

Research Paper

Rethinking climate change adaptation and place through a situated pathways framework: A case study from the Big Hole Valley, USA

Daniel J. Murphy^{a,*}, Laurie Yung^b, Carina Wyborn^{b,c}, Daniel R. Williams^d^a Department of Anthropology, University of Cincinnati, United States^b Department of Society and Conservation, College of Forestry and Conservation, University of Montana, United States^c Luc Hoffman Institute, World Wildlife Fund, United States^d Rocky Mountain Research Station, US Forest Service, United States

ARTICLE INFO

Keywords:

Climate change

Place

Adaptation planning

Scenarios

Collaboration

ABSTRACT

This paper critically examines the temporal and spatial dynamics of adaptation in climate change science and explores how dynamic notions of ‘place’ elucidate novel ways of understanding community vulnerability and adaptation. Using data gathered from a narrative scenario-building process carried out among communities of the Big Hole Valley in Montana, the paper describes the role of ‘place-making’ and the ‘politics of place’ in shaping divergent future climate adaptation pathways. Drawing on a situated adaptation pathways framework and employing an iterative scenario building process, this article demonstrates how ‘place’ contextualizes future imagined trajectories of social and ecological change so that key impacts and decisions articulate as elements of place-making and place politics. By examining these key ‘moments’ of future change, participants illuminate the complex linkages between place and governance that are integral to understanding community adaptation and planning for an uncertain future.

1. Introduction

This article describes a research project exploring the intersection of place, community, and social change through scenarios of possible future adaptive pathways in the Big Hole Valley, Montana (USA). It builds on a growing consensus that climate change adaptation planning must consider how adaptation is made meaningful and particularly as it relates to the meanings and practices of ‘place’ (Adger, Barnett, Chapin, & Ellemor, 2011; Castree et al., 2014; Chapin & Knapp, 2015; Devine-Wright, 2013; Fresque-Baxter & Armitage, 2012; Groulx, Lewis, Lemieux, & Dawson, 2014; Lamargue, Artaux, Barnaud, Dobremez, Nettier, & Lavorel, 2013; Perry, 2015). Much of this growing chorus concerns the role of ‘place’ as a ‘boundary concept’ (Groulx et al., 2014) and communicative tool for engaging diverse stakeholders and facilitating collaborative adaptation planning (Chapin & Knapp, 2015). We build on this attention to place by situating this article in a parallel shift away from viewing adaptation as an outcome towards adaptation as a process (Wise et al., 2014). In this sense, adaptation not only represents the temporal dynamics of ecological feedback and response over time but also the ways in which decision-making processes and governance unfold as pathways of *social change* in actual, socio-ecological landscapes (Wise et al., 2014; Wyborn, Yung, Murphy, & Williams, 2015).

Using qualitative data gathered from a multi-scaled, iterative scenario-building process carried out with diverse community members and land management actors, this article builds a case for a theoretical and methodological integration of these two emerging research themes of place and pathways through a ‘situated pathways’ approach (Wyborn et al., 2015) and explores the implications for planning for an uncertain future. Such an approach is directly relevant to the growing literature on pathways, which emerges from diverse regions of the world; for example, Indonesia (Butler et al., 2014), New Zealand (Lawrence & Haasnoot, 2017) and the Netherlands (Haasnoot, Schellekens, Beersma, Middelkoop, & Kwadijk, 2015). As this concept is transported globally, it is critical that it is sufficiently grounded with a robust theoretical understanding of place so that adaptation planning attends to local dynamics and contexts.

This integration, we argue, is critical because the consensus on ‘place’ as a boundary concept tends to treat ‘place’ in apolitical, atemporal, and somewhat naïve ways, whereas pathways approaches tend to focus on technocratic and bureaucratic practices of decision-making in which certain views on place, particularly ‘scientific’ ones, are privileged. In this article, we argue that ‘place’ is not a salve but is helpful primarily because it can both situate and foreground often hidden politics of place, some of which might be incommensurable. A place-

* Corresponding author.

E-mail address: murphdl@ucmail.uc.edu (D.J. Murphy).

based approach that does not attend to these politics is devoid of the dynamic forces that bridge meaning into action. Yet, in a similar vein, a pathways approach that does not attend to place is devoid of the substantive content through which these politics become meaningful. To reframe these emerging research foci, we offer *place-making* and *politics of place* as integrative concepts that bridge these perspectives in a situated pathways approach. Here we follow loosely Williams' (2014) definition of place-making as a process "of deliberate effort of people to try to shape, contest, and/or otherwise govern the landscape" in meaningful ways. Politics of place encapsulates the ways those efforts are embedded in and emanate from power and political struggle.

To demonstrate the value of this perspective, we investigated key trajectories of future change from a set of scenario narratives built with the participation of residents and land management agencies living and working in the Big Hole Valley, Montana. This article explores one key scenario of potential transformation to demonstrate how participants illuminated the complex linkages between place, identity, and governance that are integral to understanding community vulnerability and adaptation in the context of future climate change. In particular, we explore key points at which the intersection of place and governance become vital to future community resilience. Attending to place in such transformational moments enables understanding of the politics of negotiation and contestation that underlie collaborative adaptation planning and decision-making around the world (see Erikson et al., 2015).

2. Theoretical framework

As Adger et al. (2013) point out, adaptation research has struggled to situate adaptation in ways that are both recognizable to social scientists and the people who are enacting and/or experiencing adaptation as *social change* (see also Wyborn et al., 2015). We argue that this is partly due to poorly theorizing the intersection of social change and place in adaptive planning processes. Consequently, this section outlines a framework for bridging and integrating temporally mediated notions of place, such as *place-making* and *politics of place* with adaptation pathways (Wise et al., 2014; Wyborn et al., 2015). In short, thinking about climate change adaptation in grounded, situated ways provides a more robust interpretive framework for illuminating the dynamics of adaptation than the resilience and social-ecological systems frameworks that dominate the literature, which pose a number of obstacles for many social scientists, particularly their incongruence with predominant theories of *social change* (Basset & Fogelman, 2013; Cote & Nightingale, 2012; Davidson, 2010; Olsson, Jerneck, Thoren, Persson, & O'Byrne, 2015). Here, our focus is on integrating theories of social change, represented narrowly by place-making and politics of place (within a broader political ecology). We argue this can improve conceptual tools for both the social science of natural resource management and for practitioners and communities confronting the complexities of adaptation as well as the possibilities for future conflict and collaboration (Olsson et al., 2015).

2.1. From system adaptation to situated pathways

As others have noted, because many adaptation frameworks derive from ecological science, they are often devoid of political and historical dynamics as well as cultural meaning and their role in adaptive processes (Cote & Nightingale, 2012; Davidson, 2010). As Basset and Fogelman note (2012), for instance, understanding that the vulnerability that makes adaptation necessary is generated not by simple physical exposure to a threat or hazard but rather by the underlying social, political, and historical root causes that mediate them discounts the applicability of system attributes like 'functionality' or 'adaptedness'. Consequently, as Cote and Nightingale (2012: 479) argue, "power relations and cultural values are integral to social change and to the institutional dynamics that mediate human-environment relations." (see

also Erikson et al., 2015).

This critique focuses, in particular, on the dominance of a systems perspective which diminishes the role of the human agent in social change (Cote & Nightingale, 2012; Davidson, 2010; Olsson et al., 2015; Wyborn et al., 2015). Accounting for agency extends beyond a simple insertion of rational decision-makers and is further complicated by "the fact that any description of an ecosystem is from the perspective of an observer" (Olsson et al., 2015: 3). As several scholars have argued following Nagel (1986), systems frameworks often frame adaptation and resilience through a 'view from nowhere', as opposed to a 'view from somewhere' (Brugger & Crimmins, 2013; Cote & Nightingale, 2012; Williams, 2014). Adaptation, or adaptedness, is *always* a view from somewhere and those views depend on the positionalities, subjectivities, and performative capacities of the agents who define and animate them (Cote & Nightingale, 2012). Subsequently, bridging these views also requires "situate[ing] adaptation within interacting political, economic, institutional, and biophysical processes" (Wyborn et al., 2015). As such, similar to Cote and Nightingales' (2012) 'situated resilience framework', adaptation can be grounded in ways that provide temporal and spatial depth through attention to specific actors and to the cultural, political, and historical dynamics that shape them. To develop this conceptually, we offer an elaboration of the adaptive *pathways-and-envelope approach* (Wyborn et al., 2015) and merge it with the contemporary literature on place to demonstrate the efficacy of such an interpretive frame for planning and practice.

As Wise et al. (2014) define them, *adaptive pathways* are a metaphor for the iterative decision cycles that bridge incremental adaptation to long-term transformational adaptation (or small changes to large changes). In this sense, adaptation pathways not only attend to the social production of actual adaptation histories but, in practical terms, they also open up the realm of future possibilities for applied efforts like planning. In this sense pathways are "*trajectories* of knowledge, intervention, and change which prioritize different goals, values and functions" (Wise et al., 2014 citing Leach et al., 2010: 5). In other words, pathways always reflect temporalities of "social framing" because "how social groupings with different values or worldviews may choose different decision pathways ... [reflects] particular contextual assumptions, methods, forms of interpretation and values that different groups might bring to a problem, shaping how it is bounded and understood" (Wise et al., 2014 citing Leach et al., 2010).

Further extending the adaptation pathways concept in ways that attend to social theory and social change, Wyborn et al. (2015) "recommend conceptually pairing adaptive capacity with an 'adaptation envelope' to acknowledge the multi-scaled social structures creating and reinforcing vulnerability and adaptive capacity." Moreover, this approach also envisions adaptation as "a continual pathway of change and response" so that "the emphasis on the ability of agency to influence structure distinguishes a pathway from path dependency" (Wyborn et al., 2015). This pathways-and-envelope approach more closely approximates actual social process as it reflects a more robust dialectic of adaptive agency and structural contingency, exemplified, for instance, by institutional dynamics. In other words, pathways are not just a sequence of decisions but rather result from a broader set of structural conditions and dynamics that limit, constrain, or enable possibility.

To further extend the pathways-and-envelope metaphor as an analytical tool we propose a *situated pathways approach* in which cultural and political dynamics animate diverse trajectories of change over time (see Morzillo et al., 2015 for a similar perspective). As Cote and Nightingale (2012: 481) point out "this is not simply a case of 'adding' cultural and historical factors in feedback models"; rather, this approach reflects the fundamental fact that decisions and contexts are constituted by and implicated in *culture and power* (Hulme 2011; Strauss 2012). As Wise et al. (2014: 330) point out, "of particular relevance is how these actors, consciously or implicitly, view and define the relationships between human and nature, the goals of adaptation, and the

role of knowledge in decision-making". We see place as offering a way to ground these cultural and political elements of adaptation as both constitutive and animating in a situated pathways framework.

2.2. Situating place in adaptation planning

Place has received increased attention from scholar-practitioners engaged in climate adaptation research (Amundsen, 2013; Chapin & Knapp, 2015; Devine-Wright, 2013; Fresque-Baxter & Armitage, 2012; Groulx et al., 2014; Lamargue et al., 2013; Lyon & Parkins, 2013; Lyon, 2014; MacGillivray, 2015; Morzillo et al., 2015; Perry, 2015; Schroth, Pond, & Sheppard, 2015; Willbanks, 2015). In localities already experiencing significant disruptions and impacts from climate change, place is "emerging as an important factor for climate adaptation in regions where existing livelihoods are unlikely to be maintained" (Adger, Barnett, Brown, Marshall, & O'Brien, 2013:113). As Agyeman, Devine-Wright, & Prange (2009: 510) point out, "in extreme cases this can lead to problems of nostalgia, disorientation, and alienation [or] 'root shock' [and] 'place detachment'". Moreover, given that 'place' represents a key conceptual link between communities and resource management (Cheng, Kruger, & Daniels, 2003; Smith, Siderelis, Moore, & Anderson, 2011), as Adger et al. (2013: 112) argue, "these elements [i.e. culture] may in turn be fundamental enablers or barriers to adaptation". Recognizing how the "nonmaterial or 'subjective' attributes of adaptation ... are more difficult to quantify" (Fresque-Baxter & Armitage, 2012: 251), place, some argue, can be an effective "platform" (Groulx et al., 2014) or boundary concept (see also Chapin & Knapp, 2015; MacGillivray, 2015; Scannel & Gifford, 2013). However, utilizing place to situate adaptation pathways is complicated by the bird's nest of place theories and the fundamental fact that place is itself *politics*.

As Cresswell argues "place is not just a thing in the world ... place is also a way of seeing, knowing and understanding the world" (2004: 11). Taking this point seriously, place illuminates "fundamental differences between the ontologies, epistemologies, and values systems" (Brugger & Crimmins, 2012: 1831) that underlie how people interact with, and produce place(s). In short, contrary to objectivist notions of place as a 'thing' itself (MacGillivray, 2015), for us, place is complicated by "the multiple, hybrid, fluid, and diverse forms of people-place relations" (: 63, citing Castree, 2009). In particular, seeing place as place-making and as a politics of place brings these dynamic elements of difference and distinction to the fore (Yung, Freimund, & Belsky, 2003). For instance, recognizing the diversity of ontological and epistemological bases of 'place' in the context of climate change adaptation, Chapin and Knapp (2015) point out that the existence of multiple "place identities in the same place may lead to different stewardship goals" (1) so that "place dependence can cause friction if there is disagreement about the appropriateness of various activities that are connected to specific livelihoods" (3). Brugger and Crimmins (2012) articulate this in exploring what they call the "*art of living*" in the American Southwest contrasting the different articulations of situated knowledge and experience with adaptation thinking and decision-making. Further contextualizing and shaping the linkage between knowledge, experience, and decision-making are the norms and institutions that produce and sustain different orientations to place and possibilities of place. For instance, understanding how networks of governance, legal structures, and bureaucratic practice function in the evolving politics of place in adaptation is critical because the disjunctures and disputes surrounding place may be less about substantive characteristics of place and more about political process and the capacity to decide. This understanding of place allows us to envision situated pathways not just as a product of a plurality of 'places' but also as an outcome of politically tense decision-making and the 'envelopes' that limit or enable particular pathways.

Likewise, bridging pathways and place in this perspective allows us to work beyond the timescale of the past and into the contemporary and

future while moving beyond limited deployments of place as a 'boundary concept' and salve for the difficult politics of adaptation. For the former, a situated pathways framework re-orientates a focus on past adaptations as analogs for the future by situating strategic forms of planning and negotiation in future terrains of place, climate risk, and uncertainty. Much of what follows aims to demonstrate the value of this approach. However, in articulating this perspective we do not offer place as 'the missing link' of adaptation practice. Fresque-Baxter and Armitage (2012: 258), for instance, argue place-making is an "ongoing process [that] can serve to strengthen both individual and community identity with places, resulting in common values, shared history and joint narratives". In a similar vein Groulx et al. (2014) argue, "when place-based meanings and values are incorporated into any planning process, the process and its outcome become more community-specific and place-appropriate" (Fresque-Baxter and Armitage, 2012: 260). Whether intended or not, too often the impression is given that focusing on place and ensuring that adaptive processes are place-specific will result in shared success. In contrast, we follow the attenuation offered by Chapin and Knapp (2015) that though place can facilitate learning and communication across disciplines and between scholars, managers, and the public, it can, at the same time, become a barrier to consensus, as we describe below. In other words, though place might serve as a 'concept and metaphor for integration' (Newell, 2012) or 'platform' (Groulx et al., 2014) in adaptation practice, our understanding of place should not be rooted in pastoral notions of community but situated in the pluralities of place (Williams, 2014) and the oftentimes contentious, difficult politics of place and place-making (see also Yung et al., 2003). Below we explore how a future scenario-building process reveals the ways a situated pathways approach to place in adaptation planning illuminates both the pluralities and politics of place that underlie adaptation pathways as acts of place-making.

3. Study site and methods

Research was conducted in the upper Big Hole valley in south-western Montana (see Fig. 1), a high elevation dry shrub steppe landscape surrounded by lodgepole pine montane forests in the upper northwest of the USA. This valley of the northern Rocky Mountains contains the headwaters of the Big Hole River and sits almost entirely above 6500 feet. The valley bottom (28% of land in the upper Big Hole) is almost entirely in private ownership, managed for cattle grazing and hay production by multi-generational family ranchers. Roughly 300 inhabitants live on these ranches and in the small communities of Jackson, Wisdom, and Wise River. Currently, there are no tribes living in the upper Big Hole but the Shoshone-Bannock and Confederated Salish, Kootenai have relationships with the Beaverhead-Deerlodge National Forest through treaty rights (USDA, 2009). The Nez Perce have a strong, formal relationship with the Big Hole National Battlefield (National Park Service, 2013) but do not have traditional claims to the wider valley. The scenic beauty, abundant wildlife, and renowned fishery bring in amenity migrants who have settled on small parcels amongst the ranchlands as well as tourists for hunting, skiing, angling, scenic driving, wilderness trips, and cycling. The upper Big Hole valley is comprised of 72% national forest lands (the Beaverhead-Deerlodge National Forest) and some small parcels managed by the Bureau of Land Management, the National Park Service, and the State of Montana. Conservation initiatives include easements that prevent subdivision on some private ranchlands, collaborative drought management through the Big Hole Watershed Council, and candidate conservation agreements with the Department of Interior's US Fish and Wildlife Service to protect habitat for the arctic grayling fishery.

This study employed an innovative iterative scenario building methodology designed to engage participants in developing and responding to future socio-ecological trajectories as a means to assess future community vulnerability and adaptive capacity (see Murphy et al., 2016 for a detailed description). Drawing on landscape history,

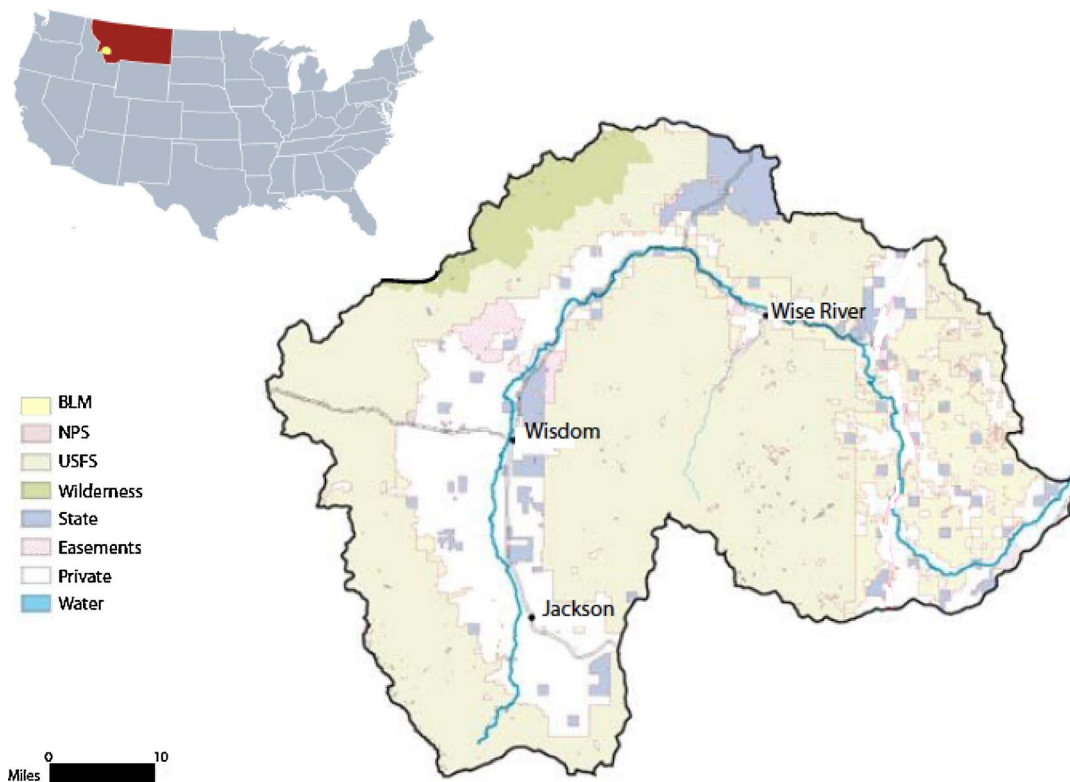


Fig. 1. Upper Big Hole Valley and distribution of land ownership (adapted from US Fish and Wildlife). Location of Montana and Upper Big hole Valley with distribution of land ownership.

current trend data, expert knowledge, and downscaled climate impacts, a team of biophysical scientists developed three initial scenario narratives describing a range of plausible climate-driven landscape-scale futures over a 20 year timeframe (see Box 1). The scenarios were written to make local climate change impacts more tangible, while also explicitly acknowledging uncertainty (Tompkins, Few, & Brown 2008; Van Aalst et al., 2008).

The scenario narratives (i.e. the textual documents) were then iteratively built through three separate rounds of individual and focus group interviews with 26 individuals representing four key constituencies who were identified through preliminary interviews: 1) private landowners, including nine working family ranchers and one amenity owner/hobby rancher; 2) seven small business owners including hotel, bed and breakfast, restaurant, gas station, and store operators; 3) four hunting and fishing outfitters; and 4) five “agency” representatives from county government, USDA Forest Service, US Fish

and Wildlife Service, Montana Department of Natural Resources and Conservation, and a conservation organization active in the valley. Though two participants from the agency group were also residents, they were asked to respond primarily as representatives of their respective agency/organization. All participants from the other three groups were residents. Individuals were selected through purposive sampling with the goal of engaging a diversity of residents and land managers who will likely be impacted by climate change. In the results section, the term residents refers to groups 1–3, while the terms agency or manager refers to group 4.

For the first round of data collection, the lead author conducted 22 in-depth semi-structured interviews with individual participants to elicit views on vulnerability and adaptive capacity relative to the different scenarios. Based on analysis of these initial interviews and relevant biophysical literature, likely responses to the climate impacts and the ecological impacts of those responses were integrated into each

Box 1

Initial biophysical scenarios for the Big Hole Valley.

Scenario Title	Climate Description	Select Ecological Implications
1. Some Like it Hot	Warmer and drier across all seasons with perennial drought, earlier snowmelt, deeper summer drought	Declines in forage production, longer fire seasons, grasslands expand, native fish decline
2. The Seasons are a Changin’	Warmer across all seasons, more winter precipitation (including both snow and rain), earlier snowmelt and heavier spring floods	Increases in forage production, larger and more intense fires, spread of invasive plants, non-native trout expand
3. Feast or Famine	High inter-annual variability with hot, dry years followed by cool, wet years, more frequent floods and droughts	Forage production varies considerably year to year, fires larger during dry years, elk and aquatic species decline

of the three scenario narratives and revised for the second round (e.g. if ranchers suggested that they would likely switch to pivot irrigation under the ‘Some Like it Hot’ scenario, that response and the potential consequences for hydrology and fisheries were integrated into the scenario).

In the second round of data collection, the lead author used these revised scenarios to engage four focus groups in thinking about vulnerabilities and adaptation options in response to the revised scenario narratives. Each focus group had approximately 5 individuals from each ‘constituency, including two who were not included in the first round. The goal was to understand how groups within the community respond to the potential “adaptive” actions suggested by others, and what kinds of vulnerabilities and capacities are important under different scenarios for each group. These focus groups revealed a number of potential conflicts, disputes, and disagreements about institutional responsibilities and authorities, decision-making processes, and governance arrangements. These insights were then integrated into a third iteration of the scenarios.

Finally, the lead author convened a community-level focus group with eight diverse participants (including six participants from previous rounds of data collection plus two new participants) to discuss the revised scenarios, preliminary findings from the first two rounds of data collection, adaptive pathways that had been described by the different groups, and the more abstract qualities of vulnerability and adaptive capacity like trust and leadership. As per Institutional Review Board protocols, all interviews and focus groups were taped, professionally transcribed, proofed, coded, and analyzed.

The multi-scaled, iterative nature of the research, moving from individual to group and then to community scales, allowed us to progressively contextualize participant’s responses through each round of data collection within a greater range of networks, institutions, and social relationships, and the complexity of social and ecological feedbacks. The qualitative data presented below focus primarily on responses to the “Some Like it Hot” scenario due to the transformative potential of this scenario (see below for more detail) and thus results do not constitute a comprehensive summary of responses nor the final scenarios themselves. Data were selected for their representativeness and how they address unfolding concerns during the scenario process. These results, particularly responses to the transformative loss of small-scale, family ranches, speak to the critical importance of a situated pathways framework and more robust considerations of the role of place in adaptation planning.

4. Results

Participants interpreted the changes described in the scenarios through locally relevant and meaningful frames that reflect the critical role of place, identity, and community in both the manifestation of climate change impacts and in responses to it. In Section 4.1 we first explore current configurations of place and community in the Big Hole (as a baseline), because these are clearly already at risk. Second, in section 4.2 we narrow our focus to responses to the first scenario (Some Like it Hot) and explore the way place both frames transformational moments of change and how a politics of place constitutes the pathways and envelopes along which adaptive futures might unfold.

4.1. Place, community, and change in the Big Hole

Participants described the Big Hole as “unique,” saying “it is one of the last best places.” They often emphasized the relationship between history, livelihood, and geography, detailing the ways that connections between work and landscape formulated the Big Hole as a ‘place’ (see [Brugger & Crimmins, 2013](#) for a similar analysis). Participants described the Big Hole through various historical, community, and place-based stories illustrating the contemporary relevance of the pioneer and settler past, the grit and determination of a ranching community, and,

in particular, deeply personal memories of kinship and belonging. As one rancher-outfitter stated:

part of this is our ... place and the fact that my granddad, my great-granddad was here, our families were here. I feel a closeness to the land. I get up at night and check these heifers, and I think, god, I wonder if granddad was out here checking ... I feel that closeness.

Family history and connections to the landscape were inseparable for multi-generational ranchers.

Participants also described a deep connection between the biophysical character of the landscape and the character of its inhabitants. They described residents as “pretty damn tough folks” who had gone through “tough times” and “hard winters”. The high altitude and isolated geography of the valley combine to produce a climate that is significantly colder than the surrounding region of southwest Montana. In fact, Wisdom is frequently cited as the coldest place in US outside of Alaska, a point of pride that was voiced by numerous participants. This participant exemplifies this perspective, saying:

Adversity is something that they ... are well-suited to tackling because it’s part of who they are. Everything has been tough. Scratch out a living over there, and some of them have prospered in that, it takes ... moxie.

These geographic and climatic factors were frequently described as critical to understanding not just the “moxie” of individuals and their independent spirit but also, somewhat paradoxically, community cohesion. As one participant suggested, “It’s very tight-knit ... the people are very close. I think that goes back to when this valley was cut off in the winter, when the roads were not open”. Thus, climate and remoteness were believed to produce a community that is both tough and close-knit.

The Big Hole was also identified with agriculture. As one resident stated, “this whole valley just basically lives on agriculture” and “we have sort of what we call a symbiotic relationship or dependent relationship between ranches and small businesses.” Participants discussed the iconic haystacks and beaverslides that still dot the valley as evocative of both connections to the past and the contemporary character of the place. Several participants described childhood memories of the rhythm of ranch life – haying, assembling horse teams, and operating beaverslides. Ranchers spoke of a “lifestyle” deeply rooted in working the land, with the layering and sedimentation of embodied memories in the landscapes that surround them, similar to [Brugger and Crimmins \(2013\)](#) description of ranching communities in Arizona.

Anchoring agriculture in the production of the Big Hole as a ‘place’ is the river itself, a central conduit of community identity across the valley. Participants repeatedly pointed out that “the river is (our) life blood”. Flood irrigation was seen as key to both hydrology and livelihood, creating a “sponge” for snowmelt and run-off thereby ensuring higher water flows through the summer. Outfitters recognized the critical role that ranchers play in making the river through irrigation and ranchers appreciated the role of outfitters in the local economy.

At the same time, participants acknowledged the multiple ways that the valley was changing and implications for their sense of place. Though much of the landscape is still peopled by the “old families,” participants lamented the “loss of the beaverslides,” a loss emblematic of economic shifts in ranching that have led to consolidation (i.e. larger ranches), changes in haying and pasture use, and declining local populations. Ranches continue to face pressure related to the price of beef, challenges with inheritance taxes, and the cost of inputs. These changes have impacted local businesses and services.

Shifts in community and economy have been accompanied by changes in the biophysical landscape. Participants noted earlier springs, warmer summers, more drought, larger fires, and the spread of pine beetle. The idea that “winters aren’t as tough” now was repeated frequently by many long-term residents of the valley. As this resident stated, “There is no doubt that we don’t get the extreme cold that we

used to.” Participants also discussed the decline of moose and the sudden appearance of pronghorn.

Biophysical landscape changes were impacting the community in a variety of ways. Smoke from wildfires was reducing tourist activity, drought conditions were impacting fishing outfitters in the late summer, lower game populations (or at least perceptions that they were lower) were affecting hunting, and the spread of invasive plants was stressing county resources. At the same time, a small but significant number of amenity migrants had purchased property in the Big Hole (mostly in the lower portion around Wise River), further impacting community and senses of place. As a result of amenity migration and second-home ownership, residents said that “ag was king. Now ag is the prince.” One resident argued that wealthy newcomers do not “have the same feeling” about the Big Hole. Others argued the home building along the river impacted its “pristine” character.

Big Hole residents responded to these changes by actively pursuing adaptive pathways that would preserve the continuity of valued identities and senses of place. Ranchers responded to drought by improving irrigation, to wolves through innovations such as guard dogs, and to economic pressures by diversifying operations. Small business owners adapted to seasonal ebbs in tourist volume and in response to fire. Outfitters responded to low flows and fire events by taking clients to other rivers.

Big Hole communities have also responded collectively and in partnership with local, state, and federal agencies and non-governmental organizations. For example, some ranchers, outfitters, agencies, and conservationists have come together to preserve fisheries and irrigation through the work of the Big Hole Watershed Committee, the Big Hole River Foundation, the Fish and Wildlife Service, and a local drought task force, with a focus on Candidate Conservation Agreements with Assurances (CCA). Participants also described collaborations to control invasive plants such as the local *Weed Whackers Ball* fundraising event and initiatives to market new tourist activities such as skijoring and golf. Both individual and collective efforts respond to change in ways that preserve some semblance of the sense of community, identity, and place that defines the Big Hole for residents. Thus, even in the face of considerable change, there is continuity in the assemblage of practices and meanings rooted in relationships to the landscape.

4.2. Transformation and the politics of place in the context of future climate change

In looking across the three narratives that were generated through the iterative scenario-building process, we see radically different outcomes in terms of livelihood, landscape aesthetics, community well-being, and resource management. For instance, at the end of the scaled iterations, we found in scenarios two (Seasons’ are a Changing) and three (Feast and Famine) a largely resilient community, though a marred landscape both ecologically and aesthetically. In the second scenario, other than amplifying problems with invasive weeds, all groups found many of the impacts to be predominantly manageable. In the third scenario, irrigation systems and river health remain sufficient to sustain both ranches and key aquatic species though many felt that the high variability could affect landscape aesthetics due to increased forest fires and flooding from ice jams. In the first scenario (Some Like it Hot), however, we find a Big Hole that is not similarly resilient but, rather, experiencing what we might call *transformation* and in ways that extend beyond the material to the meaningful. In this scenario, the impact of reductions in water availability and rangeland productivity, we found, exceeded the adaptive capacity of small-scale ranching thereby challenging community resilience and pushing the Big Hole towards a transformational shift as the ripple effect of their loss impacts business owners, outfitters, conservation agencies, and even basic services. Though ecosystem functions themselves were largely maintained, the current array of social and ecological relationships that sustained the Big Hole as a recognizable ‘place’ will likely fragment and break

down. This past ‘place’ would be supplanted by emergent sets of social and ecological relationships that potentially entail new practices and identities, and ultimately, formulating a new place. The sense that these dynamics might produce a new or different place generated considerable anxiety around the future of the Big Hole in the context of climate change. Consequently, in this section, we focus primarily on the *Some Like it Hot* scenario to illustrate not only how place illuminates a broad set of participants’ concerns but also how the politics of ‘place’ configure adaptive pathways over time. In the following analysis we focus on how the loss of small-scale ranching exemplifies the dynamics of situated adaptation trajectories and how governance of place, in the end, becomes a key point of contention.

Though the potential loss of small scale ranching was a prime concern across each scenario and livelihood group as well as through the iterative rounds from individual to community, it was of greater concern in the first. A recently arrived retiree argued before reading the scenarios that “we get the impression that these ranchers are really here to stay.” However, after reading the scenarios, she concluded that *Some Like it Hot* would precipitate a chain of events that could eliminate small-scale, family ranching, stating “if the cattle aren’t here, I mean, we’re going to have no business here. There’s not going to be any reason to be here. I mean, it’s going to affect the schools, it’s going to affect everything.” In short, reduced grazing would lead to herd reductions, land sales, and consolidation into larger ranches, many of which would be corporate or absentee owned. Without small, family ranches, depopulation would precipitate school and post office closures and according to participants, eventual community collapse.

In a strictly material sense, however, the loss of small-scale ranching was not a bad thing for everyone. As one fishing outfitter stated, “I mean if there were no ranchers, and water wasn’t being diverted, it’d be much easier to get through a drought year. There would be more water in the river, and the fish would be in better shape”. However, like other fishing outfitters, who are often perceived as pitted against ranching, he asked “are they going to be ranchers in the Big Hole or are they going to cash out and move into an area where life is a little easier? I think that is what people are trying to preserve. You need the haystacks out in the Big Hole. You need these ... ranches.” Clearly, for some, the value of ranching extends beyond the economic returns and ecological function it brings to the valley.

For example, in each iterative round, ranching, small business, and outfitter participants spoke of ranching as the key to the future of their own articulation with the Big Hole. For small business owners, the pastoral nature of the ranching landscape was vital to tourism. Local community identity, whether they ranched or not, was tied to the presence of *family ranching*. As described above, small-scale ranchers, descendants of early white settlers, were also a marker of history and memory that formulate the imagined past of the Big Hole. In this sense, the relationship between identity, memory, and place were not only at risk but also key to how these dynamics might unfold. As one rancher stated,

At the end of the day, if it gets to where your inputs are too high and you can’t make a living, I am sure that the end result would be we might just as well sell the land. But, I believe when people are tied to the land like you have close in this valley, fourth and fifth generation folks, that would be a very last resort.

Here nostalgia and memory are rooted in the practice of ranching, substantiated by ties of kinship and belonging that constitute meaningful modes through which ranchers make decisions. Such decisions, adaptive or otherwise, that propel the unfolding pathways are not just filtered through but constituted by their sense of place and place attachment. In this sense, a business decision is not just a result of economic cost-benefit analysis but a decision about place.

Though some felt that there were not “a lot of things the Big Hole is good for other than raising cattle”, to most the implications of the loss of small-scale ranching were drastic. In particular, loss of small-scale

ranching threatened a shift common across the west: an increase in amenity and second-home ownership as well as hobby ranching. As one fishing outfitter stated,

The bottom line is, if we make it so tough for the ranchers to make a living, and force them to sell out and it becomes developed through large real estate sales that subdivide into smaller plots, it's going to look like any other watershed in the state or in the country.

In the most immediate sense, this shift would precipitate an aesthetic transformation that would seem “out of place” and impact the community economically. As another outfitter pointed out:

The huge trophy homes we've seen go up on the river have really disappointed the residents in the valley, because one of the hallmarks of the river itself is the fact that it's still pristine and it looks and feels like a wild river, undeveloped. And then all of a sudden you come around the corner and you see this six thousand square foot monstrosity, and it looks so out of place.

The outfitter went on to explain how these visual changes impact his client base by altering the character of the fishing experience. Repeatedly participants decried the aesthetic implications of amenity home-ownership arguing that, rather than subdivisions, the community needs “the pastoral nature of ranching, (pointing) the river over there, the ranching”. And in this context we see how these formative ties between the river, ranching, and the community convey key frames through which participants communicated future trajectories.

The implications of amenity migration, residential subdivision, and new landowners in the Big Hole went beyond aesthetics to potentially impact the community itself. One rancher lamented:

to me the bigger impact is when you get absentee landowners—wealthy—that come in and I think at that particular point in time, aside from many of these things that we manage somehow...those are the bigger impacts because the fabric of the community is lost.

Participants were concerned not just about the loss of sociality between residents or the wedge “outsiders” might present but also how the introduction of different ideas about property and land use might become dispossessing in the long run. The previous rancher continues:

The Leon Hirshes came in and the Ted Turners and the Russ Smiths and they just privatize everything and nobody gets to fish on their water, so to speak. You take the community out of the community is what it amounts to. And, of course, they don't have to worry.

In this sense, access to resources, community sustainability, and place are mutually implicated. The desire to prevent the community from crossing such social thresholds was clearly a unifying sentiment among community residents, as one small business owner argued “there really is cohesion, no doubt about it”.

Over the iterations, avoiding the implications of the *Some Like it Hot* scenario and preventing the loss of small-scale ranching, and what it might imply (i.e. ‘place detachment’), even led some to consider pathways they might not have otherwise. For instance, some outfitters who rely on the idea of the Big Hole as a ‘freestone’ stream (i.e. unimpeded) were willing to consider dam installation (impoundment) as a means to attenuate the impacts of reduced water availability for ranchers and thereby retain the pastoral character of the valley despite the ecological implications. Some who would not otherwise consider conservation easements stated they might consider them as a means to stem drastic changes in land use such as subdivision. As this resident stated, “people don't want to see it subdivided and over-run with people. We'd like to keep it what it is. Because it is definitely a unique area. We're the last best place.” Yet, overall, participants were willing to consider a diverse array of previously inconceivable or economically irrational responses to prevent certain pathways from unfolding.

Some participants also envisioned expanding the adaptive pathways that are already part of the local economy. For residents, the untapped

potential of the Big Hole for tourism, especially given changes elsewhere in the west, was a source of unity and positive change. In this sense, even enthusiasm for increased economic diversification, as a means to stem the loss of ranches, was filtered through a priority of place. On the one hand, tourism, many residents felt, would allow them access to increased economic opportunity while maintaining the landscape and “way of life” that form the core of their community identity. On the other hand, as one small business owner noted about increasing tourism:

what you are going to do is turn a little-known place into a better-known place and I don't think that [the community] wants to do it. We may be doing fine with our restaurant, but pretty quick we are going to have a Denny's [a prominent restaurant chain] right there.

In contrast, for agency participants (including public land managers and conservation NGO personnel), given the deep ecological impacts described in the *Some Like it Hot* scenario, there was general reticence to engage with the adaptive actions recommended by residents. For instance, though some agency participants were personally affected by the impacts to Big Hole communities due to their hybrid position as residents, there was limited capacity to envision what role agencies could play in assisting or forging pathways that might sustain or assist in transforming ‘place’ in ways that support the visions of Big Hole residents. In the second round focus group, when presented with a revised *Some Like it Hot* scenario describing the consequences of the loss of small-scale ranching, a common agency response was “I hate to see this happen but I don't know what we could do about it”.

Following from this latter observation, anxieties about the future direction of the Big Hole were both refracted through current concerns and what they might imply in terms of future decision-making and potential configurations of resource management and *governance*. Analysis of the scenario process explored both thresholds of place (i.e. when a particular configuration of place becomes untenable) and also how politics of place configure the pathways and envelopes that determine adaptive trajectories over time. As one participant stated it all “has to do with wanting to maintain a life here”. Concerns about shifts in community and community membership, in this sense, are not so much centered on interpersonal relationships but rather on the desires to collectively pursue particular pathways rooted in a commonly held sense of place. For instance, in discussing the implications of reductions in water availability described in the *Some Like it Hot* scenario, a rancher in the focus groups argued:

Internally it seems like you don't have the sense of community to really advance towards a solution as much. If people are putting each other out of business because they are calling their water rights, ‘I have senior water rights and I am going to take all the water and leave you nothing’. That community is likely to fissure slightly with that.

The ranchers went on to lament what community fissuring might mean in terms of acting collectively as well as collaboratively with land managers. A key element of the Big Hole, for the resident participants, was its deeply held sense of community. Interestingly, across participants, this sentiment was often referenced in comparison to another nearby valley, the Bitterroot. As one agency representative pointed out, “its great to have the Bitterroot over there” for comparison because “in some basins, the Bitterroot in particular, people are more I want mine, I am going to get mine”. In the community meeting, a small business owner argued in contrast to this individualist ethic saying “we've got to work together if we're going to continue this lifestyle that we want to pass on”.

Changing community membership, through in-migration of amenity homeowners or through out-migration spurred by economic decline, would drastically alter the political forces that decide how the Big Hole as a shared sense of place is negotiated, produced, and enacted. Participants were keenly aware of differences between agency and

community perspectives and the implications for potential adaptive pathways. In particular, the way these shifts in orientation to place and resource values intersect with resource governance and decision-making were critical. Agency representatives, for instance, were acutely aware that shifts in community membership imply shifts in the ability to enact their mission, policies, and projects largely due to differing values and ideas of place. For example, the fracturing of community brought about through land consolidation (i.e. larger ranches) and the loss of small-scale, family ranching was seen as a potential *positive* by agency participants, particularly from a conservation perspective. As one agency participant pointed out:

... land consolidation isn't always a bad thing. It allows you to plan and do things across a broader scale. You can negotiate with one landowner rather than six which is generally a little bit easier. If you can establish a good relationship with one landowner, you can do a lot more restoration a lot more efficiently than with a bunch of landowners.

During the second round focus group with agency participants, there was general agreement on this point. Clearly, how climate change materially impacts who is at the bargaining table could dramatically alter the potential pathways for resource management in the valley, whether on public or private lands. This example also highlights the ways that agency managers not only seek out, but seek to enact particular kinds of places – specifically places amenable to desired management actions and interventions. For agency staff, none of the scenarios threatened their role or place as *managers* in this particular landscape – though certain projects or goals might be at risk (e.g. weed management or restoration efforts). Their future presence as managers, unlike other participants, was neither tied to the viability of a ranching landscape and community, nor to the current assemblage of meanings and practices that constitute the Big Hole as a place. Further, managers' engagement with residents outside their missions or institutional capacities could constitute a potential risk that might produce landscapes (and 'places') more difficult to 'manage'. For example, by the second round, it was clear that public land grazing allotments enable a future trajectory that sustained small family ranches. However, maintaining public lands grazing allotments, which would sustain current configurations of place, was circumscribed by the institutional, legal, and bureaucratic limits on public lands management. As this agency participant stated in the second round focus group:

Unfortunately, our hands are somewhat tied through our forest plan and the forest plan standards...in regards to the grazing for example, we don't have a whole lot of wiggle room. We can't just turn our head and say "yeah, go ahead, because it is a drought year, we feel for you so go ahead and graze everything down to the dirt." We just can't do that. Our number one priority is the resource.

Thus, agency managers envisioned their adaptive envelope as constrained in ways that prevented them from working with Big Hole residents to sustain what was otherwise a widely shared idea for the Big Hole as a place.

In the final community meeting and in follow-up discussions with both residents and agency representatives it was clear the *Some Like it Hot* scenario produced conditions leading to potentially incommensurable futures. Visions of the Big Hole as a place constituted adaptive pathways for residents. However, for agency managers, a highly constrained view of their adaptive envelope precluded collaborating with residents to address future climate impacts and preserve the type of community resilience residents desired in the context of change. And more importantly, as the transformative implications of the *Some Like it Hot* scenario illuminated, the limits of the imaginative potential of place as a platform, also highlights the need for robust and concerted political negotiation to reconsider what is possible.

5. Discussion and conclusion

The data generated from the scenario-building process demonstrates the critical importance of viewing adaptation through the lens of place as it both animates and constitutes how people think about and respond to changes like those envisioned by participants in the upper Big Hole valley. Differently situated and positioned actors recall, experience, and envision the landscape and communities of the Big Hole in diverse ways, some of which overlap in potentially synergistic ways and some of which might be incommensurable. Clearly, the impacts and responses discussed above demonstrate that place does not just inflect adaptive decisions, or the envelopes in which they are made, it constitutes and situates them as they unfold. In our analysis it is evident that future concerns about the Big Hole as a place predominantly circulate around core values of what we might call 'community resilience' or 'resource management', with important differences most evident between residents and agency resource managers. For the former, the Big Hole is a place in which the productive activities and social life of small-scale family ranching shapes both an aesthetically pleasing pastoral landscape and a social community. Consequently, for them, the valley as a place was produced by small-scale family ranching and its future lies in the sustainability of that lifeway over time. Conversely, agency participants, while they might sympathize with community sentiments, are constrained by an institutionalized sense of the Big Hole as a landscape that sustains 'ecosystem services' and 'species diversity' and in turn allows them to fulfill their bureaucratic duties and legal obligations as set out, for example, in forest plans. Consequently, for agency managers, the future landscape of the Big Hole requires the replication of a governable and manageable space on which legal obligations, mission statements, and bureaucratic forms of planning can be enacted and inscribed. For all participants then, the future of the Big Hole as a place is dependent on *place-making* as a very material, active endeavor of cultural politics.

This is most evident in the transformations of place and the role of place in formulating transformations in the (contested) pathways that unfolded. In the *Some Like it Hot* scenario where small-scale ranching, the lynchpin of the economy, crosses a critical threshold of cultural and economic sustainability and transitions to large-scale, consolidated ranches, many participants recognized a kind of 'root-shock' or 'place detachment' in that "the Big Hole will no longer be the Big Hole" (see [Murphy et al., 2016](#)). For these participants, the 'place' they recognize as the Big Hole, and its assemblage of practices and meanings, disintegrates and re-assembles in ways that not only exclude prior senses of place and livelihood, but in many ways exclude them physically from it. This threat to 'place' motivates the kinds of adaptive outcomes and decisions residents, in particular, hope to see. In this sense, the possibilities and 'thinkability' of particular notions of place form key elements of the adaptive envelope that limits and constrains, yet also enables particular kinds of imagined pathways to unfold. For instance, Big Hole residents' reliance on economic diversification and keen focus on tourism as a positive pathway for future social and economic adaptation in the upper valley was motivated largely as means to sustain a sense of place and the role of community in that particular assemblage. Place also played a role in the kinds of trade-offs community participants were variously willing to consider or not consider. For example, landowners who saw themselves diametrically opposed to conservation easements stated that they were consider them if it meant conserving the Big Hole as a pastoral, ranching landscape. Others began to consider stream impoundment (dams) as a means to conserve water resources and prevent a move to center-pivot irrigation, despite the narrow, short-term benefits of the latter. As noted above, the senses of place that underlie these trade-offs are often difficult to integrate in collaborative adaptation but are also decisively important to the negotiations that underlie collaboration.

These findings also speak to the utility of place as a platform for climate change adaptation planning and practice. Place conceptualizes

human-environment relations by integrating material and symbolic worlds in recognizable ways that speak to lived experiences across the world. In this sense, place is key to asking not just what kind of world we are working with, but also what kind of world we want. As such, place, as an integrative ‘boundary concept’ (Chapin & Knapp 2015), helps us move beyond the technocratic risk thinking rooted in the way things are and a pessimistic view of the future. Focusing on place and its incumbent politics allows us to think more hopefully about the role of human agency in crafting the future.

Attending to place is obligatory given that human activity is neither outside nature nor space-time, and therefore human action always entails place-making. However, the findings presented here also raise concerns that the centrality of place as a salve or key to consensus and collaborative forms of climate change adaptation is at best overselling the efficaciousness of ‘place’, or at worst, naïve. Though we *must* take place into account, doing so does not make the work of collective action and negotiation less complex, less uncertain, or less political; it simply makes things, events, processes, and decisions as well as the junctures, waypoints, and envelopes of adaptive pathways, more recognizable and meaningful and often reveals deeper politics that are often at play but also often ignored. Place enlivens and animates the communicative dynamic of collaboration and negotiation in ways that bureaucratic processes, which are deeply wedded to a knowledge regime that privileges science, do not. This we argue raises a number of concerns about the role of place in the collaborative processes that underlie adaptation planning around the world.

How a collaborative adaptation process is designed to integrate diverse knowledges and ‘ways of being’ is as fundamental as what knowledges and ‘ways of being’ are engaged in that process as well as underlie the process itself. In contrast to Groulx et al’s (2014: 137) contention that “a place focus offers a common language that is familiar to, and shared by, landscape professionals and citizens”, we find that processes of adaptation too often privilege the scientific “view from nowhere” of said professionals for whom ‘place’ is an object of knowledge rather than a reflection of their own lived experience. A singular notion of place as a ‘platform’ works to both collapse the diverse ontological and epistemological perspectives that underlie distinctions of place and to treat such place knowledge as “things” rather than as politics. This “leads to a problematic instrumentalization of such knowledge” (Cote & Nightingale, 2012) in which non-scientific knowledge is subsumed in a technocratic “vortex” (Fairhead & Leach, 2003) where ‘place’, for instance, becomes a means to an end rather than the fabric of collaboration and negotiation. As Agyeman et al. (2009: 510) notes reflecting on one such place-based process: “residents perceived public meetings as condescending and meaningless as their value is diluted by the universalistic ideals of science as chief over experiential or traditional ecological knowledge and wisdom”. This observation transcends the notion that “language matters deeply for analysis, interpretation, and action” in climate adaptation (: 1160) because if this is the perspective in which efforts are undertaken, it not only jeopardizes the social contract that underlies governance, but also the utility of place-based adaptation. Moving beyond this singular modality of place requires acknowledging that science, management, and the processes developed to integrate knowledge are themselves acts of place-making and ultimately reflect their own politics of place.

In the *Some Like it Hot* scenario, agency participants did not appear to be viable partners for exploring, much less enacting, pathways that might ensure small-scale ranching, as a key element of community resilience and community senses of place. Resource governance, and the institutional matrix of law, policy, and science through which resource managers decide and act, entails a particular sense and politics of place. However, conceding that a manager’s “view from nowhere” is a “view from somewhere”, and one engaged in the production of *some place*, does not necessarily require marginalizing or minimizing the need for science or governance in adaptation – only a recognition that collaborative processes must begin from a plurality of ‘places’ and the

reflexivity to see and recognize one’s own (Olsson et al., 2015; Williams, 2014). This is a perspective that sees adaptation planning as an exercise in *mutual* place-making and bridging this divide demands a recognition that “it is [only] through diverse, collaborative, and often contested sense-making embedded in actual places that pluralism in knowledge, meaning, and value is ultimately reconciled” (Williams, 2014: 81) and through which adaptive pathways are imagined and enacted.

Acknowledgements

The authors wish to acknowledge the collaboration and financial support of USDA Forest Service’s Rocky Mountain Research Station and the Montana Institute on Ecosystem’s award from NSF EPSCoR Track-1 EPS-1101342 and EPS-IIA-1443108 (INSTEP 3). We also wish to extend our gratitude to the research participants from communities in the upper Big Hole in Beaverhead County, Montana. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

References

- Adger, N., Barnett, J., Chapin, F. S., III, & Ellemor, H. (2011). This must be the place: Underrepresentation of identity and meaning in climate change decision-making. *Global Environmental Politics*, 2, 1–25.
- Adger, N., Barnett, J., Brown, K., Marshall, N., & O’Brien, K. (2013). Cultural dimensions of climate change impacts and adaptations. *Nature Climate Change*, 2, 112–117.
- Agyeman, J., Devine-Wright, P., & Prange, J. (2009). Close to the edge, down by the river? Joining up managed retreat and place attachment in a climate changed world. *Environment and Planning A*, 41, 509–513.
- Basset, T., & Fogelman, C. (2013). Déjà vu or something new? The adaptation concept in the climate change literature. *Geoforum*, 48, 42–53.
- Brugger, J., & Crimmins, M. (2013). The art of adaptation: Living with climate change in the rural American Southwest. *Global Environmental Change*, 1830–1840.
- Butler, J. R., et al. (2014). Framing the application of adaptation pathways for rural livelihoods and global change in eastern Indonesian islands. *Global Environmental Change*, 28, 368–382.
- Castree, N., et al. (2014). Changing the intellectual climate. *Nature Climate Change*, 4(8), 763–768.
- Chapin, F. S., & Knapp, C. N. (2015). Sense of place: A process for identifying and negotiating potentially contested visions of sustainability. *Environmental Science and Policy*, 53, 38–46.
- Cheng, A., Kruger, L., & Daniels, S. (2003). Place as integrating concept in natural resource politics: Proposition for a social science research agenda. *Society and Natural Resources*, 16, 87–104.
- Cote, M., & Nightingale, A. (2012). Resilience thinking meets social theory: Situating social change in socio-ecological systems. *Progress in Human Geography*, 36(4), 475–489.
- Davidson, D. (2010). The applicability of the concept of resilience in social-ecological systems. *Society and Natural Resources*, 23(12), 1135–1149.
- Devine-Wright, P. (2013). Think global, act local? The relevance of place attachments and place identities in a climate changed world. *Global Environmental Change*, 3(23), 61–69.
- Eriksen, S. H., Nightingale, A. J., & Eakin, H. (2015). Reframing adaptation: The political nature of climate change adaptation. *Global Environmental Change*, 35, 523–533.
- Fairhead, J., & Leach, M. (2003). *Science, society, and power: environmental knowledge and policy in West Africa and the Caribbean*. Cambridge: Cambridge University Press.
- Fresque-Baxter, J., & Armitage, D. (2012). Place identity and climate change adaptation: A synthesis and framework for understanding. *WIREs Climate Change*, 3, 251–266.
- Groulx, M., Lewis, J., Lemieux, C., & Dawson, J. (2014). Place-based climate change adaptation: A critical case study of climate change messaging and collective action in Churchill, Manitoba. *Landscape and Urban Planning*, 132, 136–147.
- Haasnoot, M., Schellekens, J., Beersma, J. J., Middelkoop, H., & Kwadijk, J. C. J. (2015). Transient scenarios for robust climate change adaptation illustrated for water management in The Netherlands. *Environmental Research Letters*, 10(10).
- Hulme, M. (2011). Meet the humanities. *Nature Climate Change*, 1(7), 177–179.
- Lamargue, P., Artaux, A., Barnaud, C., Dobremez, L., Netti, B., & Lavorel, S. (2013). Taking into account farmers’ decision making to map fine-scale land management adaptation to climate and socio-economic scenarios. *Landscape and Urban Planning*, 119, 147–157.
- Lawrence, J., & Haasnoot, M. (2017). What it took to catalyse uptake of dynamic adaptive pathways planning to address climate change uncertainty. *Environmental Science & Policy*, 68, 47–57.
- Lyon, C., & Parkins, J. (2013). Toward a social theory of resilience: Social systems, cultural systems, and collective action in transitioning forest-based communities. *Rural Sociology*, 78(4), 528–549.
- Lyon, C. (2014). Place systems and social resilience: A framework for understanding place in social adaptation, resilience and transformation. *Society and Natural Resources: An*

- International Journal*, 27(10), 1009–1023.
- MacGillivray, B. (2015). The position of place in governing global problems: A mechanistic account of place-as-context, and analysis of transitions towards spatially explicit approaches to climate science and policy. *Environmental Science and Policy*, 53, 1–7.
- Morzillo, A., et al. (2015). Communities in the middle: Interaction between drivers of change and place-based characteristics in rural forest-based communities. *Journal of Rural Studies*, 42, 79–90.
- Murphy, D., et al. (2016). Engaging communities and climate change futures with multi-scaled iterative scenario building. *Human Organization*, 75(1), 33–46.
- National Park Service (2013). *State of the park report for big hole national battlefield* Washington, DC: Department of Interior.
- Newell, B. (2012). Simple models, powerful ideas: Towards effective integrative practice. *Global Environmental Change*, 22, 776–783.
- Olsson, L., Jerneck, A., Thoren, H., Persson, J., & O'Byrne, D. (2015). Why resilience is unappealing to social science: Theoretical and empirical investigations of the scientific use of resilience. *Scientific Advancement*, 1, 1–11.
- Perry, J. (2015). Climate change adaptation in the world's best places: A wicked problem in need of immediate action. *Landscape and Urban Planning*, 133, 1–11.
- Ribot, J. (2011). Vulnerability before adaptation: Toward transformative climate action. *Global Environmental Change*, 21, 1160–1162.
- Scannel, L., & Gifford, R. (2013). Personally relevant climate change: The role of place attachment and local versus global message framing in engagement. *Environment and Behavior*, 45(1), 60–85.
- Schroth, O., Pond, E., & Sheppard, S. R. J. (2015). Evaluating presentation formats of local climate change in community planning with regard to process and outcomes. *Landscape and Urban Planning*, 142, 147–158.
- Smith, J., Siderelis, C., Moore, R. L., & Anderson, D. H. (2011). Place meanings and desired management outcomes. *Landscape and Urban Planning*, 101, 359–370.
- Strauss, S. (2012). Are cultures endangered by climate change? Yes, but *WIREs. Climate Change*, 3(4), 1757–1780.
- USDA (2009). *Beaverhead-Deerlodge national forest plan. Beaverhead deerlodge national forest*. United States Forest Service.
- Wilbanks, T. J. (2015). Putting 'Place' in a multi-scale context: Perspectives from the sustainability sciences. *Environmental Science and Policy*, 53, 70–79.
- Williams, D. R. (2014). Making sense of 'place': Reflections on pluralism and positionality in place research. *Landscape and Urban Planning*, 131, 74–82.
- Wise, R. M., et al. (2014). Re-conceptualizing adaptation to climate change as part of pathways of change and response. *Global Environmental Change*, 28, 325–336.
- Wyborn, C., Yung, L., Murphy, D., & Williams, D. R. (2015). Situating adaptation: How governance challenges and perceptions of uncertainty influence adaptation in the Rocky Mountains. *Regional Environmental Change*, (4), 669–682.
- Yung, L., Freimund, W. A., & Belsky, J. (2003). The politics of place: Understanding meaning, common ground, and political difference on the Rocky Mountain Front. *Forest Science*, 49(6), 855–866.