:

I can tell you, it is the closest thing to a city planning committee you ever saw in your life. Because we do things that have nothing to do with firefighting.... It’s now at this point, we invite people, you got anything going on in the community that’s bugging you, come to our meeting and talk about it.... It doesn’t have anything to do with fire. If the Fire Council thinks it’s a pretty good idea to chase ... we chase it. And we’ve had really, really good luck at it.

The process of developing a CWPP in Grizzly Flat resulted in more than fuels management or reducing structural ignitability; it produced a community.

So I think it has just brought ... a sense of community. We don't have a city government, but it's a sense of community.

Discussion

The data from these two California communities illustrate some of the diversity in the social context, and thus adaptive capacity, of WUI communities as it relates to wildfire protection planning. The two communities reviewed here are very different in terms of formal organization, socioeconomic characteristics, and patterns of social interaction. While in ALT the wildfire-relevant social interactions revolved around the formal structure of a well-funded property owners association and activities association with the VIP program, in Grizzly Flat social interaction was almost nonexistent until new residents brought with them expectations regarding what it means to be a community and took steps to increase informal interactions and civic engagement via the burger night tradition initiated by one resident. In each case we see that the existing social adaptability and diversity of these two communities dictated the different approaches to wildfire protection planning. The Grizzly Flat example, in particular, points to the concept of community as an evolving process. The CWPPs developed for both communities address wildfire risks in the local surroundings, with contractors bringing the scientific knowledge necessary to assess risks and develop projects to modify risks. The process used to develop the CWPPs reflected the values and social contexts of each community. ALT residents are accustomed to hiring professionals to carry out projects and they trust professional judgments to be accurate and appropriate. People did not feel it was their place to question the contractors' professional judgment regarding the prioritization of wildfire projects in the ALT CWPP or to introduce local knowledge. In Grizzly Flat the CWPP process not only addressed wildfire management needs identified by the community, but also helped build community capacity to take on new projects not necessarily tied directly to wildfire. Neither contractor produced a cookie-cutter solution to the CWPP challenge, but both worked to meet community expectations and to build on or improve elements of community context.

From these data and the literature presented earlier, we suggest that effective policy and resource management in and around communities comprising the WUI necessitates that we first know the social context of these communities, focusing on elements such as interactions/relationships among residents, access to scientific/technical information networks, demographic/structural characteristics, and place-based knowledge they bring to the table. To

accomplish this we argue for a synthesis of social understanding that can adequately make sense of the WUI, a "new species" of human habitation that marks a change in the way people interact with and live on the land. The WUI is complex because its porous social, economic, and political boundaries allow increased interaction between vastly different segments of society and at a variety of spatial scales. Seasonal homeowners from urban areas now live next door to those with traditional ties to resource extraction; average household incomes, education, or ecological knowledge among residents of nearby communities may vary dramatically; and local political systems and infrastructure of some communities may incorporate differing levels of bureaucracy, local knowledge, or capacity to enact change.

We argue that a more complete understanding of the WUI should combine relevant aspects from the literatures described above. The conceptual elements we introduce help explain not only previously identified linkages between demographic/structural characteristics and community complexity or resilience, but the informal knowledge networks and relationships to place that are not so easy to quantify. Take, for example, the proximity of a community to public lands or a regional city (Jakes and others 2003, 2007b; Flint and others 2008). Both elements clearly influence the character of such a community. Similarly, the presence of local community organizations such as FireWise, volunteer fire departments, and increasingly specialized fire prevention districts (Jakes and others 2007a, b) is clearly linked to local action and knowledge that is so central to Wilkinson's interactional approach to community.

Other aspects contributing to social complexity in the WUI are elements linked to both conceptual bases included in this paper. These elements include the income or education levels of residents (Walker and others 2006; Winkler and others 2007) or economies currently or recently supported by resource extraction (Flint and Luloff 2005). For instance, some work indicates that seasonal homeowners are often less apt to work collectively within their communities and place a high value on retaining the aesthetics of an area rather than reduce fuels (Bright and Burtz 2006).

Perhaps more importantly, our grounding in the above-discussed conceptual perspectives allows us to identify and help explain intangible elements of community agency and adaptability. As we suggested in the introduction, the adaptive capacity for dealing with a variety of issues related to the proximity or connections to wildlands, including knowledge networks, is an undervalued and underrepresented portion of community resilience that our conceptualization can add to the larger discussions of hazard management (Berkes 2007). Wilkinson's (1991) notions of interactional fields of community and locality

are the basis for the continuing process of community development and the maintenance of local knowledge about hazards and other potential challenges. Each of these aspects contributes to whether residents can collectively mobilize resources to prevent, mitigate, or recover from hazard events such as fire. Thus, increased adaptive capacity will help create more resilient communities.

The recognition of difference in WUI communities and the additional diversity uncovered by our previous perspectives create a gradient of social conditions within its borders. This gradient is not unidirectional across the landscape, but will most likely result in a mosaic of local adaptation and culture. Our perspective does not disregard all traditional notions of rural and urban, nor does it attempt to place “tidy” boundaries around them; rather, it suggests additional layers of complexity in existing theory and spatial arrangement to reflect changing American settlement patterns. Such a perspective allows us to view how the physical environment and community ability to mobilize collective resources interact to influence their abilities to prevent, mitigate, and recover from hazards.

The argument we have made in this paper is largely conceptual. However, we suggest that it is conceptualization for a very practical end. Many resources have been spent in recent years developing policies and programs to help WUI residents deal with wildfire risk and other challenges faced in the WUI. These policies can have a variety of outcomes, and local communities adapt national goals to local needs. We believe the time has come to more systematically document the actual needs and existing capacities of WUI communities. The conceptual understanding that we have suggested here is a useful starting point for the empirical investigation of these needs and capacities. The end result would be the selective targeting and distribution of scarce resources to areas where they are most needed.

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