

**MANAGING THE YELLOWSTONE RIVER SYSTEM WITH  
PLACE-BASED CULTURAL DATA**

A Dissertation

by

DAMON MEREDITH HALL

Submitted to Office of Graduate Studies of  
Texas A&M University  
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2010

Major Subject: Wildlife and Fisheries Sciences

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## ABSTRACT

Managing the Yellowstone River System with Place-based Cultural Data. (August 2010)

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This project aims to create new research tools within the human dimensions (HD) of the natural resources field to improve environmental policy decision making. It addresses problems that arise from the recent trend towards decentralized natural resource management (NRM) and planning (e.g., community-based planning, watershed-based and collaborative management, others). By examining one decentralized riparian management planning effort along the Yellowstone River (Montana), this study finds that decentralization forces new needs such as localized information requirements and a better understanding of the rationales behind local interests. To meet these new scale demands and to ensure that policy best fits the social and biophysical settings, this project argues that local cultural knowledge can serve as an organizing framework for delivering the kinds of understanding needed for decentralized planning. This was tested by interviewing 313 riverfront landowners, recreationalists, and civic managers to understand how residents conceptualize the river's natural processes, its management, and their desires for the future of the river. Analysis of the transcribed in-depth interview texts—the Yellowstone River Cultural Inventory (YRCI)—found that: (1) altering decision venues places more significance upon

interpersonal working relationships between managers and citizens; (2) while local expertise can provide higher quality information to managers, local decision making cultures still retain power dynamics that can inhibit or advance conservation policies; (3) how natural resource places are symbolically communicated has a material impact upon resource uses; (4) how residents conceptualize the ownership of land is complicated along a dynamic river; and (5) this dynamism impacts planning efforts.

In sum, this project argues that for social research to provide the data and analysis appropriate, a modification in scale and a commensurate shift in the lenses used for social inquiry is necessary. An in-depth understanding of local cultures—like the YRCI—enables agencies to best manage in decentralized scales of planning by calling attention to site-specific nuances such as power dynamics and place representation which are often missed in traditional large-scale HD methods and lenses. This research also functions as a preemptive way to engage the public in environmental planning helping decision makers' best fit policy to particular socio-cultural and ecological settings.

## **DEDICATION**

To Lindsay, Mom, and Dad

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# CHAPTER I

## INTRODUCTION: MANAGING THE YELLOWSTONE RIVER SYSTEM WITH PLACE-BASED CULTURAL DATA

### Description of Dissertation Project

This project is an effort to create new research tools within the human dimensions of natural resources (HD) field to improve environmental policy decision making and planning. The tools developed are grounded in systems theory; interpretive theory, cultural studies, and a reflexive sociology. They constitute alternative lenses that managers and stakeholders may use for addressing the complexities of natural resource planning especially at local levels of planning. The primary argument is that our greatest difficulties in addressing environmental problems has to do with how we define, approach, interpret, and communicate social-ecological systems (SES) and problems which affects our capacity to manage, conserve, and live within natural systems (cf., Lefebvre 1991; Tuan 1991; Guttenberg 1993; Greider and Garkovich 1994; Herndl and Brown 1996; Dryzek 1997; Peterson 1997; Stokowski 2002; Norton 2005).

The problem setting is the changing social research needs due to the localization trends of NRM policy in community-based planning, collaborative management, public participation practices, watershed-based decision making, corridor-level planning, and

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This dissertation follows the style of *Society & Natural Resources*.

others. Altering decision venues requires more local scales of information and places more significance upon interpersonal working relationships between managers and citizens if policy formation and implementation are to benefit from these changes. The study site for all three chapters is a cultural inventory study within a larger cumulative effects planning project along the Yellowstone River in Montana and North Dakota.

This dissertation is organized into three stand-alone essays as its chapters. Chapters are written as article manuscripts to expedite the accessibility to practitioners in the field. The first chapter explicates culture as a tool for creating the kinds of knowledge that allow for more allied management between residents, landowners, users, publics, and agency personnel in a way that preserves both ecological functioning and cultural functioning. Specifically, it outlines the practices of the Yellowstone River Cultural Inventory (YRCI) as a management tool to best study local understandings of human-natural system interactions, residents' uses of and desires for local riparian resources, and particular local knowledges helpful to managing a shared resource like the Yellowstone River which spans many miles, jurisdictions, and symbolic meanings. It argues that an emic understanding of culture enables agencies to best managed in decentralized scales of planning. A secondary aim of this chapter is to demonstrate that a cultural inventory (like the YRCI) functions as a preemptive way to engage publics in environmental planning.

The second chapter uses data of the YRCI to discuss how managers can use cultural data to attend to and manage the symbolic resources to best aid the management of the natural resources. It demonstrates that how a place—like the Yellowstone River—

is discursively represented by various local citizen and scientific discourses has an impact upon the material land-use and the ecological functioning of a place. While representations of place seem to emerge, they are historical products often strategically arranged and advanced to the advantage of some groups' land-use practices over others. This essay uses the case of the Alan Spur Dam debate and the strategic framing of the Yellowstone River that prevented the dam's construction yet lead to today's management problems thirty years later.

The third chapter uses the data of the YRCI to operationalize a systematic way of discussing issues of local power in decision making. The objective is to create a systems model that simulates coupled natural and human systems in a way that includes an account of group power relations. This coupled human-natural multi-agent simulation model offers one way to demonstrate explicit layers of influence between heterogeneous agents in social decision making dynamics. This model helps agencies understand (imagine) public responses to decision making within the context of ecological response to decisions made. The model shows how small decisions made by agencies may lead to drastic consequences in ecological functionality and public satisfaction over time.

The following sections detail the problem setting of decentralized planning, the research setting of this study along the Yellowstone River, and the contributions these essays bring to the human dimensions of natural resources.

### **Problem Setting: Localization of Natural Resources Management and Policy**

The problem context relates to the latest trend in natural resources management (NRM) decision making, planning, and environmental policy; characterized as decentralization. Decentralization is a change in the scale of decision making from centralized State (federal, national, and state) venues to increasingly local community-levels of planning (Manor 1999; Raik et al. 2008). This adaptation of decision scale is the next step in following the National Environmental Policy Act's administrative directive to improve the "education of decision makers" via a "systematic, interdisciplinary" integration "of the natural and social sciences" with democratic participation (42 U.S.C. § 4321). The advantage is improved efficacy of policy formation and implementation by mitigating adverse effects of mismatched scales of planning (Salzman and Thompson 2007). Because environmental problems are problems of particular communities and specific natural systems, local managers, landowners, and residents have a better understanding of and access to relevant on-the-ground conditions. Advancing decentralized NRM suggests that locally-made policies are more likely to soundly fit the places where problems occur.

Changes in the scale of decision-space and venue require equivalent changes in the social information needs of decision makers. For social research to provide the data and analysis appropriate a modification in scale, a commensurate shift in the lenses used for social inquiry is necessary. The kind of knowledge for improving decision making must be rooted in the contextual nuances of the immediate policy setting. This alteration in theoretical and methodological approach within environmental planning is broadly

characterized as site-specific (McCool et al. 2008), context-dependent (Honadle 1999), place-based (Norton and Hannon 1997; Yung et al. 2003; Cheng et al. 2005; Davenport and Anderson 2005) research, and “the particularization of knowledge” (Fischer 2000). This project argues that local cultural knowledge can serve as an organizing framework for delivering the kinds of understanding needed at local scales. This nuanced understanding is a kind of tacit local knowledge derived from field experience in the study-specific decision setting. This cultural understanding can help decision makers best fit policy to particularized social and ecological settings.

A cultural acumen can also aid managers in overcoming a second challenge of decentralized policy: the creation and maintenance of long-term working relationships with local publics. As policy making becomes more local, relationships between citizens and managers also change. For policy to become adaptable and nimble—quickly able to adjust to changes in the natural and social systems—decision making groups need to regular productive interaction and a degree of trust.

### **Research Setting: The Yellowstone River Cultural Inventory**

The Yellowstone River Basin drains an area of 114,000 km<sup>2</sup> (70,000 mi<sup>2</sup>). From its headwaters on the continental divide in Wyoming it flows north through Yellowstone National Park and falls into a 670-mile long braided waterway through scenic Paradise Valley, Montana and then easterly through Montana’s most productive irrigated agricultural lands where it joins the Missouri River twenty miles into North Dakota. Approximately 84% of the riparian lands are privately owned. The upper reaches are a world-renowned cold water Blue Ribbon Trout Stream and habitat of the endangered

cutthroat trout (*Oncorhynchus clarki bouvieri*) (Leighton 1998). The downstream warm-water fishery constitutes critical habitat for the endangered pallid sturgeon (*Scaphirhynchus albus*). In addition to being managed as a part of the Greater Yellowstone Ecosystem, a source for irrigation water, and the headwaters of the Mississippi River, the Yellowstone River is of special management interest because it is the longest undammed river in the U.S. Besides the symbolic value of this unique attribute, this feature creates biological and scenic amenities attractive to recreational users, retirees, and vacation home owners.

The river's floodplain is undergoing moderate to significant land use changes. Development along the river stems from suburban growth in Billings—Montana's and the region's largest metropolitan area (pop. 150k in 2005)—and from the impacts of this rural agrarian valley increasingly being used as a recreational destination. In the upstream communities, river-related tourism has grown via fly-fishing outfitters while downstream ranch lands have been increasingly purchased or leased for hunting. Many Montanans worry that the unplanned riverfront recreation industry and home development threatens the quality of the amenities which attract visitors (Herring 2006). Yet a strong private-property rights ethos in the region often prevents many from acting on these concerns (Peterson and Liu 2008).

The attractive undammed character also heightens risk to growing riverfront communities. The periodic summer flooding from mountain snowmelt causes regular streambank erosion which impacts productive agricultural lands, residential properties, and public infrastructure. In 1996 and 1997, the Yellowstone River had two consecutive

100-year floods damaging infrastructure, homes, and farm lands throughout the corridor. The aftermath of which was a reevaluation of planning for the mitigation of these risks.

The U.S. Army Corps of Engineers (USACE) regulates riparian corridor activities under the authority of Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 401) and Section 404 of the Federal Water Pollution Control Act: the Clean Water Act (CWA; 33 U.S.C. § 1344). The USACE works in conjunction with state agencies (e.g., Montana Department of Environmental Quality), county conservation districts and county floodplain administrators to review and grant bank modification permits to stabilize stream banks (with levees, barbs, weirs, rip-rap, etc.) to prevent erosion. Since assuming CWA permitting duties in 1975 to 2004, the USACE had processed a total of 156 permit actions for the upper Yellowstone River: Park County, MT, two-thirds of these permit actions were granted following the 1996 and 1997 floods (Auble et al. 2004). In the aftermath of the floods, publics scrutinized the USACE's understanding of the cumulative effects of permitted bank stabilization projects on riparian ecology. The source of conflict was a general distrust of Federal government and a specific mistrust of the USACE's interests in protecting the ecology of the river. Publics feared that indifferent permitting of channel modifications would negatively impact the fishery and scenic values of the river turning it into a 'rock-lined channel' or an 'armored ditch.' National concern lead the National Geographic hailing the river as, "America's last best river" and the American Rivers placed the Yellowstone on its list of top ten endangered rivers in 1999 (Chapple 1997). In a successful lawsuit, the court ruled that the USACE needed to improve how they consider the cumulative effects of

bank stabilization on the integrity of the riverine ecosystem (*Montana Council of Trout Unlimited v. Corps of Engineers*). The USACE placed a moratorium on streambank stabilization projects and initiated an interdisciplinary cumulative effects study with funding from the Water Resources Development Act in 1999 (PL 106–53 § 431).

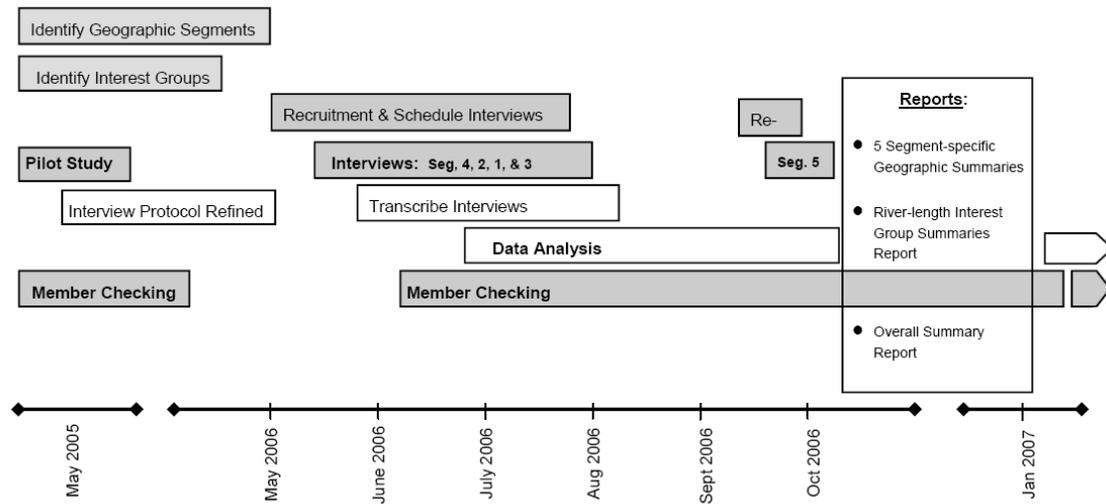
The comprehensive corridor study sought to amend outdated baseline data with channel migration mapping, wildlife inventories, hydrologic modeling, geomorphologic inventories, demographic studies, and modernizing 30-year old flood insurance rate maps. The research was required to be conducted in coordination with the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the Natural Resources Conservation Service (NRCS), with the full participation of the State of Montana and tribal and local entities, and needed to provide for public participation. The USACE worked closely with the county-level stabilization permitting agents represented by the Greater Yellowstone River Conservation District Council (Council) which consists of representatives of each of the 11 conservation districts along the river, an NRCS agent, and a representative body of recreational interests added during early planning phases. To reconsider permitting practices the local members of the Council sought a means to investigate and understand the opinions, knowledge, and desires of those riverfront residents and agriculturalists—their neighbors—who would be affected by changes to the permitting process.

The USACE too saw a need to engage the public to learn local perceptions of river dynamics, management efforts, bank stabilization, and conflict between river uses. Instead of traditional public forums for participation, we suggested a cultural inventory

as a systematic means of both engaging and gathering riverfront landowners' and river users' input about the riparian corridor, erosion, bank stabilization permitting, and other emergent management concerns (Gilbertz et al. 2007).

The Yellowstone River Cultural Inventory (YRCI) was funded by the U.S. Army Corps of Engineers and the Yellowstone River Conservation District Council as one part of an "interdisciplinary planning study" of the Yellowstone River Corridor (<http://nris.mt.gov/yellowstone>). The corridor planning study included data collection and GIS mapping of hydrologic, geomorphic, and biologic information layers. In total, a team of three researchers conducted one-hour-long moderately-scheduled open-ended interviews with 313 riverfront residents in their home places along the entire 670-mile length of the river for five weeks over a twelve-week summer (Figure 1). Our conversations with the riverfront residents provided the cultural and socio-economic data that exist in the places along the river. A database was constructed of possible participants from county tax and property records, municipal and county government web sites, recreation clubs' publications, and referrals provided by the local Conservation Districts, the Yellowstone River Conservation District Council, and the Montana Office of Natural Resources Conservation Service. Interest group lists were systematically sampled by geographic location and participants were contacted by telephone, appointments were made, and we went to speak with them. Table 1 summarizes the number of participants and their distribution across the five geographical segments and four interest groups. The geographical segments were based on the

hydromorphological characteristics of river and the interest groups were chosen based on the standard participation interests of the public in past river management decisions.



**Figure 1.** Timeline and methods used for Yellowstone River Cultural Inventory.

**Table 1.** Summary of Yellowstone River Cultural Inventory participants by geographic segment

	GEO SEG I: Missouri River to Powder River	GEO SEG II: Powder River to Big Horn River	GEO SEG III: Big Horn River to Laurel	GEO SEG IV: Laurel to Springdale	GEO SEG V: Springdale to Gardiner	TOTAL IN GROUP
AGRICULTURAL	22	22	16	12	14	86
CIVIC	14	14	18	14	8	68
RECREATIONAL	15	16	16	13	16	76
RESIDENTIAL	15	11	16	15	19	76
GEOGRAPHIC SEGMENT TOTAL	66	63	66	54	57	
NATIVE AMERICAN						7
PROJECT TOTAL						313

These are riverfront agriculture, residential riverfront agrarians who own less than 20 acres (8 ha), city and county civic managers, and regular river recreationalists. We decided to add a fifth category for the Crow and Northern Cheyenne Native American Nations. Although the reservations are not directly on the Yellowstone River, the river was the noted center of their homeland approximately six generations ago and is still considered so today.

Our interview protocol consisted of moderately-scheduled open questions revolving around the following six areas: (1) how they describe their place along the Yellowstone; (2) benefits and problems of living with the river; (3) erosion and bank stabilization sensibilities; (4) existing and ongoing conflicts and ways to improve them; (5) what their place will look like in ten years and for the next generation; and (6) finally what is most important to them (Gilbertz et al. 2007). As a complement to the interviews, we gathered related documents, engaged in participant-observation, and performed thematic analysis of all texts (Peterson et al. 1994). We analyzed and organized these comments into a report of the cross-sectional themes that ensured the inclusion of each unique perspective using 1700 quotes from participants to illustrate and provide evidence for our reported findings (Gilbertz et al. 2007). The analyses of the nearly 2200 pages of transcripts serve as a basis for this dissertation.

### **Contribution to the Field of Human Dimensions of Natural Resources**

Natural resources managers and decision makers have various tools to become familiar with the biological, geological, hydrological, and other physical dynamics of a site. To meet specific managerial needs, this information is updated by more field study.

Yet, when it comes to gaining familiarity with the social attributes of a place, only managers who are native to the site or have long tenure in a location possess the knowledge required for collaborative localized decision making. Veteran agents draw upon years of personal interactions with diverse residents and resource users. Yet, most managers and agencies have a fragmented understanding of the interests, desires, and lives of the publics they serve (Gray 1989; Salzman and Thompson 2007). For attaining socio-cultural familiarity, there are few resources agents may consult to obtain site-specific social knowledge on par with the available biophysical knowledge.

Traditional methods of the HD research have reflected the national planning research and the social psychology and sociology methodologies of those early-funded social science scholars within NRM (Field et al. 2004; Patterson and Williams 2005). These large-scale HD studies used a model of society that linked human behavior with the attitudes and values held by publics (cf. Ajzen and Fishbein 1980). Though efficient for gathering macro-level group opinions and explicating and anticipating desires at larger scales of planning, the inherited HD research techniques do not provide the necessary level of detail for current shifts towards localized planning (Grunig 1989; Cantrill 1993; Smith 1999).

The traditional HD lens focused on attitudes and values as an end-product does not provide resources that improve transferability between scientific and of public (the local and cultural) realms. Scientific discourses—as universalized (context-transcendent) and generalized (subject-free) frameworks (cf., Flyvbjerg 2001; Toulmin 2001)—prove difficult to reconcile with individuated context and subject-dependent cultural accounts

of place. As a result, citizens are alienated by these technical discourses contributing to the distrust of agencies and the processes of public engagement (Yosie and Herbst 1998; Schwarze 2004). For agents to work with citizens as allies in management of shared resources, they must become familiar with the resource-using audiences whom they serve. One way social researchers have refined their methodological toolkits to better serve the needs of these changing relations, has been through the provision of contextualized and site-specific social information via the lenses of the culture.

The cultural turn within HD affirms the utility of cultural data as a means to improve decision making (Nelson 2002). Cultural examinations of public participation practices, stakeholder groups, NRM conflict, and comanagement have been used to explain and understand: Resource user behavior (Poncelet 2001; Hansen-Møller 2009), preferences and values (Stephenson 2008), local knowledge (Flanagan and Laituri 2004; Calvo-Iglesias et al. 2006), regional cultural values (Skogen and Thrane 2008), community decision making (Chenoweth et al. 2002), stakeholder conflict (Skogen 2003), cross-cultural communication of scientific information (van Wyk et al. 2008), relations of trust (Durrant and Durrant 2008; Stern 2008), and the cultural contextualization of policy (Lejano et al. 2007). These studies demonstrate that a better understanding of the interactions between landscapes and the cultural forces driving them is essential for their sustainable management (Naveh 1995). Yet these studies rely on an etic definition of culture which consists of categorical observations meaningful to researchers that facilitate comparative research and universal knowledge claims. The etic conceptualization of culture binds demographic variables to expressed values and

behaviors to enable prediction of a group's attitudes, values, needs and desires related to land use behavior. While this approach is efficient for gathering a macro-level broad understanding of group behaviors, it risks oversimplifying and misrepresenting the publics being represented (Rikoon 1996).

Improving the quality of resources requires improving relationships with those who use it, manage it, and live with it. To meet the micro-scale demands of decentralized planning, we use an emic view of culture. The emic conceptualization of culture focuses on intrinsic distinctions meaningful to "inside" members of a culture. The emic perspective acknowledges that meaning is produced and knowledge is socially-constructed. This turn in lens constitutes a means to organize the assemblage of local culture's observable meaningful talk, stories, gossip, representations, explanations, perceptions, wishes, fears, ideal and material interests. Following this constructionist lens, culture is "the historically transmitted pattern of meanings embodied in symbols, a system of inherited conceptions expressed in symbolic forms by means of which men communicate, perpetuate, and develop their knowledge about and attitudes toward life" (1973, 89). Culture is pervasive and routine as an ordinary experience of everyday life (Williams 1958, 1981). In its ordinariness, culture is inescapable. Culture is that "sort of freely available and all-purpose knowledge that you acquire in general at an age when you don't yet have any questions to ask" (Bourdieu 1990a, 29). This inherited frame of reference for daily life and problem solving, enframes much of how we think, speak, and act; rationalizing and giving meaning to common practices such as story, gossip, ceremonies, small talk, daily rituals, work, etc. (Geisler 2000). Culture allows us to see a

context for practices, styles, habits, and actions that impact the natural and symbolic resources within a particular situation. Thus knowing a local culture is to know the meaningful practices that people use in everyday life.

The critical difference between the emic and etic model of culture relates to how culture connects to behavior. Culture does not predict what actions people will take in a situation so much as it tells us what social resources and practices people draw from to decide how to act, behave, and speak concerning the natural world. Knowledge of riparian landscapes, histories of normative land uses, and meanings given to these places along with culturally-embedded values “shape the capacities from which strategies of action are constructed” to solve problems (Swidler 1986, 277). Therefore, language matters because how people understand and speak about nature affects their capacity to manage, conserve, and live within specific systems (cf. Foucault 1972; Guttenberg 1993; Dryzek 1997; Fischer 2000). This emic view of culture requires micro-level examinations of individuals’ patterns of shared meanings embedded within observable practices of everyday talk and action. These overt practices constitute the empirical basis of a cultural inventory. The culture’s “insiders” are the judges of the emic account’s accuracy and final authority.

One way of describing the kinds of knowing required for place-based management is through the notion of *phronesis*: Aristotle’s third form of knowledge. Phronetic ways of knowing aims to use knowledge to deliberate wisely. It seeks action. As such, phronetic knowledge (phronesis) must be situationally-dependent, context-rich, and enmeshed in the particulars of the affected places of the decision making (Devereux

1986; Smith 2003). Other forms of knowledge—like the theory building of social and natural sciences—are context-independent; based on universal claims derived from observations across various contexts (Flyvbjerg 2001). Phronetic knowledge is not ends-oriented; seeking rulebooks for predicting in multiple contexts. Instead, phronesis is means-oriented so as to best address the problems of the immediate situation. Phronesis seeks pragmatism in the particular context and is open to local wisdoms as a resource to fix NRM problems.

Place-based knowledge affirms, challenges, and enhances universal knowledge. The objective is to understand local knowledge so as to use it to achieve management goals while improving important long-term relations; not to depoliticize the situation, colonize it into existing social frames and terms, or strip the context of its complexity (Fischer 2000). To do so, social researchers must adopt a mindful comportment of their own. Like medicine's Hippocratic Oath and conservation biology's land ethic, a certain ethic of care to conserve (improve) the quality ecological and cultural functioning is necessary for analysis and application (cf. Soule 1985). For example, realizing that a majority of citizens affected by management decisions are beneficiaries of successful efforts to improve environmental quality, their voices must not be excluded from what is considered "important information" for decision making (Senecah 2004); as scientific discourses so often excludes (Latour 2004).

This project is an attempt to find ways which social researchers can act as honest brokers between science, communities, and decision makers by arming decision makers with a greater number of available tools, ideas, options, and alternatives for policies that

impact social and ecological systems (Pielke Jr. 2007). This project is an effort to increase the variety of tools and lenses available to researchers and expand the range of readied lenses, actionable practices, and alternatives as a means to best address sustainability problems.

### **Dissertation Chapter Abstracts**

Chapter I, “Culture as a Means to Contextualize Policy: The Yellowstone River Cultural Inventory.” Natural resource management and decision making has increasingly shifted its scale to provide participation opportunities for local voices. This trend recognizes landowners and resource users as allies in successful planning and management. This change in decision space and relations requires different information. Social researchers need to adapt their methodological approaches and theoretical lenses to meet emergent context-specific needs. This paper offers the Yellowstone River Cultural Inventory as a means of meeting scale-appropriate local planning needs. We draw from the experience of 313 in-depth interviews, analysis, and reporting to discuss the advantages and possibilities of this cultural lens.

Chapter II, “Integrating Divergent Representations of Place into Decision Contexts.” Places are spaces that humans have bound, ordered, and defined by communication. Such representations are culturally situated and inherently involved in the production of legitimate knowledge. Place representations slice space into pictures of the world that simultaneously flatten and deepen space within public discourse. Flattened space is the bounded site where place is displayed as generalizable, accessible, calculable, and isometric. Deepened space displays the experience of place through

artistic or poetic accounts. Whereas flattened representation of place removes the subject to accurately replicate the reality of place, deepened representation of place focuses on active participation of the experiencing subject in place. Conflict arises when groups must reconcile a site's simultaneously deepened and flattened representations. Thus, attending to how place is represented in various natural resource management (NRM) decision contexts is critical to the potential success of NRM. Since managers and decision makers cannot fully control the representation of place, they need to understand how place representation connects meaning and language to culture via practices of everyday life. We offer a cultural inventory as a tool that can facilitate development of such an understanding. The cultural inventory emerged from informant-directed interviews with landowners, recreationalists, civic leaders, and agriculturalists along the Yellowstone River. After interviewing resource users, we analyzed interview transcripts to discover how these residents represented their place, focusing on discursive frames that flattened and deepened it. Our analysis suggests how a hermeneutics of place representation provides NRM advisors, planners and other decision makers with a conceptual framework that may help them integrate divergent place representations into decision contexts, leading to more effective management.

Chapter III, "Social influences in environmental planning: Modeling Bourdieu's theory of symbolic capital." Natural resource management agencies constantly balance their responsibilities to various sectors of coupled natural-human systems. Any decision has the potential to influence both ecosystem function and public support. We constructed a coupled human-natural multi-agent simulation model to demonstrate

explicit relations of influence between heterogeneous agents in social decision making contexts. Using the social theory of Pierre Bourdieu (1985, 1986, 1989) provided a commensurate language between social and ecological theory in “capital” to demonstrate the reciprocal interactions between human and ecological dynamics. The model specifies social power relations and makes explicit how social power functions in ecological decision making. It also illustrates how data from qualitative cultural studies may be utilized within systems modeling.

## CHAPTER II

# CULTURE AS A MEANS TO CONTEXTUALIZE POLICY: THE YELLOWSTONE RIVER CULTURAL INVENTORY

### Introduction

To increase successful implementation of policy, natural resources management (NRM) decision making spaces have become more localized. The rationale is that by leveraging local expertise and site-specific social dynamics, management can better meet the needs of each setting than by using centralized planning. Broadly characterized as “decentralization,” community-based conservation, collaborative planning, place-based, and resource-specific management have proliferated as means to achieve conservation objectives (cf. Raik et al. 2008). This modification in planning scale recognizes the importance of allying with local publics because environmental problems are social problems; embedded within local terminologies, histories of land use practices, past management relations, and local behavioral norms and values. As such, natural resource policy targets human behavior as well as natural resources.

This change in policy scale implies an equivalent change in the information needs of managers. Social research must provide appropriate data that allow management practices to be firmly grounded in the world experienced by those whose behavior is the object of the policy (Honadle 1999). To do so in increasingly decentralized management efforts requires managers and social researchers to

understand the complexities of context-specific interactions between natural and cultural forces which together shape a site's ecological and human behavior (Antrop 2005). This necessitates adaptation of current social science approaches including both theoretical and methodological lenses used, and what constitutes relevant objects of inquiry.

Natural resources managers and decision makers have various tools to become familiar with the biological, geological, hydrological, and other physical dynamics of a site. To meet specific managerial needs, this information is updated by more field study. Yet, when it comes to gaining familiarity with the social attributes of a place, only managers who are native to the site or have long tenure in a location possess the knowledge required for collaborative localized decision making. Veteran agents draw upon years of personal interactions with diverse residents and resource users. Yet, most managers and agencies have a fragmented understanding of the interests, desires, and lives of the publics they serve (Gray 1989; Salzman and Thompson 2007). For attaining socio-cultural familiarity, there are few resources agents may consult to obtain site-specific social knowledge on par with the available biophysical knowledge.

To address as the need for scale-appropriate social information, we offer the cultural inventory as an encyclopedic account of the diverse voices of a place. Just as wildlife and resource managers use physical-feature inventories and biological inventories to understand the landscape, we present the cultural inventory as a geographically-specific systemic documentation of landscape knowledge and shared meanings regarding a resource as it is commonly discussed within local communities. Such an inventory is based on systematic in-depth field interviews and ethnographic

research. This research tool may benefit managers through providing an accessible and rich compendium that synthesizes participant descriptions of local social and behavioral dynamics based on resource practices, uses, knowledges, terminologies, attitudes, histories, conflicts, priorities, and desires surrounding shared resources. This synthetic report offers a means of attaining local cultural acumen: the type of know-how that would take a career worth of conversations to acquire. The application and uses of these data are manifold. In addition, conducting the cultural inventory has an impact that prepares a deliberative space for resource planning within affected communities.

The research methodology uses poststructural reconceptualizations of the significance of local culture in natural resource decision making as a lens which may facilitate better understanding of the social complexities involved in managing shared resources. This perspective toward culture offers a model of society that treats human behaviors as socially dynamic. Using the Yellowstone River Cultural Inventory (YRCI) in the U.S., we argue that a cultural understanding enriches localized NRM and has the capacity to improve the applicability of social research to the context-specific information, communication, and relational needs of decentralized policy planning (Gilbertz et al. 2007).

We first describe the Yellowstone River cumulative impacts planning which constitutes an example of localized decision making. We then locate our approach to place-based socio-cultural examination within the human dimensions (HD) of natural resources literature. Next, we describe the YRCI. We conclude with a discussion of the strengths and weaknesses of using the YRCI as part of the planning process, specifically

to provide a baseline understanding of the social uniqueness of a particular setting. We argue that as the scales of planning change, social research must continually adapt itself towards providing management with appropriate tools. The cultural inventory offers managers an in-depth cultural understanding of the unique social dynamics of a place.

### **Problem Context: Yellowstone River Riparian Management**

The Yellowstone River Basin drains an area of 114,000 km<sup>2</sup> (70,000 mi<sup>2</sup>). From its headwaters on the continental divide in Wyoming it flows north through Yellowstone National Park and falls into a 670-mile long braided waterway through scenic Paradise Valley, Montana and then easterly through Montana's most productive irrigated agricultural lands where it joins the Missouri River twenty miles into North Dakota. Approximately 84% of the riparian lands are privately owned. The upper reaches are a world-renowned cold water Blue Ribbon Trout Stream and habitat of the endangered cutthroat trout (*Oncorhynchus clarki bouvieri*) (Leighton 1998). The downstream warm-water fishery constitutes critical habitat for the endangered pallid sturgeon (*Scaphirhynchus albus*). In addition to being managed as a part of the Greater Yellowstone Ecosystem, a source for irrigation water, and the headwaters of the Mississippi River, the Yellowstone River is of special management interest because it is the longest undammed river in the U.S. Besides the symbolic value of this unique attribute, this feature creates biological and scenic amenities attractive to recreational users, retirees, and vacation home owners.

The river's floodplain is undergoing moderate to significant land use changes. Development along the river stems from suburban growth in Billings—Montana's and

the region's largest metropolitan area (pop. 150k in 2005)—and from the impacts of this rural agrarian valley increasingly being used as a recreational destination. In the upstream communities, river-related tourism has grown via fly-fishing outfitters while downstream ranch lands have been increasingly purchased or leased for hunting. Many Montanans worry that the unplanned riverfront recreation industry and home development threatens the quality of the amenities which attract visitors (Herring 2006). Yet a strong private-property rights ethos in the region often prevents many from acting on these concerns (Peterson and Liu 2008).

The attractive undammed character also heightens risk to growing riverfront communities. The periodic summer flooding from mountain snowmelt causes regular streambank erosion which impacts productive agricultural lands, residential properties, and public infrastructure. In 1996 and 1997, the Yellowstone River had two consecutive 100-year floods damaging infrastructure, homes, and farm lands throughout the corridor. The aftermath of which was a reevaluation of planning for the mitigation of these risks.

The U.S. Army Corps of Engineers (USACE) regulates riparian corridor activities under the authority of Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 401) and Section 404 of the Federal Water Pollution Control Act: the Clean Water Act (CWA; 33 U.S.C. § 1344). The USACE works in conjunction with state agencies (e.g., Montana Department of Environmental Quality), county conservation districts and county floodplain administrators to review and grant bank modification permits to stabilize stream banks (with levees, barbs, weirs, rip-rap, etc.) to prevent erosion. Since assuming CWA permitting duties in 1975 to 2004, the USACE had

processed a total of 156 permit actions for the upper Yellowstone River: Park County, MT, two-thirds of these permit actions were granted following the 1996 and 1997 floods (Auble et al. 2004). In the aftermath of the floods, publics scrutinized the USACE's understanding of the cumulative effects of permitted bank stabilization projects on riparian ecology. The source of conflict was a general distrust of Federal government and a specific mistrust of the USACE's interests in protecting the ecology of the river. Publics feared that indifferent permitting of channel modifications would negatively impact the fishery and scenic values of the river turning it into a 'rock-lined channel' or an 'armored ditch.' National concern led the National Geographic hailing the river as, "America's last best river" and the American Rivers placed the Yellowstone on its list of top ten endangered rivers in 1999 (Chapple 1997). In a successful lawsuit, the court ruled that the USACE needed to improve how they consider the cumulative effects of bank stabilization on the integrity of the riverine ecosystem (*Montana Council of Trout Unlimited v. Corps of Engineers*). The USACE placed a moratorium on streambank stabilization projects and initiated an interdisciplinary cumulative effects study with funding from the Water Resources Development Act in 1999 (PL 106-53 § 431).

The comprehensive corridor study sought to amend outdated baseline data with channel migration mapping, wildlife inventories, hydrologic modeling, geomorphologic inventories, demographic studies, and modernizing 30-year old flood insurance rate maps. The research was required to be conducted in coordination with the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the Natural Resources Conservation Service (NRCS), with the full participation of the State of Montana and tribal and local

entities, and needed to provide for public participation. The USACE worked closely with the county-level stabilization permitting agents represented by the Greater Yellowstone River Conservation District Council (Council) which consists of representatives of each of the 11 conservation districts along the river, an NRCS agent, and a representative body of recreational interests added during early planning phases. To reconsider permitting practices the local members of the Council sought a means to investigate and understand the opinions, knowledge, and desires of those riverfront residents and agriculturalists—their neighbors—who would be affected by changes to the permitting process. The USACE too saw a need to engage the public to learn local perceptions of river dynamics, management efforts, bank stabilization, and conflict between river uses. Instead of traditional public forums for participation, we suggested a cultural inventory as a systematic means of both engaging and gathering riverfront landowners' and river users' input about the riparian corridor, erosion, bank stabilization permitting, and other emergent management concerns (Gilbertz et al. 2007).

### **A Cultural Turn in Human Dimensions Literature**

Dynamic interactions between natural and cultural forces change the environment where people live (Antrop 2005). Values and behavioral norms are embedded in cultural practices shaping resource use. Although nature shapes the land in a particular way, culture enables localized management. Culture then may serve as an organizing framework for gathering site-specific public perceptions of natural resource dynamics and their management. Any cultural model for society depends on the theories used to define 'culture.' This choice drives a conceptualization of how culture links to

behavior which in turn delineates what objects of inquiry are necessary to examine as well as how the findings can be applied. In this section, we locate where the cultural inventory diverges from other cultural definitions within NRM research.

At macro scales of inquiry, culture has been used to locate stakeholders within typologies to distinguish resource use. This definition of culture refers to what is distinctive about a people's 'way of life' (cf. Hall 1997). This approach focuses on etic definitions of culture which are categorical observations meaningful to researchers that facilitate comparative research and universal knowledge claims. The etic conceptualization of culture binds demographic variables to expressed values and behaviors to enable prediction of a group's attitudes, values, needs and desires related to land use behavior. While this may be efficient for gathering and anticipating macro-level group behaviors, it risks oversimplifying and misrepresenting the publics being represented (Rikoon 1996). Many argue that this inherited model of culture does not provide the necessary level of detail to apprehend the embeddedness of social practices necessary for local NRM information needs (Cantrill 1993; Smith 1999; Corbett 2006).

To meet the micro-scale demands of decentralized planning, we use an emic view of culture. The emic conceptualization of culture focuses on intrinsic distinctions meaningful to "inside" members of a culture. The emic perspective acknowledges that meaning is produced and knowledge is socially-constructed. These shared practices of truth telling inform a group's conceptual maps, normative behaviors, and interactions with the natural world (cf. Barnes 2001; Disco 2002; Nelson 2002). Following this constructionist lens, culture is "the historically transmitted pattern of meanings

embodied in symbols, a system of inherited conceptions expressed in symbolic forms by means of which [men] communicate, perpetuate, and develop their knowledge about and attitudes toward life” (Geertz 1973, 89). This inherited frame of reference for daily life and problem solving, enframes much of how we think, speak, and act; rationalizing and giving meaning to common practices such as story, gossip, ceremonies, small talk, daily rituals, work, etc. (Geisler 2000). Culture becomes an inescapable part of the places where people live and is embedded in their daily routines (Williams 1981; Bourdieu 1990b).

The critical difference between the emic and etic model of culture relates to how culture connects to behavior. Culture does not predict what actions people will take in a situation so much as it tells us what social resources and practices people draw from to decide how to act, behave, and speak concerning the natural world. Knowledge of riparian landscapes, histories of normative land uses, and meanings given to these places along with culturally-embedded values “shape the capacities from which strategies of action are constructed” to solve problems (Swidler 1986, 277). Therefore, language matters because how people understand and speak about nature affects their capacity to manage, conserve, and live within specific systems (cf. Foucault 1972; Guttenberg 1993; Dryzek 1997; Fischer 2000). This emic view of culture requires micro-level examinations of individuals’ patterns of shared meanings embedded within observable practices of everyday talk and action. These overt practices constitute the empirical basis of a cultural inventory. The culture’s “insiders” are the judges of the emic account’s accuracy and final authority.

Culture, from this perspective, offers a means to understand the rationales behind resource use practices rather than a means for classifying groups. Cultural context—its discourse, its production of ecological knowledges, and how its worldviews interact with landscapes—must be faced, understood, explained, and communicated if managers and local publics are to successfully work together to solve problems. For if a resource policy solution is to speak to a people, “it needs to find roots in their life, language, and thought” (Campbell 1974, 444). Because landscape change is an interaction between natural and cultural forces, the survival of shared riparian landscapes is mutually dependent upon ecological and cultural knowledge (Decamps 2001; Chenoweth et al. 2002; Flanagan and Laituri 2004). This is the rationale behind the YRCI.

### **Implementation of the Yellowstone River Cultural Inventory**

The YRCI was designed to meet the needs of a particular policy context. It was commissioned by the USACE with technical advice from the Council as the cultural resources portion of the Yellowstone River cumulative impacts study. Cumulative effects analyses (CEA) are an emerging discipline within the scoping phases of NEPA (CEQ 1997). It is an iterative process of inquiry that examines past, present, and future public and private actions impacting the resource, which then provides baseline information for identifying indicators, interagency cooperation needs, and immanent and future decision making (40 CFR §§ 1500–1508; CEQ 1997). Following CEA principles, a pilot study, and technical advice, we bound our study area to affected communities and the natural boundaries of the resource affected. The river within the study areas was

divided into five geographic segments based on hydromorphological characteristics. We sought out stakeholders directly affected by changes in stabilization permitting, those interested and likely to participate in riparian planning, and those directly impacted by management changes but were unaware. A database was constructed of possible participants from county tax and property records, municipal and county government web sites, recreation clubs' publications, and referrals provided by the Council and the Montana office of the NRCS. Interest groups were chosen based on participation interests of the public in past river management decisions. These are riverfront agriculture, residential riverfront landowners of less than 20 acres (8 ha), city and county civic managers, and regular river recreationalists. Once in the field, we added a fifth category for the Crow and Northern Cheyenne Native American Nations. The primary function of interest group classifications was to assess and ensure equitable distribution of sources across geographic segments and prominent interest areas. Interest group lists were systematically sampled then snowball sampled by location. Participants were contacted by telephone, appointments were scheduled, and we traveled to speak with them in their homes, cafes, offices, and places of their preference. In total, our team of three researchers conducted one-hour-long moderately-scheduled in-depth interviews with 313 riverfront residents in their home places along the 540-mile Corridor Study length of the river (Gilbertz et al. 2007).

We documented how the people of the Yellowstone River describe the physical character of the river, how they think physical processes, such as floods and erosion, should be managed, and how they value the river's riparian zone (Table 2). Special

attention was given to the differences between perspectives from diverse geographical settings and interest groups as well as how interest groups view management practices and plans as they relate to the river as a shared resource. Because, interview data are created from an interaction between the interviewer and the informant (Lincoln and Guba 1985), open-ended questions were asked as a means of encouraging the residents to talk about the river, the local environs, and their personal observations and concerns freely and in their own words. The interview protocol consisted of open-ended questions concerning six topics: (1) how they describe their place along the Yellowstone; (2) benefits and problems of living with the river; (3) erosion and bank stabilization sensibilities; (4) existing and ongoing conflicts and possible ways to improve them; (5) how they imagine their place on the river will look in ten years and further into the future; and (6) what is most important to them (Gilbertz et al. 2007).

**Table 2.** Yellowstone River Cultural Inventory interview protocol objectives

Key Concerns
<p><u>Bank stabilization</u>, esp. to discover:</p> <ul style="list-style-type: none"> <li>a. how people describe the “best ways” to prevent erosion, and</li> <li>b. how people discuss the tension between controlling the river and allowing the Yellowstone to remain a free-flowing river.</li> </ul>
<p><u>Riparian Zone</u>, esp. to discover:</p> <ul style="list-style-type: none"> <li>a. the extent to which people recognize the riparian zone, and/or</li> <li>b. the extent to which people recognize the importance of the riparian zone.</li> </ul>
<p><u>Management and System Health</u>, esp. to discover:</p> <ul style="list-style-type: none"> <li>a. the extent to which individuals explain connections between river management strategies, the health of the overall system and their individual goals, and</li> <li>b. the extent to which individuals explain management concerns as a competitive concern</li> </ul>

### *Analysis*

In naturalistic inquiry, analysis occurs throughout the entire process. Analysis was done by the team of three field researchers because experiencing these conversations, places visited, and the time in the field adds a tacit knowledge which is vital for providing on-the-ground substance behind any generalized claims. We were immersed in only this study for a 12-week summer. Between each week of fieldwork, we reserved a week for team analysis and scheduling the next week's interviews.

The analyses of interview transcripts involved both deductive and inductive elements. We located common themes, topics, and representations for each interest group focusing on one geographic segment at a time. We tested emergent themes with a different subset of the transcript data. Where there was divergence, we considered fit and uniqueness of the comments. One means of affirming the saliency of themes was built into the protocol's final question: "Of all we talked about, what is most important to you?"

Because the inventory involved descriptions that were the constructs of the researchers, we wanted to ensure that the voices of river residents spoke louder than any voices of the researchers. We evidenced each theme with participant quotes to reflect the narrative structure of participants as well as to reveal high to low salience of beliefs. We maintained vernacular quality by keeping local phrases, terms, and sayings intact. Each team member specialized in a particular interest group to ensure that the nuances across geographic summaries could be effectively drawn out. We reviewed, commented, and

edited each others' work. And each wrote a two-page summary to highlight the most critical implications for management.

The reporting of the YRCI was carried out in public and communicated to the publics where they live. We engaged in member-checking throughout the in-field and post-field analysis by 30+ community presentations, a 90-minute call-in radio program on Yellowstone National Public Radio (aired 3 Jan 2007), and frequent conversations with technical advisory board members and opinion leaders (Figure 2). Throughout the analysis, we critiqued our claims by asking one another: When our participants read this report, will they say "Yes, this is my voice, what I experience, think, and believe."

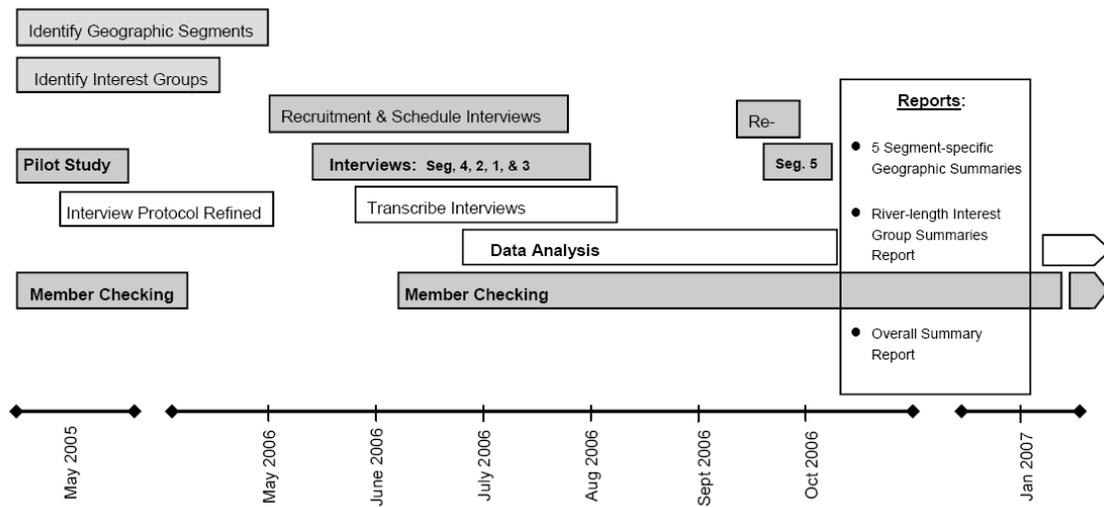
### ***Reporting***

All written documents are rhetorical as they seek to appeal to a model of truth which attempts to satisfy some need (Killingsworth 2005). As such, the final report shows the richness behind a multiplicity of resource use perspectives that exist within the words of those who live with the Yellowstone River. The technical report is divided into five geographic summaries and one river-length summary. It is organized from 'big-picture' to 'little-picture' details: from succinct single page bulleted summary tables to two-page interest group summaries focused on explicit management implications to multi-paged findings trailed by numerous quotes demonstrating a spectrum of voices substantiating each claim (Gilbertz et al. 2007). We sought to protect local knowledge by keeping it accessible. First, the reports are accessible in the content and language of the documents. They provide enough detail so readers may find them useful at whatever

level of commitment they decided to read them with. Secondly, the reports are accessible in their location. They are available online and in print in each county library along the river. The accessibility in location and writing style is critical for the report's utility, whoever and however individuals decide to use them.

### **Benefits of the Cultural Inventory**

The immediate benefits of the CI stem from the context-specific information provided (report content) and the effects of interviewing residents (the form of engaged inquiry). To meet emergent demands of decentralization, the CI (1) offers a route for citizens to voice their concerns and become engaged in a manner better suited to local cultures than traditional forms of public participation; (2) opens a space for conversation, engagement, and relation building in the scoping phase; and (3) provides managers with accessible scale-appropriate study-specific information in the vernacular needed to communicate planning efforts with publics (Table 3).



**Figure 2.** Yellowstone River Cultural Inventory methods.

### *Engaging Citizen Voice*

Compared to traditional forums for public participation (e.g., town hall meeting or the public hearing), the CI offers a forum where commenting is convenient, comfortable, and familiar. Unlike the public hearing where citizens must have the capacity and time to travel distances to a scheduled meeting, we traveled to participants' homes or other locations of their choice, and adjusted to their schedules. In the public meeting, publics must prepare a statement, go on record and give what amounts to a public speech. For an third generation irrigator whose livelihood depends upon this resource, no unidirectional speech limited to two minutes is likely to be civil, polite, or collaborative. Because of the scarce and limited nature of nonrenewable shared resources, statements are likely to be more competitive than collaborative (Daniels and

Walker 1996; 2001). As such, comments reflect strategy rather than communicating interests and desires (Gray 1989; Peterson and Franks 2005).

Informants for the CI discussed interests, values, knowledge, and opinions in a safe place at a convenient time free from imposed time limits. The interviews were private and the informant's identity was kept confidential. The tone of the conversation was familiar and dialogic rather than unidirectional and scripted. Unlike etic survey research, comments did not have to conform to researcher-supplied metrics such as Likert scaling or pre-designated responses. Participants freely asked questions about our goals and received immediate feedback.

Senecah (2004) has explained environmental conflict as a problem of voice, conceptualized as a three-part process of access, standing, and influence. Publics must be able to *access* relevant information and spaces of deliberation; communicate their ideas within those spaces (*standing*), and *influence* the decision making process. Conflict escalates when publics lack any of these aspects of voice. The CI provides *access* and *standing* for citizens to voice desires, interests, and concerns. It provides a foundation for *influence*, dependent upon management decisions.

**Table 3.** YRCI benefits table

YRCI Report's Benefits for Management	Effects of Research and Benefits for Communities
<p><b>Provides Knowledge of:</b></p> <ol style="list-style-type: none"> <li>1. Emic level: culturally-shaped skills, abilities, know-how, styles, practices of everyday life, norms, sensibilities, common senses, habits, stories, memories, phrases, terminologies, vocabularies, discourses, symbols, values related to river</li> <li>2. Historical uses that have shaped resource</li> <li>3. How people think about the resource dynamics</li> <li>4. How people talk about the river: The common discursive framing used to think through problems, express and argue for interests</li> <li>5. The spectrum of values, interests, and desires</li> <li>6. Opinions about river management, policies, and agencies</li> <li>7. Why certain values and attitudes are held</li> <li>8. How stakeholder categorizations overlap and where common overlaps/divergences occur</li> <li>9. Temperature of willingness to partner</li> <li>10. Local understandings of technical terms</li> <li>11. Geographic basis of knowledges</li> <li>12. Specific problems observed</li> <li>13. Local prioritizations of problems</li> <li>14. Ideas for solutions to problems identified</li> <li>15. Citizens to eliminate agency-held stereotypes of locals</li> <li>16. Common conflict areas; wedge issues, triggers, and historic agency failures articulated in common stories</li> <li>17. Perceptions of the river's future</li> </ol>	<ol style="list-style-type: none"> <li>1. Stirs river-related conversations</li> <li>2. Attention to river-related thinking</li> <li>3. Orients, prepares residents to anticipate changes to river management</li> <li>4. Gives time to react to potential use changes</li> <li>5. Iterative: Immediate feedback</li> <li>6. Creates a planning presence in communities</li> <li>7. Demonstrates agency's desire to listen to citizen voices</li> <li>8. Gathers voices in one document accessible to all</li> <li>9. Initiates a climate of planning: opens a space for engagement and offers a starting point for conversation</li> <li>10. Generates common questions</li> <li>11. Interviewers can address immediate questions of participants</li> </ol>
<p><b>Useful to:</b></p> <ol style="list-style-type: none"> <li>1. Test specific terms</li> <li>2. Identify geographically-specific informational needs</li> <li>3. Target and design informational tools</li> <li>4. Include in record of decision and other documents to evidence local support/desires</li> <li>5. Pre-test EA/EIS alternatives –planning scenarios</li> <li>6. Get public reactions to published planning materials and reports</li> <li>7. Design and disseminate surveys</li> <li>8. Identify significant social arrangements of a place</li> <li>9. Identify those with highest stakes and their concerns</li> <li>10. Identify common voiced concerns and opinions</li> <li>11. Educate new agents</li> <li>12. Search for specific topics</li> <li>13. Design public participation formats, venues,</li> <li>14. Create site-specific ways of gathering NEPA comments for EA, EIS, etc.</li> <li>15. Anticipate common conflict areas; wedge issues, triggers, historical agency failures</li> <li>16. Thread together multiple agency planning interests</li> </ol>	

### *Expanding Decision Space*

All field research has an impact on the study site. Our presence in river communities sparked thought and stirred conversations about river management desires. It was surprising how many riverfront residentialists said, “well, I guess I have never thought about the river that much.” The interview presses community members to think about its shared resources. Where citizens are often unpleasantly surprised by the planning process (Peterson and Franks 2005), the CI creates a space for planning by initiating local conversations about the resource. It encourages communities to consider planning efforts than simply react to proposed rule changes.

The act of engaged cultural research also demonstrates decision authorities’ desire to use time, budget, and energy to listen to local citizens. This symbolic gesture communicates that the management agency values residents’ input, and seeks sustainable development of the resource and associated human communities.

Local knowledge is valuable for documenting inherited and present land-use practices and changes in the landscape. Participants in the YRCI identified behavioral impacts, erosion problems, and offered suggestions that otherwise may have been overlooked. For example, one agriculturalist shared an erosion mitigation technique which had proven effective for him over 35 years of flooding. As in other cases, these historic practices may be promoted as strategies to reach current NRM objectives (Calvo-Iglesias et al. 2006). Local communities know local environmental problems well, but rarely are familiar with regional problems (Cantrill 1993). The CI allows citizens to provide local knowledge that may enhance managers’ ability to anticipate

problems based on similar or up/downstream social and biological trends. For example, downstream communities in the YRCI were seeing early signs of increased recreational development in the floodplain that upstream communities began addressing a decade ago. Lessons learned from one community can more readily be used for planning in another if they are clearly identified as emerging from local citizens.

Decentralized policy making transfers responsibilities to local actors fundamentally changing the relationships between policy makers, resource managers, and engaged publics. This heightens the importance of local communication within decision-making space and in so doing puts added pressure on interpersonal relations between citizens and managers (Innes 1999; Sandström 2009). For groups to work cooperatively, a common vocabulary of terms is needed (Burke 1959). The YRCI report reflects the logics, terminologies, and frames that will be involved in vocabularies and terms used to manage the problem. Communities create and employ a distinct vernacular for discussing ecological dynamics. These frames and terms are cultural artifacts of past and present NRM, as well as local tradition. Cataloging this local vernacular is one way to begin to understand what citizens understand and what shared vocabularies might be used, either in place of or in conjunction with technical jargon. When conducting a CI, the interview protocol can be designed to test understanding and saliency of relevant planning terms. For the YRCI, for example, we asked participants what they understood “corridor” and “riparian corridor” to mean. Their responses indicated that these terms lacked salience, suggesting that managers should replace them with others that resonated with local residents.

When local citizens use the CI report, the decision space expands. A grassroots organization used the YRCI in the Draft Environmental Assessment of the Special Area Management Plan (SAMP) and referenced it in a form letter (Tillinger 2009). This use of the report by local citizens affirms its legitimacy for local residents. It also affirms both the rights and responsibilities local citizens gain when the decision space for NRM is expanded and enriched.

### ***Providing a Management Tool-kit***

Localized cultural knowledge developed through conducting a CI can be used to improve management by making agency practices and functions more adaptable to on-the-ground realities, audiences, and constraints. A CI benefits managers by sharpening existing tools, refining management practices, and highlighting options.

### ***Sharpening Existing Tools***

Tactful inclusion of place-specific and vernacular terms into planning documents (e.g., the record of decision) and research practices (e.g., surveys) improves the readability of documents to the publics they serve by offering a commonsensical way of conceptualizing local problems and solutions. A CI offers a variety of locally generated quotations that can be included in documents. For example, the grassroots organization cited above included quotations from the YRCI report in the Draft EA for the Upper Yellowstone River SAMP (Tillinger 2009). Sometimes a colloquialism can penetrate the heart of the matter better than the disciplined expert's remarks. Like learning the local tongue, this knowledge helps agents speak and listen more effectively.

For further social research, emic cultural knowledge is useful for designing more adroit survey tools for larger samples and specific topics (Skogen and Thrane 2008).

Using the familiar vernacular may improve response rates. Conducting a CI can enable researchers to design interview protocols with improved effectiveness, reach and accessibility.

### ***Refining Management Practices***

Just as agencies share research results and data, emic cultural data from a CI also may be used for meeting multiple agency needs. Various NRM, political, and civic agencies could use CI reports to educate decision makers about stakeholders' needs and preferences. For example, after acquiring a large parcel of riverfront property, the state of Montana used the YRCI's relevant geographic segment sub-report to scope for local recreation needs and desires. A state fisheries biologist has integrated portions of the YRCI cultural information within his research reporting. The depth, breath, and unique specificity of emic cultural data enable uses consistent with the specific cultural setting. Inter-agency planning during the interview protocol design phase can thread together several agencies' planning objectives and informational needs. Agencies or departments in coordination could share the cost of CI field research.

Cultural knowledge collected through a CI can assist in structuring key stakeholder committees or citizen-expert advisory boards. Reports could be used to identify important social arrangements for partnerships or to fulfill public participation needs. They also provide agency personnel with a cultural guide for a specific region. Not unlike travel guides, CI reports offer a single source to learn local histories, customs,

taboos, and past conflicts spoken in the native language. Such a sourcebook can especially benefit NRM agencies with high rates of employee mobility.

### ***Providing Options***

For the requirements of federal policy, the CI research provides an alternative means of gathering NEPA-related comments. Data collected for a CI have cultural salience beyond the immediate study. Although the YRCI report summarized and reported on the study-specific topics of interest in 2006, it also identified local vocabularies, social connections and historical relationships that retain significance beyond the express purpose of the inventory. A variety of other NRM and planning issues can be answered by periodically returning to and analyzing the report, as well as the additional 2200 pages of interview transcripts. Using qualitative analytic software—such as QSR NVivo 8.0™—CI data can be organized into a database that is available when new NRM needs arise. For example, several conversations were relevant to a 2009 U.S. Fish and Wildlife Service proposed rule to list of the shovelnose sturgeon as a threatened species to protect the endangered pallid sturgeon (50 CFR part 17). Because it can be utilized in multiple decisions, analyses, reports, and time periods, lifespan of emic cultural data is perhaps its most worthwhile asset.

### ***Considering the Challenges of the CI***

Naturalistic inquiry, field research, and qualitative analysis like the YRCI is not without challenges. First, may be more expensive than traditional socio-economic studies. The financial costs include expenses for field visitations, coordination, field

equipment, and transcription. It requires considerable commitment of time for staffing, data management, analysis, and being available for sharing the research results with interested publics. The analysis requires sophisticated textual analysis skills to balance the breadth (generalizing) and depth (particularizing) of content to ensure report utility across different interest levels and over an extended length of time.

## **Conclusion**

The challenges of NRM are largely social. Each locality has a uniquely embedded way of seeing its shared natural resources, defining problems, and addressing those problems via unique symbolic and material practices kept alive by cultural forces. Most cultural practices express and record what it means to live with a particular socially-cultivated landscape and engage in everyday problem solving. These practices, both the obvious and subtle, contain the logics behind strategies for behaviors that shape social and ecological functioning.

Environmental managers must insert NRM into the mutually-shaped socio-cultural and ecological dynamics on the ground. This is the objective behind decentralizing planning. Collaborative community-based NRM decision making, policies, and practices have been designed to enable technical scientific understandings to resonate across and within a local culture's vernacular, in the hope that policy solution will be accepted by local residents.

A more nuanced and emic conceptualization of culture offers one way to deeply engage local residents in community-based planning and more effectively manage natural resources within decentralized settings. Site-specific cultural knowledge and

acumen makes integrating formal science and cultural knowledge to better understand and manage resource complexity more feasible. Conducting a CI grounded in an emic understanding of culture enables NRM planning that respects the meanings and attachments local stakeholders have for their landscape. Tactless NRM policies consistently yield conflict, high transaction costs, and lawsuits. Certainly, there will continue to be a struggle between different interests to define the problem, rules, and the preferred routes to the solution. Conducting a CI does not depoliticize the situation. Nor does it colonize cultural knowledge into existing social frames and terms, stripping it from the context of its complexity.

The CI seeks to foster decision making and policy practices that fit cultures in place. It is social research carried out in public and communicated to publics so as to generate an understanding of local culture that is sanctioned by those persons whose behaviors are the target of policy. This type of knowledge can leverage past strategies, logics of local common sense, and practices that can be promoted to reach today's objectives and allow adaptation to tomorrow's goals. Conducting a CI engages publics in planning conversations while accumulating the kind of tacit knowledge managers need for relation-building to co-construct policies and practices that best fit the particular resource and culture. Ultimately, the power of emic cultural knowledge is that it enables both NRM managers and local residents to use these symbolic resources to build data bases of relevant information and improve long-term working relationships. As one informant put it:

*There is a bar in a small town north of here that has a sign that says “Welcome to Montana. We don’t give a shit how you did it back home. Have a nice day.”...No one likes somebody coming from someplace else and telling us how to do things, even if you have a similar background, you need to know the culture (SL Riverfront Resident 1D).*

## **CHAPTER III**

### **INTEGRATING DIVERGENT REPRESENTATIONS OF PLACE INTO DECISION CONTEXTS**

#### **Introduction**

Environmental conflict often arises because divergent representations of a shared resource clash. Representations of place—as containers for groups’ identities and interests—become sites of struggle for control over the interpretive frames that direct land use and planning. A shared vocabulary helps groups of people work together (Burke 1959; Peterson 1997), and agreement on a shared set of terms for representing a place endows decisions about how to manage that place with legitimacy. Because managers cannot fully control the social dynamics of how groups represent place, they need to understand how place representation connects meaning and language to culture via practices of everyday life and the practical consequences of those practices. An awareness of this easily overlooked social compact is useful for framing decisions that emerge seamlessly from representations of place offered by local stakeholders. Place meanings can be used as rich (thick) demographic data, and observed in their politically-engaged form as representations which contribute to the struggles over legitimacy in decision making. Because natural resource management (NRM) includes both symbolic and material resources, managers need to understand both. This chapter focuses on symbolic dimensions of NRM, as they emerge through people’s taken-for-granted

communication. We offer the cultural inventory as a tool to enable managers to understand how people connect symbolic and material resources as part of their representation of place. In response to NRM needs for the Yellowstone River, we designed and conducted a cultural inventory to discover and document dominant representations of that place. The cultural inventory began as any inventory, with identification of available resources (in this case human resources), and then moved to production of a data base describing how these resources function. The primary function we sought to understand was place representation. After identifying major groups of resource users, we conducted informant-directed interviews with landowners, recreationalists, civic leaders, and agriculturalists that live along the river. We then analyzed the interview transcripts attending to how these residents individually and collectively represented their place. Our analysis suggests how attention to localized cultural discourses provides NRM advisors, planners and other decision makers with a conceptual framework that may help them integrate divergent place representations into decision contexts, leading to more effective management in and of place.

In this chapter, we contextualize the cultural inventory by beginning with a broad discussion of how processes of place representation contribute to place meaning. We then examine the functions and forms of place representation, threading together scholarship emphasizing relationships between place and discourse. Using Edward Casey's (2002) framing of the practices of place representation, we examine resource users' *flattened* and *deepened* representations of the Yellowstone River, including how discourse has integrated the river with local and cultural meanings, political strategies

implicit in the discourse, and unexpected consequences. After describing the results of the cultural inventory, we end with suggestions for how decision makers can encourage place representation frames that enable diverse resource users to creatively negotiate their identities and interests in the resource.

### **Place Meanings and Place Representation**

That people connect to place in significant and lasting ways is established. Whether this connection is based on a utilitarian experience of place such as physical sustenance, security, and dependency or an experience of place through a sublime encounter with nature, people physically depend upon and affectively attach to place. Natural resource scholars and managers have examined the expression of place meaning and its significance. These discussions of *place meaning* fit within research on the human dimensions of NRM, and focus attention on how people come to value and understand natural landscapes. The analysis of place meaning aims at discerning landscape valuation in terms beyond but not mutually exclusive from economics (Williams et al. 1992). As such, NRM scholarship operationalizes theories of place from cultural geography (e.g., Tuan 1974, 1977; Cosgrove 1998), phenomenology (e.g., Relph 1976; Casey 1993, 1998, 2002), and social and environmental psychology (e.g., Fried 1963; Proshansky et al. 1983; Altman and Low 1992) into metrics of place meaning expressed in terms of attachment, sense of place, place identification, and others (Patterson and Williams 2005). Broadly speaking, research that attempts to account for the importance of place to people tends to focus on felt experience of place and/or the communication of a *sense of place* into place meaning. These models of place

attachment are primarily rooted in social and psychological theories of attitudes, values, and behaviors and include constructs such as place bonding (Jorgenson and Stedman 2001), place dependence (Stokols and Shumaker 1981), and combinations of attributes such as place familiarity, belongingness, identity, dependence, and rootedness (Hammit et al. 2006). The social psychological basis (e.g., Ajzen and Fishbein 1980) undergirding these studies connects how people perceive and value place as meaningful to human behavior—a notion that resonates throughout the annals of place literature (cf. Tuan 1977; Soja 1989; others). Linking behavior and value relations with place meanings has proven useful for informing recreational opportunity planning (Kaltenborn and Williams 2002), understanding resource conflicts (Cantrill and Senecah 2001; Cheng et al. 2005), and incorporating stakeholder sensibilities into decisions related to changing land uses (Davenport and Anderson 2005; McCool et al. 2008). Leveraging resource users' affective valuation of place meaning as it indicates use-value and behavior can inform decision making processes, practices, and outcomes.

Although the psychometrics of place meaning are useful from a socio-demographic perspective, cataloging and using persons' expressed place meanings is problematic first from a communication theory perspective and second when we consider how these meanings enter the political realm of NRM. The context theory of meaning (Richards 1936) suggests that communicated meaning is multiple, flexible, historically bound, based on normative and habitual conventions, and inherently interconnected and interdependent with its context. This constrains the transferability of place meanings between scientific and public realms because scientific discourses

require generalized (context-transcendent) subject-free frameworks (Flyvbjerg 2001) which are difficult to reconcile with individuated context and subject-dependent affective accounts of place. No matter how accurate the symbolic system of description may appear, there is no one-to-one abstract referencing that can account for people's place meanings with consistent precision because meaning is context-dependent and unique in each voice, group, culture, moment, and situation (Wittgenstein 1958). For each person, the picture of the universe shifts as place description moves from tongue to tongue (Carroll 1956). There is no single authentic way of generalizing place meanings (Abram 1996). As such, scholars must question the utility of searching for an orderly semiology of place meanings that would render multivocal and hypercomplex place meanings commensurate (Lefebvre 1991; Casey 2002). This problem of incommensurability of place meanings first with one another and then with scientific discourses is a matter of epistemology (Williams this volume) that needs to be explored if managers are to use the concept of place as part of an effective decision calculus.

This chapter focuses on the political challenges of using place meaning to inform decision making, exploring what happens when place representation enters the political realm. In addition to its immediately practical value, however, understanding how place representation functions in the political realm can improve our ability to negotiate the conceptual problems of irreconcilable place meanings.

When we consider the interests, mandates, and stakes involved in the political realm of NRM, communicated place meanings assume a strategic form and function. In decision making, place meanings are used as tools for action that vie for control over the

truths told about a place, in order to influence management to make changes or preserve a vested status quo. Place meanings become communicated with purpose in representations of place which take a different form than individuated expression of felt value. Groups construct and advance representations of place that do work for their advocates by framing and naming the contexts of decision making, what is important/unimportant, and what should be included/excluded as valid information. The representation of place performs a constitutive function in the politics of managing shared natural resources. Places as spaces that humans have bound, ordered, and defined by communication (Sack 2001) are linguistically represented in legal, scientific, managerial, and public discourses. Thus in decision making settings the study of place is not only concerned with accounting for stakeholder's place sensibilities so that managers may navigate and anticipate buy-in or resistance to decisions. Attention to place also involves examining the social and cultural practices of socially-agreed upon representations of place within local political and managerial discourses. How publics and decision makers represent place—how it is named, labeled, mapped, and illustrated—in decision spaces has both instrumental and constitutive functions. Representing place organizes a perspective of reality that legitimizes certain cognitive schemes, and excludes others. It produces what we know about a particular landscape, what actions are proper and improper within its boundaries, and how we come to value it. How we represent place not only delineates (points to) a place by highlighting its borders but also makes a statement about its character, utility, past, future, and how it should be managed.

## **The Production of Place Discourse**

How we speak and write about place and the words we assign to it constitutes much of how we think and act in place (Lefebvre 1991; Tuan 1991; Cosgrove 1998; Stokowski 2002). A number of scholars have examined the connections between communication and place from language and place making (cf. Meinig 1979; Lefebvre 1991; Tuan 1991; Greider and Garkovich 1994; Herndl and Brown 1996; Spirn 1998) to discourse and management (cf. Berdoulay 1989; Myerson and Rydin 1994; Dryzek 1997; Stokowski 2002; Norton 2005; Wolf and Klein 2007) with each providing helpful frames for understanding how communication shapes our interactions with place. These scholars argue that representations of place in public discourse make sense of complexity, unite disparate persons, anchor collective memory, and give authority to subscribers.

Representation of any sort connects meaning and language to culture via practices of everyday life. Stuart Hall describes representation as the production of meaning through language, or “the link between concepts and language which enables us to refer to either the ‘real’ world of objects, people or events, or indeed to imaginary worlds of fictional objects, people and events” (Hall 1997, 17). Such representations are kept alive through communicative practices like storytelling because they function as a source of explanation, comprehension, thought, meaning, and beyond (Entrikin 1991; Stegner 1992; Smith 1999; Carbaugh and Rudnik 2006). Stories representing place include mostly cogent logics, a structural and temporal order and implied values.

Because people's discourse simultaneously structures and expresses their understanding of the experienced world (Burke 1969; Peterson 1997; Lakoff and Johnson 2003), identifying certain places through the naming and labeling of space simultaneously constructs and communicates what behaviors are allowed and which practices are *proper* and *improper* in that space (de Certeau 1984). Like the setting of any story, the way place is described partially determines what actions are likely to occur there (Burke 1969; Cronon 1992). Henri Lefebvre (1991) likens representations of space to street signs that are intended to guide, direct, command, and orchestrate behavior. They "serve to distinguish, but not isolate, particular spaces, and in general to describe a social space. They correspond to a specific use of that space and hence to a spatial practice that they express and constitute" (Lefebvre 1991, 16). By naming and framing normative practices appropriate for particular sites, place representation reinforces some management options while excluding others.

Managed natural resource spaces are places because they bind the site conceptually in order to think and speak about place as well as use it (Lefebvre 1991). The representation of place, then, is a cultural practice whereby people use various modes of communication to construct and adjust legitimate uses of space (Rose 1994).

Because people depend on communication to enable cooperation in the face of division, they seek a common language to conceptualize, discuss, and manage the natural systems required to sustain life (Burke 1959; Peterson 1997). Terms used for managed sites divide up the world into accepted names and conceptual representations of space necessary for identifying and referencing particular spaces (Rydin and Myerson

1989; Whatmore and Boucher 1993). The primary effect of any discursive representations is that they define and produce the objects of our knowledge (Foucault 1972). Any community (e.g., governing agency, industry, stakeholder group, etc.) has a vocabulary of terms that frame and position relations of everyday human life to the natural world and guide decision making. As such, “language reveals much about a profession, about its preoccupations, about the social, political, economic, and scientific forces that bear down upon it, and also about its readiness to confront those forces effectively” (Guttenberg 1993, 1). The discourse of NRM has relied upon technical knowledge to understand and manage the natural environment within institutional, legal, and bureaucratic capacities and frameworks. This discursive frame has bounded the ways NRM professionals conceptualize place representation in ways that may have placed unwarranted limitations on their decision possibilities.

### ***Place Representation by Flattening vs. Deepening***

Two terms especially useful for our discussion of place representation come from Edward Casey’s (2002) analysis of place representation in landscape paintings and maps. Casey (2002) argues that representations of place slice up space into pictures that flatten and/or deepen the worldplace. Representations that flatten the world make sense of complexity by flattening landscape’s idiosyncrasies into gridlines, contours, and other classifications with the aim of accurate orientation, definition, and utilization of place. Flattened space is the bounded site where place is displayed as generalizable, accessible, calculable, and isometric. This flattened space is the realm of abstract space or space as object according to the isotropic categorizations of Newton and Descartes (Lefebvre

1991). Space in this form is represented in Euclidian geometry and is often conceptualized without the potentially confounding presence of human subjects, which could threaten the objective representation of reality. An alternative way of representing place is by deepening it to explore the subjective experience of place, often through artistic or poetic accounts. Where flattened representation of place removes the subject from place to ensure accurate replication of reality, deepened representation of place is more interested in active participation of the experiencing subject in place than in creating a replicable account. Deepening space involves felt meaning of the subject living *in place*, as opposed to flattened accounts that situate the subject *above place*.

Both deep and flat representations of place are social practices. As such, they unite disparate persons, anchor collective memory, and give authority to subscribers. Since discourse simultaneously structures and expresses a perception of the experienced world, the naming and labeling of space constructs and communicates which practices are appropriate or inappropriate for each place. Conflict arises when groups must reconcile a site's, sometimes highly divergent, deepened and flattened representations. Thus, how place is represented in various decision contexts is critical to the potential failure and success of managerial efforts.

### **The Yellowstone River Cultural Inventory**

The U.S. Army Corps of Engineers (Corps) regulates riparian corridor activities under the authority of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act (CWA). Since assuming CWA permitting duties in the mid 1970's, the Corps has processed a total of 156 permit actions for the upper Yellowstone River (Park

County, MT). Over two-thirds of the permit actions occurred during or after two consecutive “100 year” floods occurred in 1996 and 1997 (Auble et al. 2004). The high volume of permit requests for bank stabilization projects to control flooding and prevent erosion prompted a grassroots call for a cumulative impact study of the potential environmental and ecological consequences of this channel modification. A moratorium on bank stabilization permitting was enacted until the cumulative effects were examined and permitting processes could be reevaluated.

The cumulative effects study focused on physical features, biological inventories and historical floodplain mapping of the Yellowstone River. When the Corps decided to include social and cultural dimensions as part of the cumulative effects study, we suggested a cultural inventory that would be analogous to the biological inventories.

### ***Historical Context***

In 1806, on a canoe made from a cottonwood tree Captain William Clark traveled down the Yellowstone River to meet Meriwether Lewis at its confluence with the Missouri for the return trip to Washington D.C. (DeVoto 1953). The objective of their journey was to map and describe the newly purchased lands of the Louisiana Purchase for purposes of delineating the riverine highways of the coveted Northwest Trade Passage between the east and west coasts of North America. Lewis and Clark characterized the landscape with maps from survey measurements and described the natural resources via journal accounts of their subjective experiences. For President Jefferson and the U.S. Government, Lewis and Clark presented the landscape in both maps which used math and geometry to *flatten* the topographic landscape to paper and

journal descriptions to *deepen* the landscape by chronicling the plants and wildlife, the aboriginal peoples and practices, the weather and the topography they experienced. Their report was the first Euro-American documentation of the Yellowstone River.

The Yellowstone River remains much as it was when Clark traveled its length; the longest undammed river in the United States. This characteristic affords scenic and recreational amenities which attracts visitors and residents. At the same time, much about this place has changed. The river's characteristic seasonal flooding, for example, is problematic for riverfront homes and farmland. In a single flood event, hundreds of acres of bordering land may be lost or gained by the movement of the river's channel. We conducted a cultural inventory exactly 200 years after Lewis and Clark's now famous expedition. We spoke with 313 riverfront landowners and users (Table 1) along its entire length, from the point where it leaves federal jurisdiction in Yellowstone National Park to its confluence with the Missouri River (Gilbertz et al. 2007). To ensure appropriate distribution of stakeholder interests and account for geographic differences we divided the river into five geographic reaches. Those whom we spoke with depicted the river, its different phases, spots, forces, and character throughout the seasons. As a complement to the interviews, we gathered related documents, engaged in participant-observation, and performed thematic analysis of all texts (Peterson et al. 1994). We analyzed and organized these comments into a report of the cross-sectional themes that ensured the inclusion of each unique perspective using 1700 quotes from participants to illustrate and provide evidence for our findings (Gilbertz et al. 2007).

### ***Inventory of Place Representations***

Words and phrases struggle to simultaneously reflect truths about place and truths to the felt place experience. Those who live with the Yellowstone River project a hyper-complex assortment of representations of both deep and flat elements onto the river. Meaningful aspects of people's lives contribute directly to the spectrum of representations they give the river: occupations, hobbies, relations with the land, loves and fears, education, expertise, daily practices, river uses, family legacy, daily activities, senses of history, pasts and childhood, geographic reach along the river, proximity to its waters, relations to area laws, economies, and politics, etc.

Among the local vernacular that heaps meaning, value, and purpose onto this resource, we found three dominant representations. Most people represented the river as: the lifeblood of the valley, a great playground, and/or a national treasure. We briefly summarize these dominant constructions, and then provide more detailed description of one case to illustrate how place representations enter the political sphere and may incur unexpected consequences upon the natural resource.

#### ***“The Lifeblood of the Valley”***

*“It's the lifeblood of the Yellowstone Valley, that's all there is to it.”* –Agriculturalist  
Perhaps the most dominant image of the Yellowstone River among agriculturalists, recreationalists, civic leaders, and other long-time residents is that of the river as *“the lifeblood of the valley,”* or an essential element in the creation and maintenance of valley life. One civic leader explained, *“the Yellowstone River is the lifeblood as far as Ag and recreation goes. It is what draws people here. It is the main artery.”* Representing the

river as “lifeblood” flattens and objectifies it into economic and legal structures that include food crops and other commodities, businesses, and services. A civic leader noted that the “vast majority of the economy is within the boundaries of that river.” The river supplies irrigation water for crops, livestock, and drinking water for humans. As a driving force for development of towns, goods, and services, the river offers communities a “*lifeline*” by making water available in the semi-arid landscape: The river as *lifeblood* evokes flat descriptions of biophysical forces. Residents understand that the valley’s “productive agricultural lands” relate to the river’s dynamic forces of historic seasonal flooding. The “*June rise*” ensures the fertility of the fields and the regeneration of the bottomland cottonwood forests. The river also provides habitat and nutrients for fish and wildlife while maintaining humidity throughout the seasons in this arid landscape. As a civic leader summed it up: “Of all the natural things that occur, [the river] is the most important thing. It provides water for drinking, flood irrigation, and recreation. It is the lifeblood of our community.”

Descriptions of the Yellowstone as the lifeblood of the valley also include deep subjective representations. One agriculturalist, for example, analogized to his own body when telling us that the river “is like having an artery in your body. It is a vital part of this valley. It is the lifeblood of the valley.” Nonlinguistic images and practices also play an important role in deep representations of the place. Everyday operations raising sugar beets, spring wheat, winter wheat, alfalfa, and others irrigated crops are passed down from grandparents and parents to children. The rhythms of flood irrigation practices are represented as part of the lifeblood. Resource users talked of opening and

closing the ditch gates, monitoring the furrows to ensure optimum flow, and pulling their irrigation boots off and on. They pointed out everyday sights such as ditch hoes and other machinery in the fields, all operating on specific increments of time. These felt practices, sights, norms, knowledges, phrases, and vocabularies are ingrained in the foundation of community and cultural values, and they represent the river as a provider. From this perspective, resource users expressed an ethic of protecting the river as a means of support, which included preserving access rights to the water, whether for irrigation or for recreation.

***“A Great Playground”***

*“There is a lot of river there. It is a huge asset to this state. There are so many opportunities. It is a great playground.”* –Residentialist

A second dominant representation of the Yellowstone resonates with, at the same time it contrasts against, the lifeblood metaphor. This is the representation of the river as “*playground*,” or a place to play and relax. Informants represented the river as a place that provides users with a refuge from the stresses of everyday life. The playground representation builds on the terministic value of sharing a name with Yellowstone National Park. A civic leader explained that, “people have a picture of what Yellowstone Park is even if they have never been there. I describe it [Yellowstone River] as an extension of Yellowstone [National Park]. You attach things like the fishing culture, the hiking, the outdoor mountain recreation.” This representation of the Yellowstone River as playground is reinforced by association with the Park’s iconic images, such as the Lower Falls, the Grand Canyon of the Yellowstone, and Yellowstone Lake. Because

Yellowstone National Park is known as a wild place where nature has been left relatively intact, so to do recreationists hope to successfully justify increased protection for the river.

Playground images typically begin with a deep account of recreational bliss: An experience of solitude, wildlife, peace, rest, natural beauty, or somehow encountering the wild. As one recreationalist enthused, “the Yellowstone is my cathedral. That’s my church; that’s my spirituality.... It’s where I charge my batteries. It’s my connection to the natural world.” Many see river recreation as a way to regain their sense of well-being whether it is through fly-fishing the cold waters or bait fishing the warm waters; hunting deer, waterfowl, pheasants, wild asparagus, mushrooms, or agates; hiking, bird-watching, boat floating, inner tubing, or swimming; or just sitting and watching the water. Although recreationists frequently used the playground metaphor, so did informants representing other user groups. One local resident explained:

*I’ve always gravitated towards it because it’s always relaxed me....My church is the river....The fog comes up off the water....The sun pops up and your line is singing out there and you look down and see the little crystals on it, then I look down and see a herd of elk crossing a couple hundred yards from me. It gives you....It’s what drug addicts are, the reason they’re drug addicts....It gives you that feeling...with no side effects,...other than you’re hooked....I’m not leaving here....This is a place to keep forever.*

The deep representation of felt experience when fly-fishing, hunting, boating, etc., is thoroughly intertwined with flattening representation, as the place becomes an

object of business and a legal matter of recreational permitting and licensing, bag limits, designations of special waterfowl habitat refuges, conflicts between users, and Montana's stream access law. Flattened representations depict the river as a producer of revenue for outfitters, guides, private landowners, and affiliated equipment rentals, fishing shops, hotels and restaurants. These representations allow calculable financial valuations of the river's recreational assets and related economic impacts at specific points along its length. The salience of the playground metaphor drives riverfront development and the local real estate industry. The gridlines and contours that define this place through relatively flattening representational practices guide motor boat restrictions, the development of public river access points, state investments in the management of fisheries, and further flattening representation (map making) for boating and angling.

The economic motif of the playground metaphor is most visible among residents and other resource users of the western cold-water stretches of the river where tourists travel through Paradise Valley, which lies near the northern entrance of Yellowstone National Park. Post cards, calendars, brochures, and varied tourist kitsch depicting the Yellowstone as a sublimely wild river are sold throughout that stretch of the river. Because resource users explicitly affiliate the river with Yellowstone National Park, texts centered on the Park as a tourist destination are available to reinforce the playground place representation for the Yellowstone.

Those who represent the river as a playground often share a dedication to the uniqueness of the river and are advocates of keeping the river free-flowing. Their stated

desire often included maintaining and improving the ecological health of the river. While those who represent the Yellowstone River as lifeblood may view erosion as a threat to be mitigated or a danger to protect against, those who represent the river as a playground respect natural processes such as erosion, and argue they should generally be allowed to proceed without external controls. They want to see that others respect the river's resources, residents who live along the river, and other users. They worry that the river is getting crowded and that access across private lands is becoming more difficult to attain.

The deep representation of the river as a place of play was reinforced by Norman Maclean's book (1976) and movie (1992) *A River Runs Through It*. Although the story was about the Big Blackfoot River, the movie was filmed in Paradise Valley on the Yellowstone River. The cinematographer won an Oscar for the orchestration of the images of this mountain valley and braided river. One result of what some locals disdainfully call "*The Movie*," was that fly fishers flocked to the Yellowstone River in hordes. Leighton (1998) describes this phenomenon as a "battalion of outfitters, guides, and other full- and part-time trout bums" who are eager to exploit the region's resources in the "final Gold Rush," (p. 46). Partly in response to public enthusiasm generated via the movie, the playground representation has influenced home site preferences and the hierarchy of property values.

### ***"A National Treasure"***

*"I would like to keep the Yellowstone a free-flowing river. It is a national treasure."*

–Recreationalist

The Yellowstone River is the longest undammed river in the United States. The exclusivity associated with this material fact contributes to its representation as a national treasure, and to the frequent inclusion of the word “wild” in descriptions of the river. Informants articulated this special characteristic of the river as a rarity that enhances the quality of experience for users and quality of life for residents. The *National Geographic Magazine* labeled the Yellowstone River as “*the last best river*” (Chapple 1997) borrowing from a Montana state tourism campaign that promoted the state as the “last best place.” Local residents from across the political spectrum are especially protective of “their” river, dating at least to the proposed Allen Spur Dam in 1958, which locals viewed as threatening to both natural amenities and private property rights. Many of our informants used the idea of the river as a unique national treasure to explain why most attempts to control the river were inappropriate. As one recreationist said, “you don’t want to dam this river. This is one of the—THE—last wild river in Montana, and it may be the last wild river in the nation. There is no dam on the Yellowstone, and we really don’t want a dam on the Yellowstone.”

As with any national treasure, The Yellowstone River is often represented as needing protection. One resident articulated his obligation this way,

*I guess living next to the Yellowstone; you get such a loyalty to it. It is something that has to be protected and you can’t give it away...It just got into a real almost a spiritual thing – when you live next door to it, it becomes something bigger than property rights and that sort of thing.*

His felt experience with the river led to a deepened representation for this place. Many informants similarly expressed their sense of “responsibility,” or “duty,” to safeguard the river. By representing the river as a national treasure, our informants elevated the importance of protecting it as a rare remnant of the truly wild in nature. Residents often spoke about how “lucky” and “privileged” they felt to live along the river. “You know, every other river in the country is dammed, and it is nice to have something that’s wild in your backyard” (Recreationalist).

Of course, these deepening representations of place interact across stakeholder categories, uniting streamside residents, agriculturalists, and recreationalists in appreciation for this place. People’s descriptions interconnect metaphors of lifeblood, playground and national treasure to represent the place. Their comments often demonstrate an awareness of the place as a system that includes people such as themselves, as well as those who are different. As one recreationalist explained,

*I’m so one with the river, and it’s moods that it becomes my spirituality, ...it has different character around every bend – it acts differently in the spring than it does in late summer, it’s different in the winter, it’s an incredibly complex ecosystem, that if one person in their lifetime can figure out a little bit of it, is quite an accomplishment – and that’s what transcends the actual fishing.*

The national treasure metaphor also allows people to represent the Yellowstone River in flattened form. In this case, the financial treasure becomes the central focus, and discussion swirls around cost-benefit assessments of water storage, flood protection, and electrical power generation potential. The river’s (relatively) free-flowing status also

makes it always vulnerable to flattened images that de-value many of the felt experiences described above. Subjective description of the river's "spirituality" for example, are of little use if the river's value is predicated solely on the dollar value of its use for irrigation or the dollar cost for prevention of flooding. Whether described as the lifeblood of the valley, an incredible playground, or a national treasure, the Yellowstone River emerged as a place with distinctive deepened and flattened characteristics, and these characteristics may offer clues for NRM.

### ***Conflicting Place Representations in the Public Realm***

Different representative images of the same place can clash. The battleground is in public conversation where each seeks to reframe the place to create 'proper' ways of thinking about access rights, quality and quantity of the resource, management authority, and what is considered legitimate use of the resource. Competing representations of place "are the meeting points of tremendous pressures coming from rival word-users, each of whom would like to appropriate the word for his [sic] own purposes" (Guttenberg 1993, 6). Competing perspectives of a shared site and the coordination of competing interests is often dubbed the *politics of place* (cf. Cooke 1984; Jackson 1987; Kemmis 1990; Norton and Hannon 1997; Honadle 1999; Yung et al. 2003; Cheng et al. 2005; Norton 2005). The politics of place is then, in large part, the clash of vested and vetted socially-constructed representations of place.

Past management initiatives for the Yellowstone River illustrate this clash, and resonate in contemporary accounts of river users. In 1958, a state delegation prompted by U.S. Senator James E. Murray (Montana) and the U.S. Bureau of Reclamation

(Bureau) first offered a strategy for using the Yellowstone River to provide water and energy security by proposing the construction of a water-retention dam at a narrow point in Paradise Valley (Nolt 2007). From the agencies' flattened representation of the place, the valley was ideally shaped for a dam (Wheelwright 1978). The 380-foot tall Allen Spur Dam was to house a 250 MW power plant and a 30-mile reservoir covering 20,000 acres (Nolt 2007). A grassroots campaign soon developed around residents' recreational and agricultural practices that provided an alternative deep representation of the river as a site of meaningful experiences important to Montanans. By 1963, Park County Commissioners, the Park County Rod and Gun Club, and the Farm Bureau joined together in opposing the dam, citing concerns over the loss of farmland and fish and wildlife habitat (Nolt 2007). In the face of organized local opposition, interest in the proposed dam subsided until the energy crisis of the 1970s and the need for water resources for the Fort Union coalfields.

Recreationalists opposed the dam because it would have flooded the Yellowstone's best trout fishery, the source of several nutrient rich spring creeks where trout spawn including the endangered Yellowstone cutthroat trout (*Oncorhynchus clarki*). As one participant told us, after they learned of the proposal they resisted the proposed dam by publicly representing the Yellowstone River as a blue-ribbon fly-fishing destination and an ideal location for riverfront vacation homes. Their expressed intention was to interrupt the proposed dam by attracting wealthy fly-fishing enthusiasts to move to the river valley. Filling the valley with expensive vacation homes would discourage the Bureau from siting the dam on the Yellowstone by skewing the cost-

benefit-analysis calculations when the federal government considered the costs of necessary regulatory takings. The fly fishing community of Paradise Valley, multiple Greater Yellowstone advocacy organizations, other recreational users and agriculturalists harnessed the symbolic prowess of “Yellowstone” to forward a campaign to save the river and its natural amenities. In addition to grassroots organizing, dam opponents used the media to cover the controversy and brought visitors to Paradise Valley, the bed of the proposed reservoir. A 1978 *Life* article titled “Great River in Crisis” told the story of the proposed dam as a demand for a “30-mile long storage tank” and described the threats to this undammed wonderland alongside full-page aerial color photos of the river’s mountain scenery and quotes from a “ruddy-faced Montana cowboy with tears in his eyes” (Wheelwright 1978). The campaign worked. During initial stages of the Bureau’s planning, regional and national outcry combined with a proliferation of riverfront second homes and the values of recreation oriented home owners to prevent construction of the Allen Spur Dam. Twenty-five years later the high numbers of vacation homes in the valley continue to suppress re-visitations of the Allen Spur Dam conversation yet the fly fishing experience has changed. Some participants describe fishing that stretch of the Yellowstone River as “floating through a subdivision.” Others no longer fish that stretch of the river because of the loss of the wild attributes. Furthermore, annual flooding and the close proximity of new residents’ homes have led to the installation of large boulders (rip-rap) which affect the flow characteristics of the riparian corridor. This rapid rise of development and use leads to the common phrase we heard of “loving the river to death.” One of the original framers of the strategy to prevent construction of the Allen

spur Dam told us that although he was happy to have saved the river, the success of the campaign has now backfired. As he and other participants in the original advocacy campaign explained, their representation of place had worked too well and the continued proliferation of homes along the river is damaging the ecological amenities that preservationist advocates sought to protect.

Participants in the advocacy campaign in opposition to the dam recognized that controlling the dominant representations of place is one means of controlling the symbolic resources of decision making. By representing Paradise Valley in a certain way, advocates influenced agency behavior, interpretive frames, and decision making (Lefebvre 1991). As in this example, representations of place regularly “intervene in” and “modify spatial textures” according to a truth-teller’s interests (Lefebvre 1991, 42). In NRM, political power is actualized through the selection and exclusion of the terms and images used in representation (Bourdieu 1990b; Foucault 1994). Opponents of the dam engaged in the politics of place, as they struggled to control the “truths told about a place” to shape acceptable uses and norms so as to exclude the dam.

### **Reconciling Competing Representations of Place for Decision Making**

Like bank stabilization practices along a wild and moving river, words and images armor the boundaries of our conceptualizations of place. Different interest groups advance representations of place that privilege certain knowledge they believe will stabilize or further their advantage over other equally valid interests (Kemmis 1990; Honadle 1999; Cheng et al. 2005). Any representation, for example, deflects opposing worldviews to protect the preferred image of a place. As riverfront landowners and

agriculturalists on the undammed Yellowstone River know; all bank stabilization efforts are temporary. Likewise management cannot entirely control how a managed site is viewed by stakeholder groups and decision makers.

As we followed the Yellowstone River speaking with its residents, listening to their stories, experiencing their practices, and participating in their events, a kaleidoscope emerged. Each participant's mental image and descriptive representation of the Yellowstone was strikingly diverse and yet threaded, sutured, and sewn together by the materiality of the natural system, the legal status of the river as a shared resource, and by vernacular phrases that resonated throughout the community. When we asked participants to describe their place along the river, each informant articulated a unique image based on their lived experiences of the river. Responses displayed how participants: (1) perceived the riparian areas, (2) formed their views on flooding and bank stabilization and (3) articulated their interests and desires for future management. To many the river is a "*gem, a goldmine, and the golden goose.*" It is a "*wild and free flowing*" river that "*takes what it wants.*" It is the "*boss*" for some and commonly referred to as "*the lifeblood of the valley.*" For others it is a "*trashy*" and "*dangerous*" river that takes the lives of people each year; a "*killer.*" Some call it a "*monster*" and a "*problem*" while others call it the world's "*fly-fishing Mecca,*" a "*cathedral,*" the "*last wild fishery,*" and the "*home for wildlife.*" One agriculturalist said that "if the Mississippi is Old Man River, the Yellowstone is the *Prom Queen.*" Our informants used these, and other statements, to represent the Yellowstone River as (1) the lifeblood of the valley, (2) a playground, and (3) a national treasure.

Although we organized our data collection around interest groups and geographic segments of the river, many of the place representations that emerged cut across both locations and stakeholder categories. This is one methodological strength of analyzing how place enters everyday discourse via representation that is potentially useful for decision makers. We chose to emphasize the conceptual representations of place rather than the classification or categorization of individual informants. Emphasis on the conceptual constructions of place rather than on speaker classification enables us to reflect more of the complexity in how people conceive, experience, and reconcile place filtered by multiple overlapping representations. Focusing on the multiplicity of truths told about the place rather than on the truth-teller enables decision makers to de-emphasize entrenched positions and identity based politics.

By shifting attention from personalized symbolic meanings of place to how discourse actively represents place in ways that bind what is legitimate action in that place, the cultural inventory offers a way to identify the *shared* meanings expressed by interest groups, communities, and institutions via representations of place. This redirection towards the representation of place as both deepened and flattened space suggests opportunities for NRM advisors, planners and decision makers to explicitly incorporate multiple meanings, effects, and outcomes into their decision calculus. By taking a dynamic view of place representation, decision makers may become more conscious of the potential *impacts* of seemingly benign acts of place representation and strategic reframing. Awareness of the dynamism of place representation allows

managers and publics to actively participate in the production of legitimate knowledge about shared places via shared vocabularies.

Managing natural resources necessarily involves the management of symbolic resources. A particularly precarious and daunting task that decision makers must perform within the politics of place is the coordination and management of legitimate information. That place is classified, named, and labeled is necessary for planning and management. This necessity of representation of place is complicated because shared places are discussed and constructed multivocally. Each carries with it diverse perspectives including disciplined scientific lenses, bureaucratic organizational perspectives, multi-generation lived experiences and other resident/nonresident stakeholder interests. The problem that decision makers must overcome is of a rhetorical nature insofar as they must reconcile divergent conceptualizations of landscapes housed in place representation in order to get things done.

Just as managers attend to the consequences of physical actions on managed landscapes, so must they attend to concomitant symbolic actions. Managing natural resource sites requires them to gather and disaggregate deep representations of place to be integrated into flattened managerial frameworks and administrative policies. Managers cannot completely control representations of place, but they can study these representations to understand their role in decision making and knowledge formation by asking: What are the dominant representations of this managed place? What are the origins and assumptions of each? How do shared place meanings enter decision making? Which representations clash? What effects do place representations have upon planning

scenarios? Why? What are the potential consequences of various representations being publicly approved or rejected? How can representations of place be reconciled in a way that leverages perspectives of place to inform the common management objectives for a site?

Careful reflection regarding representation of place will help managers understand stakeholders' argumentation strategies. Analysis of the representations of place may reveal unintended consequences of certain frames. Managers may become aware of power dynamics, bring consciousness to stakeholders, actors, and agencies so that they may guard against ideological concoctions, and call attention to strategies of oversimplification, expertise, obscurity, identification, and estrangement. Discursive frames for discussing place representation within decision making vocabularies should be respectful of and accessible to local vernaculars. Members of the local community are valuable allies for implementing resource decisions. Understanding and explicitly including the interests of those involved, and then communicating to landowners and residents within these terminologies may mitigate the off-putting scientific jargon.

In order for decision makers to effectively incorporate place representation into their decision calculus, they must understand it as a participatory construction that both flattens and deepens that space. Place representation includes a (relatively) accurate flattened representation of the abiotic, biotic and social factors coordinating multiple areas of expertise. At the same time, they must integrate this understanding with awareness of an imagined deep representation that accounts for desired futures for that place and its communities of users. The difficulty lies in getting the proportions right;

and that effort remains always problematic. The flat representation must not oversimplify and be so removed that it disregards the realities of politics or neglects resource health. Deepened representations of place cannot be so personalized that it becomes too focused upon the needs of powerful interest groups or misses other ecological-level processes.

With these cautions in mind, an analysis of place representation can inform the communication efforts and strategies in agency and management choices when representing these places. Place representation also offers NRM an inventive or liberating dimension. Because place is socially constructed, it can socially reconstructed. From this perspective, planning and decision making become sets of practices of creating legitimate discourses that guide the place users. While the practices of place representation seem to entrench polar positions, forcing a choosing of sides, decision makers must remind all participants that there is only one material place to be shared: a single common ground. Managers can use existing representations to invent amicable constructions that bridge dominant existing representations of resource places and promote new ways of seeing place and NRM practices.

## **CHAPTER IV**

### **SOCIAL INFLUENCES IN ENVIRONMENTAL PLANNING: MODELING BOURDIEU'S THEORY OF SYMBOLIC CAPITAL**

#### **Introduction**

Coupled natural-human system models often treat human society as an afterthought. Yet, managing human behavior is fundamental to the tasks of natural resource management (NRM) agencies (Honadle 1999). If coupled natural-human system models are to have value to environmental planning, they must give greater attention to the complexities of social groups, human behaviors, and decision making processes. This level of detail becomes more feasible as scales of decision making processes become more localized.

Trends in the decentralization or localization of NRM emphasize a need for more site-specific social dynamics of human practices as they shape and are shaped by natural functions (Manor 1999). This trend is supported by US environmental policies (e.g., NEPA; Citizen Suit provisions under APA; other administrative calls for more public participation) and an understanding that local residents are allies in achieving management objectives (Salzman and Thompson 2007). The movement towards comanagement of resources heightens the importance of local decision making culture (Sandström 2009). Community-based conservation, watershed-level management, and collaborative processes are complex social and political activities that involve

considerations of who has the rights to use and access resources as well as determining behavioral targets of policy, such as prohibited activities surrounding the resource (cf. Kemmis 1990; Dryzek 1997; Odum 2007; Ascough II et al. 2008). While local expertise can provide higher quality information to managers, local decision making cultures still retain power dynamics that can inhibit or advance conservation policies (Peterson et al. 2005). Despite an acknowledgement of the importance of power relationships within natural resource planning, “little empirical attention has been paid to exploring the workings of power in the field” (Courtois and Tazdait 2007; Raik et al. 2008, 730). This coupled natural-human multi-agent simulation model offers one way to explore influence dynamics between heterogeneous agents in social decision making dynamics.

We seek to address the dearth of attention to human system dynamics within coupled natural-human modeling by providing an example of a socially-complex coupled systems model. We use Pierre Bourdieu’s (1985, 1986, 1989, 1990, 1991) theory of social capital to ground a model of NRM decision making regarding the cumulative impacts of social and ecological responses to various management options. In order to provide site-specific data to illustrate how this model would operate, we use data gathered through a cultural inventory of the Yellowstone River (Montana, U.S.). Beyond demonstrating how social data might be integrated into an ecological systems model, we address the influence and dynamics of localized social power (Peterson et al. 2005).

Careful examination of social influence processes is important to appropriately account for the complexity of coupled natural-human systems as well as to improve

group-based modeling (mediated modeling, co-modeling, companion modeling, etc.) processes (Levrel et al. 2009). The multi-agent simulation model we advance here was designed to develop the discussion of how social power relations could influence a coupled systems model. First, we describe the socio-political dynamics of the Upper Yellowstone River: The source of the planning exigencies and data for this project. Next we describe Bourdieu's theory of capitals and how we have adapted its use for this modeling social power within the decision setting. Then we describe the model created and its evaluation. We end with a discussion of project implications that we hope begins a balancing the level of detail between modeled social and ecological representations to improve analysis of the coupling.

### **Case: Riparian Buffer Setbacks along the Yellowstone River**

We constructed a model that responds to a management dilemma faced by federal, state and local organizations with interests or responsibilities for NRM. The specific context focuses on riparian setback ordinances or streamside buffer management zones that regulate floodplain development along the Yellowstone River. The illustrative site selected is Park County, Montana. We selected Park County for two primary reasons. First, this socio-economically diverse community routinely engages in decision making concerning riverfront development. Second, the upstream section of river exhibits advanced stages of river-length trends in tourism and development. Thus decision making scenarios in Park County anticipate events likely to occur in downstream communities along the Yellowstone River, as well as other locales caught up in conflicting uses of natural resources. We use a subsection of the socio-economic

data collected for the Yellowstone River Cultural Inventory (YRCI) (Gilbertz et al. 2007) to simulate stakeholder decision making dynamics among three stakeholder populations.

The Yellowstone River is comparatively large for the American West. Its basin drains an area of 70,000 mi<sup>2</sup> (181,000 km<sup>2</sup>) from its headwaters in Yellowstone National Park to the confluence with the Missouri River. It also is the U.S.'s longest undammed river. These natural features make the riverfront desirable to agriculturalists, recreationalists, and real estate inventors. The large volume of water affords high agricultural productivity as its waters are used for irrigation in this otherwise arid landscape. The free-flowing character of the river creates biological and scenic amenities attractive to recreational users. The cold-water riparian habitat supports the endangered cutthroat trout (*Oncorhynchus clarki bouvieri*) and is a world-renowned Blue Ribbon Trout Stream (Leighton 1998). As the river became known as a popular place for river recreation, people bought homes and built near the river. These scenic and recreational opportunities attract visitors, retirees, and vacationers as the fastest growing economic sector in Park County. As a result, riverfront development within the 100-year floodplain has increased throughout rural stretches of the river. From 1980 to 2000 the number of structures within Park County's floodplain increased from 379 to 594 buildings; a 57% increase (*Tempting Fate*, Greater Yellowstone Coalition 2002). Eight percent of the riverfront residences in Park County are vacation homes (BBC Consulting 2002). Portions of the valley floodplain were converted into lawns, homes, and driveways.

Because the riparian area is limited—there is only so much space—the land use interests compete. Competing desires for the river’s characteristics are further constrained by the undammed character which causes period flooding due to mountain snowmelt each June. The swelled waters move the river’s channel, erode streambanks, and impact productive agricultural lands, residential properties, and public infrastructure.

There are two ways to mitigate the risks and damages from this flooding. The most common way for property owners to mitigate the erosion and overbank flooding is through the use of in-stream and streambank stabilization structures such as rip-rap—boulders placed along the banks to deflect the velocity of floodwaters. The U.S. Army Corps of Engineers (USACE) in conjunction with state agencies (e.g., Montana Department of Environmental Quality), county conservation districts and county floodplain administrators regulate bank stabilization projects through permits under the authority of Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 401) and Section 404 of the Federal Water Pollution Control Act: the Clean Water Act (CWA; 33 U.S.C. § 1344). The deployment of structures to protect new high-risk properties restricts and diverts the stream flow preventing normal water storage functions of the riparian area. This diversion also changes the riparian system by increasing flow velocity to other banks intensifying downstream flooding, erosion, and other biological changes. Long-term geomorphologic and biological impacts include channelization of the river which disrupts natural flood control narrowing floodplains which exacerbate soil recharge, native vegetation and riparian forest regeneration, the downstream spread of exotic vegetation, aquatic and terrestrial habitat suitability, and other downstream

erosion (Naiman and Decamps 1997; Ward et al. 1999; Ellis and Richard 2008; others). The second and less common means of dealing with flood risk is through riverfront zoning restrictions.

Zoning decisions occur at the county and local community-levels. These policies regulate development along the river and within the 500-year floodplain beyond minimum standards required for participation within FEMA's National Flood Insurance Program (NFIP) which Park County joined in 1987. The current riparian setback ordinance limits development within 150 feet (~46m) of the river's high water mark in order to qualify for the NFIP (Hazard Mitigation Plan 2005). These local decisions impact riparian habitat, floodplain functioning, and the severity and frequency of flooding. For this undammed river, as its channel migrates, so too do the risks of flooding (Thatcher et al. 2009). Increasing awareness of short and long-term impacts of riverfront residential development has led to increased interest in zoning ordinances and floodplain planning. For years, landowners have cited political and economic rationales such as private property rights for thwarting any attempts at regulating riverfront zoning law. This enabled them to sub-divide, develop, and otherwise use the lands within the riparian corridor to their immediate advantage. Citizens often voice concern about the rate of development within the floodplain, yet a strong private-property rights ethos in the region often prevents zoning efforts (Peterson and Liu 2008).

As more homes are built along the river, flooding prompts more homeowners to install bank stabilization projects. For example, in 1996 and 1997, two consecutive 100-year floods caused damages of \$1.6 million in 1996 and \$750k in 1997 (in 2005 dollars;

Hazard Mitigation Plan 2005), and record numbers of bank stabilization permits were applied for and granted (Auble et al. 2004). Recreationalists became concerned about the impacts of these projects and the rate of development upon the fishery and the aesthetic qualities of the river. Fears over these impacts prompted the *National Geographic* to call the Yellowstone “America’s last best river” and the American Rivers NGO placed the Yellowstone on its Top ten List of Endangered Rivers in 1999 (Chapple 1997) and again in 2005 due to the increased rate of development within the 100-year floodplain (DeVries 2006).

In November of 1997, Montana’s Governor became concerned about adverse impacts of increased floodplain development and bank stabilization projects upon the river’s tourism industry and initiated the Governor’s Upper Yellowstone River Task Force to involve publics in research that would encourage a more comprehensive and consolidated planning effort (Task Force Final Report 2003). A group of recreational and environmental organizations pooled resources and filed a successful lawsuit requiring the USACE to examine the cumulative effects of bank stabilization upon riparian habitat (*Montana Council of Trout Unlimited v. Corps of Engineers*). While a moratorium was placed on new bank stabilization projects in 2001, no additional zoning to control development has been enacted despite unsuccessful efforts to pass county-level policies in 2004, 2006, and 2008 (Nolt 2007) and at the state-level Big Sky Rivers Act (MT HB-455) in 2009 (Lowery 2009).

## **Adaptation of Bourdieu's Theory of Capital**

Bourdieu's theory of symbolic capital provides a potentially useful approach to understanding social relations among advocates of competing interests, norms, and social processes. Capital is the human capacity to act upon a system based on relative position in the social and ecological logics of a situation. An explicit modeling of influence and power in social systems may enable managers and planners to visualize potential impacts on ecological systems and decision making. Bourdieu's (1985, 1986, 1989, 1990, 1991) theory of capital addresses how capital accumulation enables participants to influence social systems. Bourdieu represents the social world as a self-producing field of hierarchies where agents compete for material and symbolic resources. This competition organizes the positions of the persons within it. Such relations are so familiar that agents often fail to recognize how thoroughly they are embedded in practices that reinforce existing positions of power (Bourdieu 1989).

Bourdieu describes society as a game (1991) where capital refers to the resources that provide players with social power. He expands the treatment of capital beyond economics to include social (affiliative) and cultural resources (1989). The amount of aggregate capital and the hierarchical arrangement of types of capital in a particular social order influence an agent's position and capacity for playing the game (1985).

Following Bourdieu (1986, 1990b), we identified three sub-types of capital that combine to create one's total symbolic capital. *Economic capital* refers to financial resources, such as money and property; *affiliative capital* refers to resources of affiliation and networking that are central to negotiating social norms; and *cultural*

*capital* refers to resources of prestige that are embodied, objectified and institutionalized in educational credentials, aesthetic preferences, general cultural awareness, and verbal facility. All three combine to create *social capital*, or the relative weight and composition of an individual's legitimate power and credibility.

### **Model Description**

This coupled natural-human systems model accounts for vested individuals and social power within decision making groups and how their decisions interact with natural capital. The material transferred within this model is capital in both social and natural forms. The model consists of four nested and interactive sub-models: (1) Three individual stakeholder populations and their total accumulation of three forms of capital, (2) the decision making process concerning riverfront development zoning restrictions, (3) the natural capital of the functioning riparian floodplain, and (4) the frequency and severity of stochastic flood events. The social and natural capitals affect and are affected by the decision making process and setback outcome. The severity of flooding acts as a catalyst for initiating the decision making process.

### ***Stakeholder Capital***

The model includes three stakeholder populations to simulate the setback decision making process. These stakeholders are riverfront real estate investment landowners (*Inv*), agricultural landowners (*Agr*), and recreationalists with outdoor experience-based business interests (*Rec*). Each stakeholder group has a unique magnitude of influence represented by their total accumulation of social capital. This

total social capital (*CapTot*) consists of a combination of (1) economic capital (*Eco*), (2) affiliative capital (*Aff*), and (3) cultural capital (*Cul*). Each population is represented as a sub-model showing the three forms of capital (*Cul*; *Eco*; *Aff*), their population (*Num*), with a specific setback preference (*Pref*). Stakeholder populations are adjusted by emigration (*Em*) and immigration (*Imm*) rates based on census records. These interests and forms of capital affect and are affected by the other sub-models of capital accumulation—floodplain functioning—and the decision making process.

The economic capital values of each stakeholder group refer to income and financial assets owned. The affiliative capital values are derived from the number of social organizations and networks to which an individual belongs. It represents the stakeholder group's embeddedness in social and political structures. Cultural capital is both embodied and institutionalized. Embodied cultural capital derives from the number of generations one's family has owned land in the county. It represents rootedness in the community, accumulates with successive generations and cannot be stripped from a person. Institutionalized cultural capital derives from educational credentials denoting expertise, such as certifications or academic degrees (Bourdieu 1986).

The numbers used to represent stakeholder groups' cumulative capital, the relative weighting between the forms of capital, and the rates of capital gains and losses are derived from field observations, in-depth interviews, local advisors, and U.S. Census Bureau data. Based on our field observations and analysis from the YRCI, these three forms of capital are consistently regarded among Park County participants as measures of influence within community decision making groups. The forms of capital exist in a

hierarchy with relative weighting (*Rel Eco*, *Rel Cul*, and *Rel Aff*) (Table 4). For the situation in Park County, we weighted each form of capital according to the relative influence based on 57 interviews (14 agriculturalists, 16 recreationalists, 27 other riverfront landowners and managers). Persons given the most deference within the community are those whose families homesteaded the land they currently own. Cultural capital is therefore given the most weight at 0.40. In descending order of weight, how economic capital is of secondary influence at 0.30 followed by affiliative capital at 0.30 of one point of capital. The sum of all three forms of capital equals the stakeholder population's total capital (*CapTot*). *CapTot* refers to the sum of an individual's influence within the decision making process.

The maximum amount of capital accumulation for each type of capital is represented on a 1–100 unit scale. Therefore the maximum total capital accumulation from the three forms of capital which a group can have is 300. Each stakeholder group's initial *CapTot* scores are listed in Table 5. The maximum amount of capital operating in the society is denoted as *CapTot Society*.

**Table 4.** Relative weights of the influence of each sub-type of capital

Types of Capital	Relative Weight
Cultural	0.40
Economic	0.30
Affiliative	0.30

**Table 5.** Initial capitals of stakeholder populations

Stakeholder Group	Economic Capital	Affiliative Capital	Cultural Capital: Heritage	Total Capital (Baseline)
Investment Landowner	100	100	25	225
Recreationalist Outfitter	50	100	50	200
Agricultural Landowner	75	75	75	225

### *Population of Stakeholder Decision Makers*

To account for the shifting numbers of decision making stakeholders in this system over time that will impact the decision calculus, each stakeholder category is represented as a population (i.e. *NumRes*, *NumAgr*, etc.). These numbers are derived from U.S. Census Bureau economic data and USDA Principal Farm Operator census data for Park County, MT (Table 6). To account for only those agricultural stakeholders along the river, the USDA Principal Farm Operator census figures were adjusted using a 2003 GIS study that found that approximately 12% of all Park County rural land parcels (Montana Natural Resource Information System) occurred within 600 feet of the existing 100-year floodplain using (American Rivers and Greater Yellowstone Coalition 2003). The 2003 study excludes parcels within the city limits of Livingston, MT as the city's flood management program manages development within its floodplain.

**Table 6.** Index for stakeholder population ratios in Park County, MT NAICS number of employees of March 12 per year

Stakeholder Industry	1998	1999	2000	2001	2002	2003	2004	2005	2006
Agricultural (a)	82	85	80	76	73	82	81	82*	83*
Investment Landowner (b)	37	20-99 *	43	38	44	58	48	49	20-99 *
Recreationalist Outfitter (c)	100	73	78	79	105	106	138	114	121

Shading indicates years with complete data.

(a) USDA principal farm operator Census x .12 (1997, 2002, 2007 figures) + [11] Forestry, fishing, hunting, and agriculture support. (b) [53] Real estate & rental & leasing. (c) [71] Arts, entertainment & recreation. (d) Non Ag parcels from 2003 (750) indexed to US Census 2003 (15859) = (0.047281759) x US Census figures from 2000 and 2005. (\*) US Census estimate.

### ***Decision Making Process***

The three stakeholder populations' capital sub-models meet in the decision making sub-model to decide the revisions to county floodplain buffer zone ordinance. The policy in discussion dictates how far from the riverbank new development—new buildings, improvements to buildings, grading, filling, and other human-caused changes to the land—should be set back from the high water mark of the streambank (Hazard Mitigation Plan 2005). The current Park County riparian setback ordinance is 150 feet (~46m) (Ellis and Richard 2008). Each group has a preferred setback distance (*SetPref*) that will increase their economic and affiliative capital (Table 7).

Management (*Mgmt*) holds primary decision authority. However, resource management agencies can be over-ruled by significant social pressure—such as lawsuits—when management agencies lose public support. Management objectives (*Pref Mgmt*) are established to ensure that there is a certain amount of riparian area (*Mgmt*

*Max Nat*) and considers setback decision making upon this preferred amount of functioning riparian area.

The stakeholder group with the highest total accumulated capital will likely influence (*Social Pressure*) the setback decision based on his/her preference (*winner*). However, a stochastic corrective (*ran*) is built into this decision making function which accounts for extenuating external factors, events, and circumstances that may affect the power balances in the decision making landscape.

**Table 7.** Stakeholder group’s setback preferences and affected capitals

Stakeholder Group	Current Setback (in Feet)	Setback Preference (in Feet)	Setback Preference	Setback Decision Impacts:	% Riparian Area Impacts:
Investment Landowners	150	0	No restrictions: Allows for maximum property value for resale and subdivision	<i>Aff, Eco</i>	
Recreational Outfitters	150	500	Restore quality of resource to improve quality of recreational experience; Increase business due to natural amenities of river; Protect valuable wildlife species and habitat	<i>Aff, Eco</i>	<i>Eco</i>
Agricultural Landowners	150	100	No change in restrictions: Allows for maximum property value for resale and subdivision; Adheres to a common ethos of “private property rights” protection; Desire increased quality of riverfront livestock forage; and less need for exotic species management and associated expenses	<i>Aff, Eco</i>	<i>Eco</i>

Stakeholder groups can pool their capital in coalitions (*coal*). If a coalition can reach a certain politically-relevant threshold ( $CapTotCoalPlus > Social\ Pressure\ Threshold$ )—such as using affiliative capital to mobilize social networks to successfully

initiate and pass a ballot referendum—then the coalition exerts social pressure for their preferred setback policy. If they pool their capital and do not meet the social pressure threshold then they cannot exercise social pressure upon the decision making as a coalition.

### ***Time Scale***

While the time step for the simulation is yearly, decisions concerning the streamside buffer management on the Yellowstone River occur irregularly. Decisions are often prompted when a confluence of social, political and environmental factors exert pressure on *Mgmt* agencies. For example, riparian planning has been precipitated by changes in resource law and bureaucratic structures (1974 Clean Water Act), significantly severe seasonal flood events (Governor’s Task Force in 1997 following two 100-year floods of 1996 and 1997), changes in political personalities and demographics (election cycle of 2008), etc. Therefore decision making is not tied to any periodicity but is relative to particular flood events severe enough for local community members to decide policy changes are necessary.

### ***Natural Capital: Native Riparian Vegetation***

We represented natural capital as the percent of unaffected riparian floodplain, which was based on the percent of unmodified stream bank which allows for normal channel migration and riparian floodplain function (Thatcher et al. 2009). The amount of unaltered floodplain is viewed as an indicator of ecosystem stability with regards to mitigating flood damage (Mitsch and Gosselink 2007). As the amount of floodplain in a

riparian system decreases—through decreasing setback requirements—flood damage increases in severity due to the loss of flood water storage functioning of riparian vegetation. Increasing amounts of floodplain area leads to increased capacity of vegetation to store flood overbank waters (Mitsch and Gosselink 2007).

*Riparian area* changes as a result of increasing or decreasing *Setback* zoning decisions, namely, a larger setback increased riparian floodplain area and a smaller setback decreased it. We assumed setback decisions affect the functioning of the riparian area within the 100-year floodplain on a sigmoid growth curve:

0 feet of setback = 0% functional riparian area

150 feet setback = 80% functional riparian area

500 feet setback = 100% functional riparian area

### ***Flooding***

The most significant variables that act as catalysts for stakeholder populations to initiate the decision making process are the (1) frequency of flood events (*Flood Freq*) and (2) the severity of flood events (*Flood Severity*). Flood events are generated stochastically, and the type of flood (i.e., 1, 5, 25, 50, 100, or 500-year flood) is based on historic flood occurrences for the region (Hazard Mitigation Plan 2005). Flood frequency is calculated as the number of flood events occurring in subsequent years. We assumed flood severity was a function of the type of flood as well as the percent of riparian area remaining. Due to the large amount of uncertainty associated with the relationship between flood damage and percent riparian floodplain, we represented the relationship between flood percent riparian area remaining and flood damage as an index

(*RAI*) and performed an extensive calibration on this parameter, altering both the magnitude and functional form of the relationship.

***Feedback: Natural Capital to Social Capital***

Flood severity and flood frequency are the catalysts for setback decision making. The investment landowners' (*Inv*) setback preference is not driven by the risk of flooding. Their capitals will be affected by flooding only to the degree that flood severity influences the ability to develop floodplain properties. Therefore, groups of investment landowners will advocate for less setback or exhibit neutrality if there is frequent or severe flooding. The recreationalists' (*Rec*) setback preference is as large as possible, because more riparian area increases recreational opportunities and the quality of experience, thus increasing the recreationalist's total capital. Recreationalists use frequent and severe flooding as an additional rationale for more riparian area to store flood water and to mitigate against damage. The agricultural landowners (*Agr*) want less setback regulation so they can retain the option to sell valuable riverfront parcels and marginal agricultural lands. If there is frequent or severe flooding, however, agriculturalists will advocate for a larger setback preference to protect productive agricultural lands from flooding.

***Decision Outcome: Setback Ordinance Effects on Stakeholder Groups' Total Capital***

The *Setback* decision made impacts the affiliative and economic capitals of all of the stakeholders. Because the decision made ultimately favors a group's setback preference, the winning group benefits most from the decision which increases their

economic capital earning potential. The winning group’s affiliative capital—their political clout—also increases within the decision making setting as result of the win. The decision outcome cannot affect a stakeholder groups’ levels of cultural capital, as heritage increases only by generation, and this credentialing occurs independently of changes in natural capital.

Once a decision is made, the stakeholder group whose preferred setback distance was selected earns 5 affiliative capital units (Table 8) because their preference proved socially acceptable. The “winning” stakeholder group (*winner*) also earns a specific amount of economic capital (Table 9) as a result of the decision.

**Table 8.** Impacts of receiving setback preference on political clout

Social Capital Improvements	Effects of Receiving Preference	Max Aff pts	Effects of Not Receiving Preference	Max Aff pts
Aff Inv	• Increased Political Clout	5	• Decreased Political Clout	5
Aff Agr	• Increased Political Clout	5	• Decreased Political Clout	5
Aff Rec	• Increased Political Clout	5	• Decreased Political Clout	5

Those stakeholder populations whose preferences were not selected are negatively affected by the decision outcome. They lose 5 affiliative capital points (Table 8) and economic capital points (Table 10) because of the impact upon their earning potentials and political clout respectively. Each round of decision making has the potential to alter the total capital arrangements. For the most part, the model is designed to mimic real-world scenarios of “the rich get richer” where those groups with a majority

of accumulated capital continue to increase capital in the model structure at a greater rate than those with less total capital. Extenuating stochastic factors (*Ran*) may influence this structure representing dramatic changes such as severe flooding events or changes in state or federal policies that trump this local planning venue. Each positive impact upon stakeholder groups' capital reaches a maximum level of improvement.

The *Setback* decision has an instant social impact and a delayed ecological impact—increased/decreased *Riparian area*—which over time comes back around with a second social impact that alters the initial impacts felt directly because of the decision (Table 11). The *Setback* decision's impact upon affiliative capital is immediate. The *winners win* (setback favors preference) and the *losers lose* (setback does not favor preference) affiliative power to influence the decision making group. Therefore, impact on economic capital is also instantaneous in that the freedom to legally use/sell the space along the river is permitted or prohibited after the setback decision is made. The various setback decisions also influence the riparian area. This impact of the increased *Riparian area* (*RA in*) also increases (or decreases; *RA out*) instantly as it is an expression of the functioning *Riparian area*'s potential.

**Table 9.** Impacts and rationale for economic improvements due to increased native vegetation

Economic Capital Improvement	Effects of Increased Percent Riparian Area: Justification of weights	Max Eco pts@ 100% Riparian Area
Eco Rec	<ul style="list-style-type: none"> <li>• Improved aesthetic and scenic quality of the river</li> <li>• Increased recreational opportunities for personal and business uses</li> <li>• Suitable aquatic habitat for fish prey species and fish</li> <li>• Woody debris and leaf litter input for habitat diversity for invertebrates and fish</li> <li>• Increased shade maintains suitable stream temperature for game species spawning while lowering potential fishing restrictions due to high water temperatures</li> <li>• Increased shade also reduces algae growth which improves quality of fishing experience and increases dissolved oxygen for game species</li> <li>• Enhanced bottomland and upland terrestrial species diversity due to suitable habitat, cover, and connectivity thus improving bird-watching, wildlife viewing, and hunting opportunities</li> <li>• Improved native vegetation cover enhances privacy for fishing, boating, and hiking</li> <li>• Improved bank stability due to vegetation rooting reduces turbidity and provides underwater refuge for aquatic species during flooding</li> <li>• Improved native vegetative cover also increases water quality by filtering contaminants from residential and commercial sources which negatively impact groundwater and aquatic habitat suitability</li> </ul>	30
Eco Agr	<ul style="list-style-type: none"> <li>• Improving quality and diversity of forage for livestock grazing</li> <li>• Improving bank stability and reduces loss of land due to erosion</li> <li>• Improving a sense of certainty from erosion losses</li> <li>• Reducing exotic weed species management costs and time</li> <li>• Increasing bottomland and upland terrestrial species diversity via enhancing suitable habitat, cover, and connectivity thus improving hunting lease opportunities</li> </ul>	20
Eco Inv	<ul style="list-style-type: none"> <li>• Improved aesthetic and biological quality of the river = improved property value</li> </ul>	0

At 100% *Riparian Area*, the maximum economic capital an Agriculturalist earns is 20 points.

At 100% *Riparian Area*, the maximum economic capital a Recreationalist earns is 30 points.

Even at 100% *Riparian Area*, the Investment Landowner gains no economic capital because the losses of economic freedom greatly outweigh any gains in aesthetic value.

**Table 10.** Impacts and rationale for economic improvements due to decreased riparian area

Economic Capital Improvements	Effects of Decreased Percent Riparian Area: Justification of weights	Max Eco pts @ 0% Riparian Area
Eco Inv	<ul style="list-style-type: none"> <li>• Improved access to developable areas</li> <li>• Improved ability to subdivide parcels</li> </ul>	30
Eco Agr	<ul style="list-style-type: none"> <li>• Improved freedom to subdivide parcels and develop land</li> </ul>	20
Eco Rec	<ul style="list-style-type: none"> <li>• Loss of quality of recreational experience</li> </ul>	-5

At 0% *Riparian Area*, the maximum economic capital an Investment Landowner earns is 30 points.

At 0% *Riparian Area*, the maximum economic capital an Agriculturalist earns is 20 points.

At 0% *Riparian Area*, the Recreationalist loses 5 economic capital points.

**Table 11.** Catalysts for initiating decision making process by stakeholder population: Setback Preference in various catalyzing conditions

	Infrequent Flooding	Frequent flooding	Severity of flood low	Severity of flood high
INV	–	0	–	0
REC	+	+	+	+
AGR	–	+	–	+

– = less setback preference

+ = more setback preference

0= no resistance or advocacy

## Conclusion

Natural resource management agencies balance the risks of natural capital losses and losses in public support. This model could guide them through scenarios that are likely to occur as publics respond to agency decisions, which leads to an ecological

response that, in turn, influences future public response. The model shows how small decisions made by agencies may lead to drastic consequences in ecosystem function and public satisfaction over time.

## CHAPTER V

### CONCLUSION: THE CULTURAL AUTHORITY OF PLACE

Natural resource agencies, biological researchers, and policy makers are accustomed to fitting policies to specific sites. The necessary biophysical data are gathered through field work and coordinated with appropriate scientific theory, management practices, agency mandates and organizational procedure, and relevant laws. Researchers function to provide the pertinent data and administrators furnish oversight to ensure that decisions made conform to biological, procedural, and legal authorities.

Yet natural resource policies—in means and ends—regulate human behaviors in specific managed sites. These natural sites are shaped by human behaviors. And human behaviors are shaped by biophysical features and constraints (e.g., agriculture, transportation). This mutual shaping of place suggests that environmental policy must conform to the site-specific cultural authorities of local behaviors, practices, and logics if the NRM objectives are to be understood, shared, supported, and successfully-implemented by landscape-shaping publics.

This is the rationale behind the localization of natural resource policy and decision making: that the local expertise can be leveraged and used to inform policies that best conform to the places via the social capital gained in partnerships. Just as biological research requires engaged field research to determine what biological forces

are needed for such decision calculus, so too must social researchers provide the engaged fieldwork into those cultural forces that shape (and are shaped by) the resource. The explanatory power of this social research is in site-specific information relevant to the interactions between local behaviors and the biological processes. The application of this fieldwork is in the planning.

This project demonstrates what a systematic practice of cultural field research looks like. It is engaged research that explains cultural forces salient in social dynamics which impact how groups make decisions, define environmental problems, and make places and management meaningful. Such forces are often invariably subtle to outsiders, like the way a place is symbolically represented or the values given to cultural forms of capital as in the deference paid to a community member's generational heritage or how residents understand and explain the natural processes of riparian ecology. Yet these contextual nuances impact ecological and cultural functioning.

Culture offers a means to disambiguate salient discourses, histories of problem solving, and familiar everyday practices related to NRM practices and decision making leaving room for local wisdoms and traditional practices. Culture as a lens acknowledges the instrumental and constitutive functions of local logics and vernacular. It fosters the reconciliation of flattened (etic; scientific objective) and deep (emic; lived subjective) perspectives of place to configure pragmatic means of preserving both cultural and biological functioning in place.

For this cultural knowledge to be useful it must be grounded in authority licensed by locals rather than what is considered meaningful to communities of social scientists.

Therefore the source of validity is not external—as in context-transcendent scientific universals—but internal to the group embedded in the NRM setting. Even when local truths told about the natural world do not conform to scientific truths, armed with an understanding of how local truths function socially managers can begin to find alternatively meaningful routes to disaggregate deep truths about place to integrate into managerial frameworks.

If the decentralization of policy is to yield better managerial results, it must be carried out in a way that is engaged within the local logics, practices, voices, and meanings on site. Culture as a lens offers a way to systematically examine, understand, and simultaneously engage those whose behaviors are the targets of policy. NRM according to a decentralized schema requires openness to these functioning cultural authorities of place. The challenge of localized policy making rests with the capacity of technical experts and their institutions to part with the history of authority given to them and to view locals as citizen experts and themselves as citizens of shared landscapes.

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### Publications

- Hall, D. M., S. Gilbertz, C. Horton, and T. R. Peterson. 2011. Integrating divergent representations of place into decision contexts. In: Stewart, W., D. Williams, and L. Kruger (Eds.). *Connecting place to practice: Concepts and techniques to improve land-use planning*. Corvallis, OR: Oregon State University Press.
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